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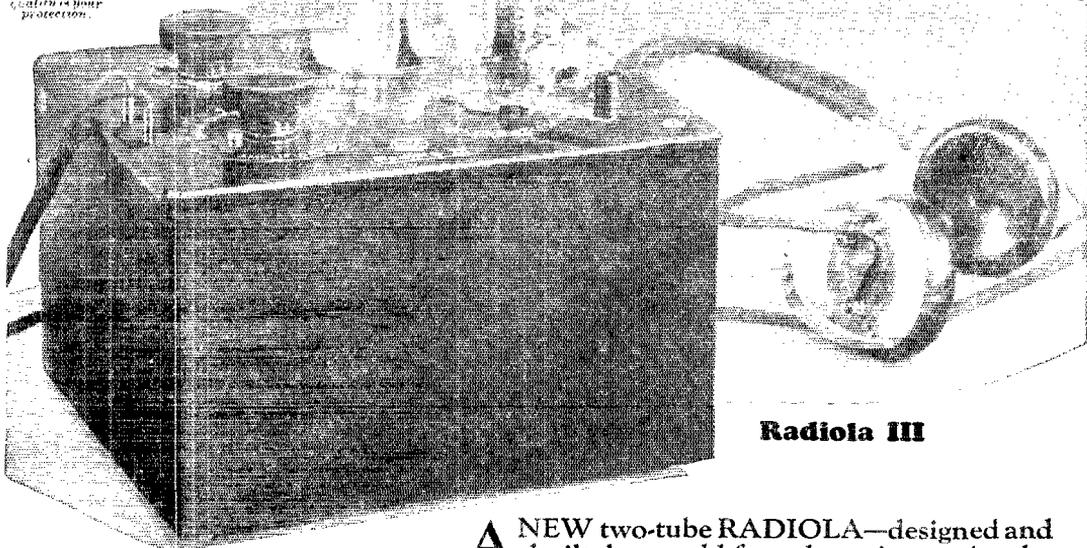
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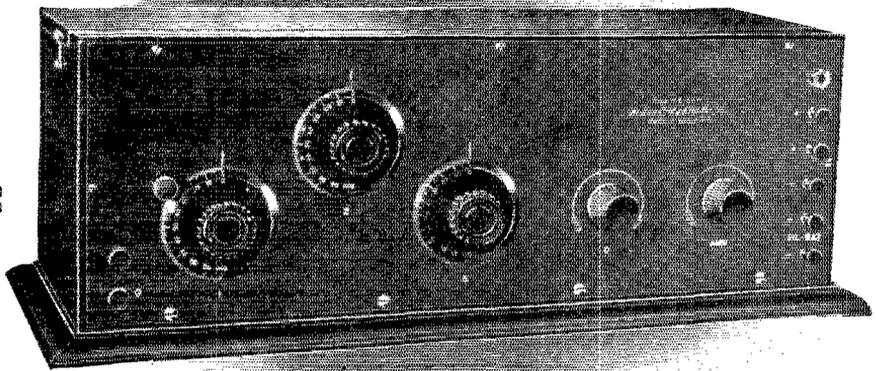
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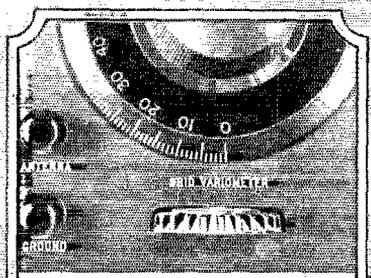
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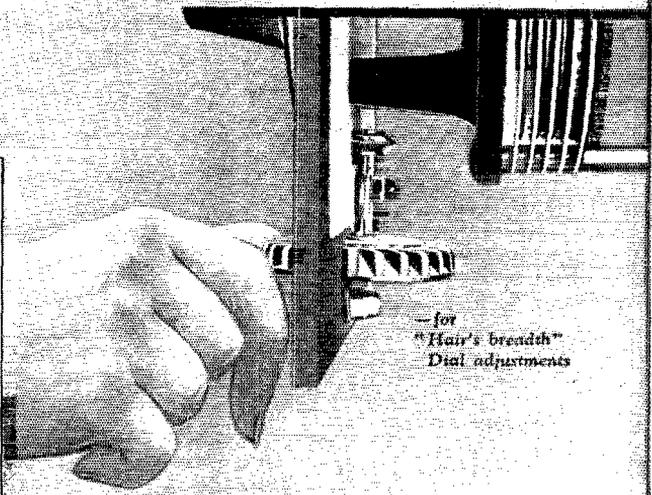
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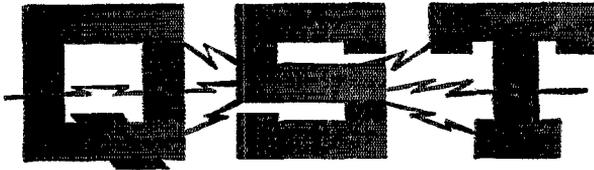


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The Official Organ of the A.R.R.L.

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MAY, 1924

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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 Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its Board.

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



The New White Bill

THE radio bills that bloom in the spring are with us. Of this season's bills by far the most important is Congressman White's, which was introduced in the House on February 28th and under the number H.R.7357 was referred to the Committee on the Merchant Marine & Fisheries, where hearings were held on it during middle March. At this writing near the end of March, the bill reposes with the MM&F Sub-Committee on Radio, of which Mr. White himself is the chairman.

The new White Bill is not a modification of the existing radio law, as was Mr. White's document of last year, but would repeal the 1912 statute and supplant it with an entirely new structure. While as far as we amateurs are concerned the law of 1912 may be proving entirely satisfactory, it has many outgrown features affecting other services, so that changes in the not distant future are not only desirable from many standpoints but certain to come. Whether or not these desirable changes could be effected by a few amendments to the present law we are not sure, altho we believe they could, but the present bill wipes the slate clean and starts from scratch. In general it follows the idea of the previous White Bill, eliminating all mention of specific classes of stations or their wavelengths and so on, and instead provides an administrative scheme calculated to endure thru years of progress in the art. To accomplish this it provides that the administrative power, the Secretary of Commerce in this case, shall classify stations and make, alter and revoke regulations applicable to all stations concerning their wave lengths, apparatus, power, interference, hours of operation, etc. Thus we find nothing in the bill to say that there shall be amateurs operating on the waves below 200 meters, as is the case with present law. When stations are to be classified by the administrative power, presumably amateur stations are to be set up as one of the classes; and, being thus provided for, they would use such wavelengths and powers and hours as might from time to time be announced by regulation.

Thus there are no guarantees of existence in the bill for anybody, and we cannot feel very happy over any radio bill that does not mention us by name in such a way as to establish it clearly that there shall be amateurs. Presumably some of the other radio interests feel the same way

about themselves. This is Mr. White's basic idea, however—this elimination of technical particulars that it may be desirable to change as time goes on—and it is not likely that any White Bill will appear in which exceptions are made to this fundamental concept. Furthermore, unless all particulars about a certain class of station are specified in the law (a hopeless and an undesirable thing), what happiness is there to be gained in a barren provision for one's "existence"? For instance, what is it worth to insist that the law say that amateurs shall be permitted, when regulations, changeable over night, might specify the wave band as 1 to 2 meters or around 60,000 meters, power 2 watts, quiet period 24 hours long?

No, it is clear that if some such "administrative skeleton" idea is to become law, we must be prepared to take our chances with it. First, however, we can examine it further to see that it is a good administrative scheme. *We do not believe the White Bill is.* Because men are human and not infallible, it is a dangerous bill. In its zeal to untie the hands of the Department of Commerce and permit it to make, alter and revoke regulations at will so as to keep pace with a rapidly advancing art, the bill leaves everything to the judgment of the Secretary of Commerce and is filled with expressions such as "in his judgment", "as he may deem necessary", "in his discretion", "sufficient to satisfy him", "as he may deem proper", etc. This is where the danger lies. If the present Secretary and the present admirable Chief Supervisor of Radio could remain in office always, we believe things would be wholly satisfactory, but politics dictate policies when not fixed by law, personnel changes, and under a different administration of the Department anything might happen. There is where the dielectric starts smoking, for no decision made under a grant of discretionary power can be reviewed by the courts. That means that no unjust, unfriendly, or mistaken decision could be appealed, and that the White Bill as framed would make the Secretary of Commerce absolute dictator and czar of radio. In the hands of Messrs. Hoover, Carson and Terrell we believe that power would be quite safe; in the hands of some other folks now gracing official Washington it would be misused without a doubt, leaving the country it is designed to serve quite helpless!

Most of the radio interests appearing before the Committee during the hearings

made representations along this line, and the Sub-Committee on Radio is now reviewing the matter. If the Sub-Committee acts in accordance with public sentiment as expressed at the hearings, it will limit this discretionary power in some manner. It must be limited! Several proposals have been made. One is simply to remove the various phrases in the bill which make the administration discretionary; then decisions would be subject to appeal to determine the facts in a case. Another proposal is that the discretionary power be lodged in a commission, instead of an individual, expanding the proposed Advisory Committee into a Radio Commission or perhaps a Communications Commission dealing with wire telegraph and phone, and radio, similar in nature and duties to the Interstate Commerce Commission. The adoption of either of these proposals will go a long way toward securing popular support for the bill. It is very much to be hoped that Mr. White's sub-committee will see the wisdom of making some such change before reporting the bill out.

As to the bill's chances of becoming law at this session of Congress, they seem fair enough if the bill is modified as proposed, for then there would be much public sentiment in favor of putting it thru and getting the job over with. If it is not modified to limit the wide discretionary powers, we do not believe it has a chance. Radiocorp and A.T.&T. are said to favor the bill in its present form, Westinghouse to oppose it, and almost all of the independent broadcasters oppose to it for exactly the reasons we cite as our own. With the Congress rocked to its pins anyway, and plenty of members ready to block grants of power in un-American fashion, figure it out for yourself. It certainly would be an immense relief, however, after all these years of words and efforts, to have a new radio law which would be fair and mutually acceptable. H.R.7357 can be modified to be acceptable. Let us hope the Committee will embrace the opportunity before it.

Don't Be Careless

WE offer our sincere sympathies to the amateurs of Australia in the unfortunate accident that has just cost the life of one of their keenest experimenters, Mr. F. L. Moore. While conducting some transmission experiments Mr. Moore came in contact with the high voltage and was electrocuted, a fatality all the more distressing because it was witnessed by his wife who was at his side during the tests and, even more so, because the widow and two little ones have been left without means. The Australian

journal *Wireless Weekly* has inaugurated a relief fund for the dependents, to which the Australian amateurs are contributing.

It is a marvel to us that there are not more serious accidents among American experimenters. Fortunately they have been very exceptional, but the way the average experimenter works he has sudden death at his elbow every moment and it seems worth saying a word about. The average relay station in active service is a safe enough proposition, because it is semi-permanent, and consequently has had some pains bestowed upon it, but in the conducting of transmission experiments the average experimenter runs a maze of loose wires to various switches and pieces of apparatus on a table and then plunges his hand into the mess each time a change in adjustment is to be made.

Let every reader pause and give thought to this matter. It is so easy to make it safe. The ideal way, of course, is to spend a little time and do a neat foolproof job, with well-insulated wiring and insulated controls, but often this takes too much time, or at least we think it does. Here is the simple way to safety: Always have a power cut-out switch in every set-up, whether it is just for a half-hour's experiment or a permanent set. Mount it in a convenient position to one side of the apparatus, and then *open that switch* every time any piece of apparatus is to be touched. Do it *every time*. And if the apparatus includes condensers of considerable capacity or if they are being worked at appreciable voltages, ground or short-circuit the condensers (power off) by some device having a well-insulated handle, before touching any part of the circuit.

A little thought in this line will pay big dividends in longevity and will save the price of some flowers.

NOTICE TO OUR NEWSSTAND READERS

As announced in recent issues, The Traffic Department Report and the "Calls Heard" Department have been eliminated from the newsstand edition of *QST* because our non-member readers in general are not particularly interested in them. This results in a saving in expense which makes possible the publication of a larger and better *QST*.

These two departments are included in the edition supplied to members of the A.R.R.L. If you are interested in them, it is proof positive that you ought to be a member of the League. May we not direct you to the handy application blank appearing on page 88 of this issue?

The Navy's Work On Short Waves

Continuation of Amateur Reports Requested To Determine Range
Of Shenandoah's New 100-Meter Set

By Dr. A. Hoyt Taylor,* Physicist, U.S.N.

No one can better prophecy the future of short-wave radio than can Dr. A. Hoyt Taylor, who has done pioneer work at every stage. Before the war few sparks outranged old 9YN at the University of North Dakota. Immediately after the war NSF-NOF, at the Anacostia Naval Air Station, leaped into prominence as the first really effective tube station. Soon afterward voice equipment was added and the 'phone of NSF was being reported from all parts of the Western Hemisphere while other 'phone stations were only just beginning. NSF then began to send musical programs and became the first long-range broadcasting station.

NKF at Bellevue has now replaced NSF-NOF and in its turn is doing pioneer work under Dr. Taylor's guidance.

The sending sets described in this article represent the experience gained in all this work. They will be finished soon and will be used regularly in the Shenandoah's work. It is hoped that there will be many flights this summer.

The Navy Department will appreciate the continued co-operation of amateurs in reporting the ranges attained on the short waves.

—Tech. Ed.

THE radio engineers of the Navy have followed with the greatest interest the astounding developments in short wave communication for which the amateurs of this country are so largely responsible, and which have demonstrated better than anything else the remarkable progressiveness, ingenuity and handog perseverance of the amateur. Most of us in this Laboratory have been amateurs in the past and, since that condition appears to be never fully eradicated by subsequent experience, we feel at heart that we are still amateurs in many respects. Therefore we take a pride in the achievements of the amateurs of this country which is scarcely second to their own.

I do not think that those who were connected with radio work in the military services during the war will ever forget the way the amateurs rallied to the colors when the country needed them. That spirit of cooperation did not cease with the conclusion of the war. I have in my files hundreds of letters from amateurs in something like 42 different states of the Union who cooperated with us when we were doing at NSF, later NOF, the pioneer work in high-power long-range broadcasting. To those old friends who cooperated with us, and with the Anacostia station, NSF and NOF, in those days, I would offer a word of explanation. NOF is no longer

in the air as an experimental station for two reasons: First, the particular studies in which we were then engaged have long since been completed and commercial stations have taken up on a tremendous scale and brought to perfection that line of work in which we were particularly interested at NOF. Second, all of the Naval radio research and design interests have now been concentrated in the new Naval



Dr. A. Hoyt Taylor, Physicist, U.S.N.
Photo courtesy U.S.N.

Research Laboratory at Bellevue, D.C., which officially went into commission last July. Only recently, that is, within the last few months, have we been in the air working with amateurs using the call NKF, our particular interests this time being in high frequencies (short waves). Again the amateurs have shown their splendid spirit of cooperation and we have worked large numbers of them, both by daylight and after dark, to our very great benefit and I hope in some cases to theirs, since we have always been glad to give them an accurate measurement of their wavelength using our standard heterodyne wavemeter, whose accuracy we believe is second to none. We can get these measurements just as easily on a station 1,000 miles away as we can on a station near the city. Since we have therefore a great deal in common with amateurs in this

*Superintendent, Radio Division, U. S. Naval Research Laboratory, Bellevue, D. C.

mutual interest in high frequencies, I venture these few comments and a further plea for the continuance of the coöperation and interest of the past, particularly with reference to the proposed polar flight of the *Shenandoah*.

We feel that amateur operators are in a position to give us not only excellent coöperation but excellent advice in many instances on account of their long experience in this end of the game, and if from time to time we can release certain infor-

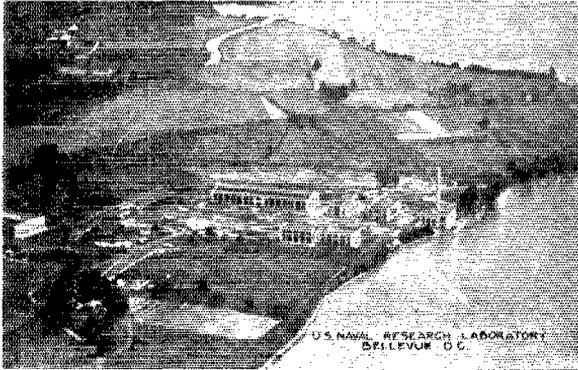


Photo courtesy U.S.N.

mation which we think will be of interest and benefit to amateurs, we believe that we shall be permitted to do so.

Our interest in short waves is by no means a new one. Since 1917 one of the standard waves on board every battleship has been 150 meters. From a modern point of view the apparatus is pretty crude, being a peculiar type of spark set which is now of no particular interest; nevertheless occasionally extraordinary long distances were reached with it.

Had amateurs in the last few years had receivers capable of tuning down below 200 meters, we would doubtless have had a great many more reports on our transmissions on 150 meters by these ships. Plans are now under way to replace this old equipment with modern tube sets of our own design. Most of you have recently heard NKF using 240 cycles ACCW—you were listening to the model set intended for this purpose. Our transmitters had to comply with certain conditions on board ship which are undoubtedly of great interest to amateurs because in the near future they will probably, owing to the pressure of complaints of broadcast listeners, be obliged to comply with similar requirements. The main thing is that the transmitter must not disturb other receivers on the same ship. These conditions compel us to design a short-wave trans-

mitter capable of a hitherto unheard-of precision of frequency adjustment and with absolute continuity of oscillation (to take out shock absorption) and quite completely purified of harmonics. We have used one of these transmitters having $1\frac{1}{2}$ amperes in the antenna in the same building where broadcast reception was being carried on. I hope sometime to release the details of these circuits. At the present time I can only point out that the results are obtained by the use of the master oscillator and

power amplifier with the use of intermediate circuits, and that the continuity of oscillations is obtained by self-rectification in the master of both lobes of the alternating current, and by so regulating things that the oscillations never die down quite to zero even during the period when the alternating current supply is passing through zero.

Several years ago we made experiments with waves as short as 5 meters with most interesting results. There, the production of standing waves and the influence of reflections, obstacles, etc., is very marked.

I can not lay too much stress on the consideration of keeping the wave constant and free of lilt and warble. It has been our experience at NKF that not one ama-

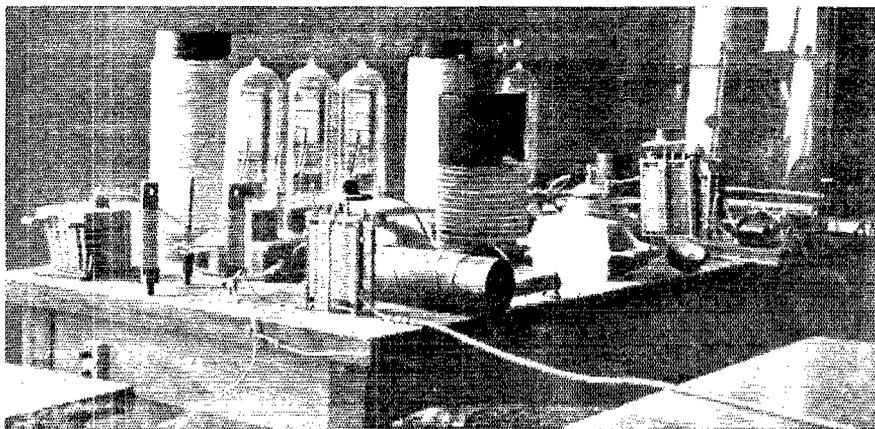
teur in one hundred has a sufficiently constant wave to be read comfortably and clearly, and I believe that one-tenth of the power would frequently suffice for communication if the wave were absolutely steady and constant. It is the old story that the number of amperes in the antenna is not always the final determining factor of the range. With the use of a master oscillator and intermediate circuits, supposing that the amateur has a limited number of tubes and power supply, his radiation may be cut down somewhat, but the gain in the steadiness of the wave will, in my opinion, entirely offset this disadvantage. I should like to make the suggestion that more work be undertaken by amateurs on definite schedules and on constant waves, thus eliminating about 98 percent of the interminable "CQ-ing" which now fills the air. C.W. communication on short waves can only be considered a success when you can get your man with a short, brief call. This can only be accomplished by marked improvements in both transmitter and receiver. I have already indicated some of the lines that we are following in this Laboratory in the way of improving our transmitters. We have recently constructed a transmitter which will go down to 80 meters and whose wave is just as steady and just as easily copied with a suitably designed receiver as a long-

wave arc or machine. We have also completed a 3,000 kilocycle (100 meter) set for the *Shenandoah*, which we hope will be almost as constant, the details of which I will give later in this paper.

Pertinent suggestions have already been made concerning the design of the receiver in recent numbers of *QST*. I can add little, except to say that we rather favor a form of super-heterodyne which is especially adapted for CW reception, and that the receiver problem can not be solved completely without the use of an auxiliary and extremely constant heterodyne circuit which can be used to set your receiver exactly on a desired wave. It is extremely difficult, if not impossible, to build a receiver which can be set at 3,000 kilocycles for instance, to within $\frac{1}{2}$ kilocycle of the desired frequency, but it is possible to fix up a receiving tube with a good condenser and a rigid coil system and with definite plate and filament voltage on the tube so that it will oscillate for many weeks within

of a disgrace and an indication of either poor material or poor operating ability. With the advent of CW, the "CQ-ing" and the long calls have come back again, and no wonder, since the transmitters are, as I have said, not 1% of them steady enough to do what I would call comfortable work with, and the receivers as pointed out by Mr. Kruse in recent numbers of *QST* are very poorly designed for our present purposes, but even with the best we can do with the receivers and transmitters, I think the heterodyne will, for operating on schedule, be an extremely valuable and inexpensive addition to the average amateur equipment. This heterodyne, I ought to say, should be properly shielded and must never be coupled any ways tight to any other circuit; otherwise its wavelength will not be reliable.

I believe the time will come when long calls and "CQs" will be considered just as much of a disgrace as they were in the most efficient period of the use of the spark



The transmitter at NKF. 250-watt master oscillator feeding three 250-watt power amplifier tubes. Plate input 1500 watts from 1000-volt storage battery. This set puts an earsplitting 50-meter signal into 1XAM by daylight during all weather conditions. On 50 meters the signal is better than on any wave between that and 110 meters.

The antenna is not near the transmitter but is located clear of the building and is fed by a R.F. transmission line. The antenna is a cage "T" 35 feet high and 35 feet long; the counterpoise is circular with six wires 25 feet long and 3 feet off the ground.

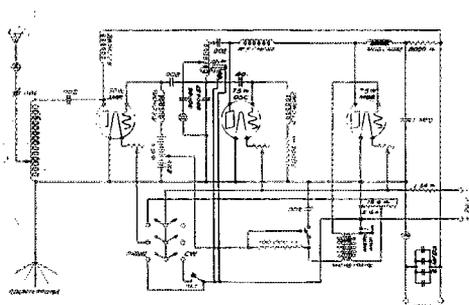
Official Photo U.S.N.

$\frac{1}{2}$ kilocycle of the described frequency. Of course, the condenser should have extremely fine adjustment or else the method of step-condenser of sub-divided units made up with several fixed with one small variable can be used. With this kind of a heterodyne used as a wavemeter it will be possible to set in advance accurately the wavelengths of both transmitter and receiver, so that the very first call should get through. I remember the difficulty we used to have in the old spark days with everlastingly long calls and "CQ". This finally came to be considered a good deal

among amateurs. My own observation leads me to believe that at present a great deal more time is taken up with long calls and "CQs" than in the actual transmission of messages or in the carrying out of tests. At the same time I see that without certain improvements such as I have indicated, the condition is inevitable.

One common cause for variation in wavelength in amateur transmitters appears to be undue forcing of the tubes. Again I will point out that the amperes in the antenna are not the only things that count. This forcing of the tubes has another bad

effect besides unsteadiness of wave, and that is the production of impact excitation giving undue interference with their immediate neighbors and production of harmonics. NKF has copied on about 100 meters (3,000 kilocycles) a large number of amateur stations who were actually transmitting in the neighborhood of 1500 kilocycles, and many of these stations were many hundred miles distant. In fact, I think we have had instances where the first harmonic at about 3,000 kilocycles came through stronger than the main wave at 1500 kilocycles. These errors can be largely corrected with a little care, a little more consideration for the rights of the other

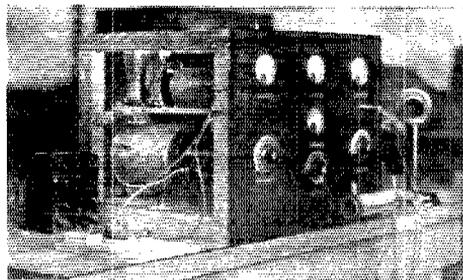


The Wiring Diagram of the Shenandoah's New Master-Oscillator Power-Amplifier Short-Wave Set. Diagram courtesy U.S.N.

fellow and fuller realization that steadiness of wave is almost more to be desired than high antenna current.

Since we have undertaken more exhaustive studies of short-wave receivers, it has been very forcibly brought home to us that the greatest hindrances to effective work in this field are due to impact disturbances from faulty power transmission lines, bad commutators and other sparking contacts in electrical machinery, bad telephone lines, and radiation from X-ray machines used in hospitals and clinics. In addition to these, we fully realize that a very great evil is impure emission from commercial and Government high power transmitters, particularly from the large Navy arcs. Not all of the complaints of interference received by the Navy Department are warranted as the interference in question can be shown to be caused by the use of non-selective receivers. The experienced amateur is not so liable to make this kind of complaint, but the average broadcast listener usually expects to get Rolls-Royce performance out of a flivver set. Nevertheless we realize the great urgency of improving the station in regard to our high power arcs. It is only fair, however, to point out that we are faced here with a very serious situation. We have a tremendous investment involved in these arcs. It would require a special

act of Congress to appropriate money immediately to replace these arcs with high power machines or tube sets. It is also well known that tube sets in very high powers are quite as capable of disturbing our friends the amateurs as some of the arcs unless they are carefully designed. We are attempting to relieve the situation by adopting means of purifying the radiation of the arc stations, for we realize the urgency of it as well as anyone. The problem is not so simple as might appear. We have already spent several hundred thousand dollars on this work and are still in doubt as to whether or not we have arrived at the best possible solution, especially for the very high power stations. I want to assure the amateurs that we are doing the best we can with the appropriation available, and hope that we shall have some very tangible results in the near future. People who demand an immediate change in such high power stations as Annapolis and San Diego can hardly realize the staggering cost of replacing such transmitters with tube sets with suitable power and purity of emission, or of putting in coupled circuits or such, for the large arcs. If they would stop to figure out the cost of a condenser suitable for handling 350 kilowatts and insulated for 125,000 volts, I think they would be surprised at the results. Nevertheless I think I may definitely state that the Navy Department is determined to cure as rapidly as possible the evils of the high-power shore stations, and plans are well under way as soon as funds are available to replace all



Portable Transmitter NKF-1. Wave length range 56 to 115 meters. This set frequently works 1XAM, South Manchester, Conn. (about 300 miles) in daylight with antenna 20 feet high. 9XAX has been worked easily on reduced power.

Photo courtesy U.S.N.

obnoxious shore spark stations with tube sets, at least as modern as those on the battleships. This will greatly mitigate interference from such sources with short-wave work.

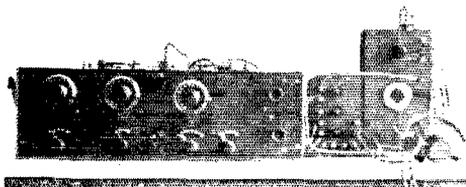
Perhaps the most outstanding thing about high-frequency or short-wave work today is the amazing ranges obtained at frequencies in the neighborhood of 3,000 kilo-

cycles (100 meters). The intensity of signals received on these high frequencies is so great that I am forced to conclude that these waves do not follow at all the ordinary laws of transmission. It would seem that the absorption term in the Austin-Cohen transmission formula is conspicuous by its absence in the case of these waves. It is a curious thing indeed that in many cases a frequency of 3,000 kilocycles will travel with far greater strength over great distances by daylight than it will after dark. This is particularly true of the 104-meter broadcast from KDKA as received in Washington, although it is understood that at other points it is frequently stronger by night than by day. To me this would indicate that there is so complete a reflection of these waves at some upper and probably ionized layer of atmosphere, that they travel not as an ordinary radio wave, but more as a wave confined between two parallel planes. This leads to a far more favorable law of variation of intensity with distance. The ease with which these waves are reflected from high buildings and natural obstacles leads also to the formation of standing waves with points of maximum and minimum which gives in some places a very poor reception, but at other spots where a receiver is located the intensity may be unbelievably great. Nevertheless, it is our experience and I believe a number of my readers will agree with me, that far greater distances can be bridged, especially by daylight, at 3,000 kilocycles (100 meters) than can be bridged by 1500 kilocycles (200 meters). I will be glad to do anything I can to stimulate the interest of amateurs in the reception of these very short waves. No one can tell now where the limit will be. There are so many frequencies available that an almost infinite number of possible channels of communication are to be had in the region of which I speak, so that there should be room enough for everybody, with certain moderate restrictions as to suitable bands wherein different interests could operate.

As before mentioned we have already had considerable cooperation from amateurs in observing intensity, steadiness, etc., of our own short-wave transmissions, but this is hampered by two difficulties. One is that so few amateurs are able to tune down to these frequencies. The other difficulty is that some of them apparently think when we give them a call from NKF that some Government station is about to criticize them for some irregularity in their own transmission, and therefore they do not answer the call. I hasten to assure everyone that our purpose in these tests is solely to obtain information which no one can give us so well as the amateurs themselves and that we hope that such tests as we make in the spirit of mutual coopera-

tion will be for our common benefit. I notice that quite a few amateurs log our call in their list of stations heard, but on the other hand many whom we have actually worked do not log our call. This is natural since we do not operate with an amateur call, but we would appreciate very much having our call logged when heard on amateur wavelengths, or shorter waves.

We have been so impressed with the possible long daylight range of short waves that it has been decided to make the auxil-



NKF's Superheterodyne Short-Wave Receiver.
Photo courtesy U.S.N.

ary set on the *Shenandoah* for the North Pole Flight a 100-meter transmitter. This will operate from 24-volt storage battery which is kept continuously charged during normal operation and good for a number of hours emergency operation. A sketch of the connections for this set is appended. There are two modes of transmission: first, by telephone for short-range work, particularly during landing and mooring operation; second, by straight CW. The plate voltage is 750 volts supplied by a motor-generator. The master oscillator and its associated modulator tube are both 7½-watt XL-filament tubes. The series resistance in the plate circuit cuts the plate voltage of these tubes to a suitable point. The power amplifier tube is a 50-watt XL-filament tube; the radiation is about 1.6 to 1.8 amperes. The effect of the series resistance in the present circuit of the master tube is to give the note a bad lilt on keying, if this is done in the usual manner by breaking the grid—therefore in order to keep the note even and clear, the wavelength of the master is altered by a relay operated by the key, said relay short-circuiting a turn of wire placed near the master oscillator coil. This shifts the wavelength several kilocycles, but since it does not cut the power off the tubes their operation is very steady. The set is very small and compact and has only the one wave. This method of keying is undesirable, but was necessary if we were to use a master tube requiring a lower plate voltage than the power amplifier. This we were forced to do on account of weight, space and power limitations. The *Shenandoah's* other transmitter is the most power-

ful transmitter yet placed aboard any aircraft. It operates ACCW on a range from 500 to 200 kilocycles. The present plan is to have all transmission carried out simultaneously with the two sets. In other words, every communication sent out by the *Shenandoah* during her flight across the continent and during her polar flight will be made on two wavelengths; one of which will be 100 meters (3,000 kilocycles). It must be remembered that during the period when the *Shenandoah* will be in the far north, it will be continuous daylight in those regions and some very interesting information will be obtained by the use of this short wave under such conditions.

From what I know of the situation now, I should be inclined to guess that if WNP had had a 100-meter transmitter instead of 200, their communication with the States would have been far more certain. I would like to seek now the cooperation of the American Radio Relay League in con-

nection with the polar flight. It may be that conditions will arise whereby the safety of the entire expedition will depend on the reception of this 100-meter wave, and the experience of the American Radio Relay League with this type of work leads me to believe that their cooperation with us during the Trans-Continental and polar flights will be of the utmost service to us. I hope there will be a good many 100-meter receivers on the job when the ship commences her flight. The *Shenandoah* receivers will be able to handle anything from 135 meters (2250 kilocycles) to 25,000 meters (12½ kilocycles).

Details of plans for communication will be given later. In the meantime we will be particularly interested to hear from amateurs and special stations who are in a position to make tests, particularly daylight tests, on high frequencies (short waves).

The Ultra Audible Microphone

By F. E. Burke, 8DGE

OUR old friend Doc Thomas, 8CFP, has got the bug. Sure as shootin' I saw his picture in the paper the other day with a pair of phones on his ears, and a foolish grin on his face, and there was a big moth on the table. Under the picture it says "Dr. Phillips Thomas Listening to a Moth". I knew from that he'd got the bug.

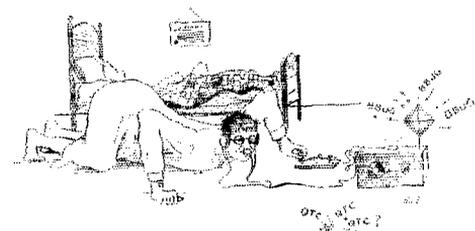
Doc is a congenial fellow, a darn good guy at a hamfest, and has a mighty fine CW set, though he doesn't operate as much as he used to. He is also the legal father

trodes is sensitive to waves of any frequency, audible or otherwise. Hence it makes a mighty handy piece of apparatus for use in picking up signals on any wave length. All that is left to provide is an oscillator to cover the necessary range and to heterodyne these signals and communication with the rest of the bugs is established. I forgot to mention that the arc can also be used as a generator of these frequencies. We are now all set to carry on two-way communication on any wave-length.

I forgot to ask Doc what wave length that moth was on, or if it was calling CQ. From the look on Doc's face I judge it had a bum fist, or that its antenna was swinging. Sure bugs have antennae. How could we communicate with them if they didn't?

It has been said that this microphone will be of great service to scientists. Let's take a case.

Suppose Prof. Anthrax, holding the seat of the chair of bugology at Dermax College, awakens in the night with a creeping sensation on his left leg. Suddenly a sharp tinge is felt in the affected member. He hastily thrusts his long lean limbs from under the sheets, snaps on the electric light and sees a small insect hop off his leg. Seizing his arc transmitter-receiver he calls 8BUG, the 8 standing for the *eaten* district, and signs PROF. The bug, being a bug, answers the CQ from this well known broadcaster and two-way communi-



of the arc microphone, the most sensitive device perfected for catching sound waves and converting them into pulsations in flow of electric current.

It isn't my object to poke fun at Doc or his invention, but to look into the future and to predict what may happen because of this invention.

The glow discharge between the elec-

cation is established. Considerable fading is experienced because 8BUG's left antenna got bent in the scuffle, if you know where that part of the antenna may be. PROF turns the loop on him and walks around the room taking readings on the compass. He soon gets the bug's QRA and, increasing power so as to block the bug's oscillator, 8BUG soon becomes a captive being. Kind of buggy, ain't it?

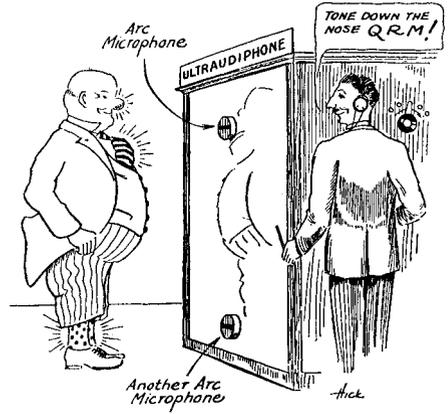
But to get down to something more practical, why not investigate light waves with this invention? Here is a grand opportunity to observe if the so called harmonious colors harmonize. In this case a separate oscillator to heterodyne the light waves is unnecessary. As long as the color combinations are harmonious, that is, the waves emitted by the colors being multiples, there will be no sound. But let color combinations appear which are what is known in music as "close harmony," with their partials and overtones, and beat notes will be produced. The greater the discord, the more the beats and the greater the disturbance heard in the ear-phones.

Let us consider some applications of this system. To say the least, it will make matters much easier for the interior decorator, for the fair damsel, for everyone who may have any interest in color combinations, and that includes all of us, I guess.

Suppose we wish to choose a necktie to harmonize with our socks. We drop into the haberdasher and make known our wants. The haberdasher glances at the socks and makes a guess as to the color scheme of a necktie to fit our needs. Glancing along the case he withdraws a

tie and places it before an arc microphone. Another arc is trained on our socks, while we slip on the phones. A terrible jumble is heard.

"I'm afraid, old top, your B bat must be on the blink," is our remark. "No", zezzee, "that's a loud combination". The tie is hastily withdrawn and the



noise ceases. Another attempt is made which is more nearly successful, but one

of the colors causes some commotion. By shading out we find a green that is quite noisy. A tie lacking that color fits the bill so that nothing can be heard. It may be necessary to send out a few QRX or QRT signs to some of the bugs if the QRM from these quarters becomes too great.



Dr. Phillips Thomas, of the Westinghouse Electric & Mfg. Co., inventor of the Ultra-Audible Microphone, which has opened a new world of research. The noise a fly makes while walking, the thunder of a moth's wings in flight, the speech of the honey-bee—all are revealed with the aid of the Thomas microphone. Dr. Thomas is shown in the above photo broadcasting from Station KDKA the heart palpitations of the lovers' kiss which, with the aid of the ultra-audible microphone, were plainly heard by crystal-set receivers in England.—(International Newsreel Photo.)

Picture Milady preparing her complexion for the afternoon promenade. Before her lie her rouge, lipstick, eyebrow pencil, et cetera. On her head a pair of ear phones and to the right an

arc microphone. She is arranging her complexion so that it is harmonious. A little dab of rouge, a touch of the eyebrow pencil, and she listens to her looks. After a little experience in coördinating ear and eye she

will be able to find the location of the discordant note in her color scheme without difficulty. It remains but to eliminate the discordant colors and her charm will be assured.

Interior decorating will no longer be a question of taste, at least that kind allowed by Volstead. The arc microphone will make it possible to be sure of harmonious color schemes of draperies, rugs, etc.

We are now facing an era of discovery

which is far beyond our comprehension. How romantic to listen to the love-song of the cockroach under the lady-bug's window!

Has not the world been full enough of awful noises, A.C. growls, M.G. ripples, sync-rectifier grinds and hollow-sounding D.C. notes, that Doc Thomas needs must bring more still more weird noises and voices to our ears?

This is Effie Bee signing off. Good gracious.

The International Amateur Radio Union

By Hiram Percy Maxim, President, A.R.R.L.

It has been previously reported in QST that our President, on a personal trip to Europe, had been asked by our Board of Directors to represent A.R.R.L. in efforts to encourage international amateur relations. He carried with him our belief that there was keen need for an international amateur body in which A.R.R.L., representing American amateurs, could join with the other national amateur societies of the world in a common effort to promote and co-ordinate free amateur radio communication between the private citizens of the various countries of the world, represent the amateur in international communication conferences, encourage international fraternalism, etc. The idea met with a splendid response, and the I.A.R.U. is the result. Our dreams are coming true! —Editor.

IF American amateurs could see by radio as well as they can hear, they would have witnessed an inspiring event, the night of March the 12, 1924, in a certain dining room of the Hotel Lutetia in Paris, France. There was a dinner being given the President of The American Radio Relay League by the most distinguished radio men of Europe.

This A.R.R.L. President has sat in at a



Mr. Maxim in the "static-room" of the S. S. Belgenland on his return trip to this country. (Wide World Photo)

good many very impressive radio meetings in the past, ranging from Maine to California, but he has never sat in at a meeting where there was quite as much thrill as at this meeting in Paris where the amateurs of nine different countries sat down together.

The countries represented were France, Great Britain, Belgium, Switzerland, Italy,

Spain, Luxembourg, Canada, and the United States of America. Denmark was represented by a letter in which regret was expressed at the inability to have a representative present and asked that the amateurs of Denmark be counted in. Names familiar to every radio amateur in every civilized country were gathered around this historic board.

The chairman of the Inter-Society Committee of the three important French radio societies, Dr. Pierre Corret, presided. After the dinner he opened the meeting with a stirring address delivered in French, which it is a great pity was not recorded and translated for the benefit especially of A.R.R.L. members. In the most dramatic fashion Dr. Corret pointed to the great amateur society across the ocean which the world looked upon as a leader in not only the science of radio communication but in the humanitarian aspects of radio. He paid, with graceful eloquence, the compliments of Europe to the President of the A.R.R.L. and certainly placed it up to the latter to come through as he had never been required to come through before.

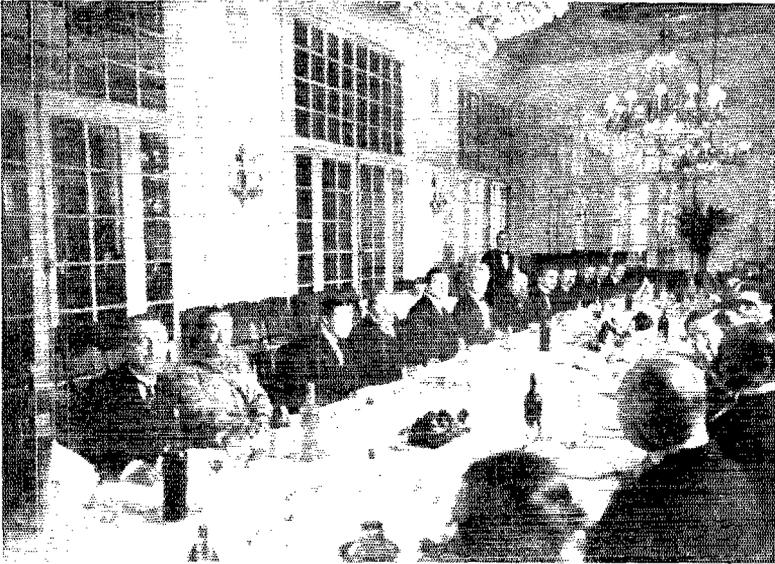
On such an occasion ponderous oratory seems out of place, and recourse was had to the simple American method of stating the case as exactly and briefly as possible and asking for its sincere consideration. The writer outlined what we in America believe would be the advantages of international amateur organization, and stated that American amateurs wished only to suggest and under no circumstances to be considered as dictating; that America offered every cooperation and help in its power, if such were wanted, and that it

was the earnest hope that some form of international amateur radio organization could be effected.

It would be difficult to describe the atmosphere that pervaded that dining hall at the completion of these two addresses. Those of us who have attended American "hamfests" have some idea of the thrill that went with this thing. Those who have never had this feeling are to be pitied. But can the American from Illinois who sits in with other Americans from California, Texas, Pennsylvania and Connecticut, and gets a real thrill, imagine the kind of a

which would take charge of arranging the details for a permanent international organization, and that representatives from the various countries be selected and requested to meet as promptly as possible.

The writer was asked to call this meeting and two days later, on March 14th, at the Hotel du Louvre, Paris, a meeting of the delegates from each of the different countries was held. At this meeting, the writer was elected president and Dr. Corvet secretary, and the committee was named The Temporary Committee of Organization. It was also decided to recom-



The Dinner in Paris Where The International Amateur Radio Union Was Formed.

thrill that passes up and down the backbone when, instead of his own countrymen, his fellows hail from nine different nations! I do not believe I am overstating the facts when I say that every man in that room will remember distinctly all his life the keen thrill of that meeting in the Hotel Lutetia in Paris that evening of March 12, 1924.

At a general meeting of this kind, where it is impossible to arrange a regular schedule of just what is to be done, it is always difficult to get something definite actually started. It was due to Comte du Waru of France that definite action was taken. He suggested that since several countries were represented, and that since it was the sense of those present that we form an international amateur radio organization, instead of putting it off for some indefinite time of the future we should do it now, while we were all together. He made the motion that a committee be appointed

to recommend that the name of the international organization be THE INTERNATIONAL AMATEUR RADIO UNION, and that a Congress to effect permanent organization be held in Paris during the Easter holidays of 1925, at which representatives from all countries were to be invited to be present. In the meantime the American Radio Relay League was invited to submit a recommendation for a constitution. This recommendation would be forwarded to the delegates of the Temporary Committee, and an effort made to arrive at an agreed-upon constitution to recommend to the Congress when it convened. The international language matter was also to be investigated by this Temporary Committee and a recommendation made.

Thus we have the beginning of a worldwide amateur radio organization which will probably be built upon lines similar to our A.R.R.L. Many Americans will without doubt find a way to attend this great-

est of all amateur radio conventions in Paris next Spring and there seems little doubt that the spirit of brotherhood that

pervades amateur radio in America can be made to spread its mantle of good fellowship over all the civilized nations of the earth.

The Meissner Transmitting Circuit

By I. V. Iverson, 7ADQ*

The Meissner circuit is very little used in amateur stations, mainly because the 3-coil form is hard to handle and the 4-coil form is little known. The 7th and 6th districts have been doing excellent work with these circuits, which have several advantages over the favorite circuits of other districts. The Meissner circuit shifts waves easily, does not get into trouble with the nodal point, works with grounds and counterpoises alike—and cuts down the keying thump that is such a nuisance when Hartley or Colpitts circuits are used.

By the way—the spelling is M-e-i-s-s-n-e-r and the name is pronounced as if it were spelled My-sner. —Tech. Ed.

THE kind of transmitter that is in demand by the amateur today is one that is efficient and at the same time flexible; that is, it must work with different antennas and be able to shift wavelength at will. The Meissner circuit gives all of these desirable things to the progressive amateur.

The Meissner circuit will work with a grounded antenna almost as well as with a counterpoise; most of the present amateur circuits will not do this.

The most pleasing thing about the Meissner circuit is that you can change from

Ed.) What would you think of a fellow who today built a spark set and used straight or conductive coupling? You would think him crazy, not only for putting in spark, but for using direct coupling when inductive coupling has proven so much more effective. Yet you probably use a direct-coupled transmitter yourself. It may be C.W. but the same principle applies to both spark and C.W.

The Two Kinds of Meissner Circuits

The Meissner circuit resembles the Hartley circuit. See Fig. 1. The peculiarity of the Meissner circuit is that it has only one tuned circuit—the antenna—in spite of being inductively coupled.

There are two main forms of this circuit in use among amateurs today. One form is the "3-coil Meissner" shown in Fig. 2.

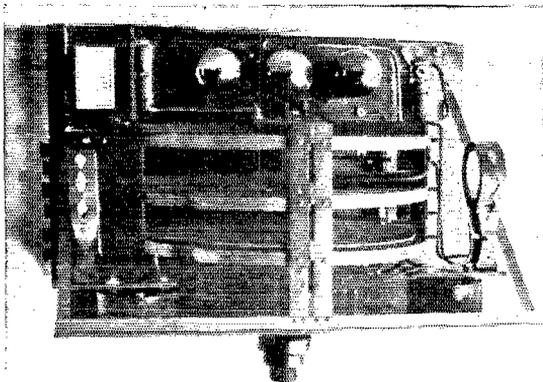
In this arrangement the three coils are the antenna coil L1, the grid coil L2, and the plate coil L3. The plate and grid coils are both coupled to the antenna coil; that is, one coil at each end of the antenna coil.

The second form is the "4-coil Meissner" of Fig. 3. In this arrangement two antenna coils are used. They are placed at right angles to each other and as far apart as convenient. Closely coupled to the antenna coil L1 is the grid coil L2. Closely coupled to the other antenna coil L4 is the plate coil L3.

(In all of the figures in this article the tuned circuit is shown in heavier lines.)

The Condensers

With either of the above circuits the use of variable condensers will be found a great help. These should be placed in shunt with



The 3-coil Meissner set at 6JD

150 meters to 180 or 220 by simply moving one antenna clip or turning one antenna series condenser. The rest of the set will take care of itself.

In addition the Meissner circuit has the advantages of inductively-coupled circuits in general. (That is to say, it does not transmit key-clicks strongly, there is no worry about the nodal point, and a single antenna-series condenser is enough.—Tech.

*Chairman, Technical Committee, Amateur Radio Club of Seattle.

—This circuit is used in the Western Electric broadcasting sets with a plate-coil condenser but no grid-coil condenser.

the grid and plate coils. The size of the condensers to be used should be .0005 microfarads maximum. The use of these condensers is not absolutely necessary (remember they are not tuning condensers.—Tech. Ed.) but the set is easier to adjust with them in the circuit. Ordinary receiving condensers are O.K. to use with powers up to 200 watts *input*, but for higher powers the use of a widely spaced

is reached. After the set is once adjusted the closed circuit need not be touched again, even if the wave is changed a great deal, for the antenna current will vary but little over the whole band 150-220. (The antenna current may be maintained steady by changing the adjustments of the plate and grid condensers. This change is very slight and for ordinary work it need not be done.)

It is very simple to change from a grid tickler or reversed feed back to the 3-coil Meissner. All that is needed is the addition of a plate coil. Nine times out of ten when you change over, even if the job is "haywire", the antenna current will rise and you will also get more consistent DX.

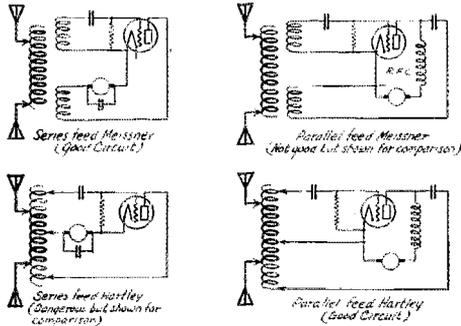


FIG. 1—FUNDAMENTAL CIRCUITS FOR COMPARISON

condenser in the plate circuit is recommended.

The 3-Coil Circuit

Naming the coils in, Fig. 2 again, L1 is the antenna coil, L2 the grid coil, L3 the plate coil. C1 is the grid condenser, C2 is the grid-coil condenser, C3 is the plate-coil condenser, and C4 is the bypass condenser. The circuit will not oscillate without the bypass condenser but the size of this condenser does not matter—as long as it is big enough.

The size of wire on the plate and grid coils does not matter much but the antenna inductance should be constructed very carefully so as to reduce the resistance as much as possible.

The plate coil should be coupled as closely as possible and the grid coil as loosely as possible to the antenna coil. The closed circuits should *not* be in resonance with the antenna circuit; the tube action is aperiodic. (The currents in the plate and grid circuits are not oscillating in nature; they are only pulses at a rate depending on the antenna tuning. Therefore the antenna controls the wavelength and it is important not to have the antenna swing. But that applies to all other circuits except the master-oscillator power-amplifier.—Tech. Ed.)

To tune up the set, put the antenna clip on some convenient point on the antenna coil and then adjust the grid and plate coils either by means of clips, to regulate the number of turns, or by condensers, so that the antenna current reaches its maximum; then take your wavemeter and find out where you are. If you are too high cut out some of your antenna coil and adjust the set as before till the correct wave

The 4-Coil Meissner Circuit

With the grid and plate coils placed as they are in the 3-coil circuit the full benefits of the Meissner arrangement cannot be had. There should be no coupling between the grid and plate coils excepting thru the antenna. But the three-coil system places the grid and plate coils on the opposite ends of the same antenna coil which means that there is certain to be coupling between the grid and plate coils. Where the plate and grid coils are coupled directly to each other oscillations will be

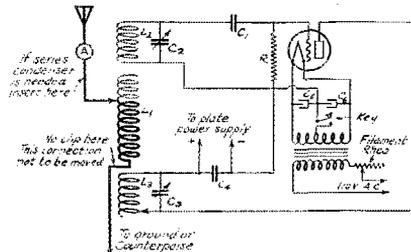


FIG 2 3 COIL MEISSNER CIRCUIT (Series Feed)

- L1—14 turns heavy wire on 6" form.
- L2—15 turns almost any size wire on 6" tube when using condensers.
18-25 turns when working without condensers.
- L3—18 turns on 6" tube when using condensers.
18-25 turns when working without condensers.
- C1—.00025 to .002 microfarad.
- C2 and C3—Good low-loss variable condensers, maximum .0005 microfarads.
- C4, C5 and C6—.002 microfarads or larger.
- R—1250 to 10,000 ohms, depending on tubes used.

Plate coil should be coupled closely to antenna coil. Grid coil should be loosely coupled. Since grid coupling must be adjusted exactly, it is suggested that the grid coil be mounted so as to rotate. A pancake grid coil can be used.

set up which are *not* on the antenna wavelength. The energy used to do this is lost, as far as the working wave is concerned; also this separate wave may cause correspondence with the Radio Supervisor's office.

The 4-coil Meissner circuit is the best

of the two by far, because in the 4-coil set the coils can easily be placed so that there

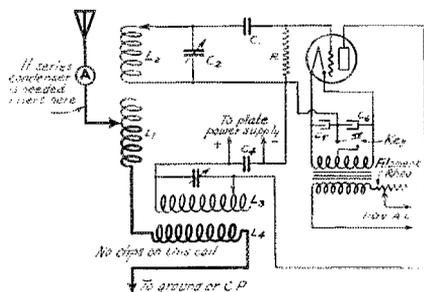


FIG. 3 4 COIL MEISSNER CIRCUIT (Series feed)

L1 and L4—each 7 turns on a 6" form or tube. Rest of coils and condensers same as in Fig. 1.

Mount the plate coil next to the lower antenna coil L4. The coupling between these coils must be close and the number of turns in the antenna coil L4 should not be changed. Couple the grid coil to the variable antenna coil.

Place the two sets of coils at right angles so as to prevent setting up local oscillation of an undesired wavelength.

is little coupling between the plate and grid coils excepting thru the antenna. This

is as it should be. This does away with extra waves and puts all the power into the main, or normal, wave. The result is more miles-per-watt.

When the coils of a 4-coil set are properly arranged the set will not oscillate if the antenna is disconnected, and the plate current will drop to almost nothing. When things are working properly the set may be adjusted with the full plate voltage impressed on the tubes. When adjusting the set, first find a place where the highest antenna current is produced for the least input on the tubes. After getting an adjustment where a fair antenna current is produced with a small input, open the antenna switch. Now adjust the grid clip (or grid-coil condenser) until the plate current is lowest, then close the antenna switch. This grid adjustment should be made with care but the adjustment of the plate clip (or plate-coil condenser) is not so critical.

As has been stated before, the plate and grid condensers are not absolutely necessary but they are very convenient and condensers on both coils are to be preferred. Be sure the condensers are good ones because if they are not the end plates will burn up when working on short waves.

How To Use CQ

---An Announcement of Standard A.R.R.L. Practice on This Much-Discussed Subject---

By F. H. Schnell, Traffic Manager

CQ—HOW many times have you heard that signal and condemned the station using it? Perhaps too many to mention, because CQ has come to be regarded as a nuisance on the air. Stations using it have been classed as "CQ Hounds," but only because the signal has been abused and its proper use in amateur radio has been forgotten. Some stations fear to use CQ because of the name that goes with it; others decline to answer stations calling CQ; while other proudly boast that CQ has never been sent out from their stations.

None of these conditions is a healthy one and the purpose of this article is to announce a definite standard form for the use of CQ and which will be recognized as standard A.R.R.L. Practice, effective upon the publication of this issue of QST.

What is the primary purpose of CQ? It is a signal used to indicate that a station wishes to communicate with another station. Broadly speaking, that means the calling station has traffic for some other

station. In amateur radio CQ has had a meaning which goes something like this: "I want some DX cards (which will never be QSL'd); will somebody please answer who is at a distance greater than 2000 miles so I can tell him 'nil hr drp erd cul 73 gn.'" It has degenerated into the call of the DX-Card Hound who seldom acknowledges receipt of a report card. There are many other abuses of this CQ signal, and all of you are familiar with them—hence the desire to restore CQ to its good standing, because it is a most important signal when properly used. Too, we must have a standardized way of bringing about this desirable condition whereby CQ means something to stations hearing it, and here is how to use it.

1. Imagine your hook clear of all traffic but that you are ready to relay messages from other stations and you want other stations to know that you are on the air. For the purpose of illustration we shall use the call 9ZT—it's a good call and at 9ZT CQ is used properly. THE VERY FIRST THING TO DO IS TO LISTEN

AT LEAST FIVE MINUTES and make note of the stations you hear working and keep in mind your tuning adjustments for each station—know their wave-lengths, in other words. If there is some particular station you want to work, call that station, but if you hear stations relaying messages and you want them to know you are ready for traffic, then call CQ in this manner: CQ CQ CQ *u* 9ZT 9ZT 9ZT CQ CQ CQ *u* 9ZT 9ZT 9ZT CQ CQ CQ *u* 9ZT 9ZT 9ZT—then stop and listen. If you are a United States amateur and are calling Canadian amateurs, use the interval *cu*; if calling amateurs in England, *gu*. For any European station, make it "CQ EUROPE", and use the interval *u* if you are U.S.A., *c* if you are Canadian. (See December QST, page 19, for proper intervals.) The idea is not to keep this up all night and abuse CQ—call NOT MORE THAN ONCE OR TWICE EVERY FIFTEEN (15) MINUTES if you fail to get in touch with stations on the first call.

No station should ever use the bad form of calling CQ more than three times without signing the same number of times. We have heard station after station call CQ anywhere from ten to a hundred times (at a speed beyond the ability of the operator—no one could read it) and wind up by signing once, poorly. Stations are not interested in listening to two or three minutes of "CQ-ing"—they want to know who is doing the calling.

2. Suppose you have traffic on your hook and you wish to clear it. Sort your traffic into four files: that going north, east, south, and west. Knowing your geography, this is an easy matter. Then try to get in communication with certain

definite stations which you have made note of while listening for five minutes, being sure your direction is right. After you have failed to reach a particular station and assuming you are trying to clear your north-bound traffic, then call CQ in this manner: CQ NORTH CQ NORTH CQ NORTH *u* 9ZT 9ZT 9ZT CQ NORTH CQ NORTH CQ NORTH *u* 9ZT 9ZT 9ZT CQ NORTH CQ NORTH CQ NORTH *u* 9ZT 9ZT 9ZT—then listen for replies. Stations hearing this will know you have made a definite request—you have indicated that you have traffic for stations to the north of you. Properly carried out, only stations to the north of you will answer. Sometimes it is desirable to relay messages directly into a city where you know stations are operating. Instead of calling "CQ NORTH" or any other direction, merely call "CQ" and insert the name of the city. Washington, for example, would be called like this: "CQ WASHINGTON"—in above form.

Remember—three calls, three signs, repeated three times, will be Standard A.R. R.L. Practice.

If you have traffic for stations in more than one direction, try to clear one direction before you start on another. By all means DO NOT CQ for all directions because you can work only one at a time anyway, and this sort of practice will defeat the purpose of the genuine use of CQ. Try one at a time.

Standard A.R.R.L. Practice does not mean that additional signals may be hitched on to the above such as QSR? QRV? QRK? etc. This is superfluous—let's stamp it out entirely and when you hear a station abusing CQ, call his attention to it by card or by letter.

The Eastward Voyage of the Tahiti

In a special little radio cabin on the after-deck of the R.M.S. Tahiti, on her recent voyage from Sydney to San Francisco, was installed the apparatus comprising the first shipboard amateur experimental radio station. Manned by two eminent Australian experimenters, Mr. Chas. D. Maclurcan, 2CM, and young Mr. Jack Davis, 2DS, the results obtained in hearing and communicating with amateurs on both sides of the Pacific during the voyage were splendid. The plans and preparations for the trip were reported in an article on page 20 of the February QST. The present article deals with their experiences on the voyage from Sydney to San Francisco.

THE recent voyage of the R.M.S. Tahiti from Sydney to San Francisco and return was quite an adventure for Mr. Chas. D. Maclurcan and Mr. Jack Davis, the operators of the experimental radio station that had been placed aboard, with the call 2CDM. This was the first time in history that a complete amateur sending and receiving station had been given a chance to show what it would do under the good radio conditions usually encountered by a ship at

sea and for this reason the occasion was watched with great interest by amateurs thruout Australasia and America. However, this was secondary to the main purpose of the expedition which was to test the range of Mr. Maclurcan's low-power station at Strathfield, Sydney, and to observe the strength of its signals, fading, and other unusual things as the ship neared the Pacific Coast of the United States.

The few days before sailing from Sydney were busily occupied in getting everything

in readiness. Apparatus was tested and schedules arranged. Mr. F. Basil Cooke, assisted by Mr. Bon Gow, was to take charge of station 2CM at Strathfield in Mr. MacLurcan's absence and transmit to the *Tahiti* at specified times each day. If conditions were good the *Tahiti* would reply and advise how 2CM's signals were received. The periods during which the operators on the ship would be listening were widely published throughout Australia, so that other amateurs could also transmit to the *Tahiti*. These schedules were printed in *QST* for April on page 45.

The transmitting apparatus installed on the ship was a duplicate of one of the sending sets at 2CM and is clearly pictured in the accompanying photographs. The receiver was a four-tube honey comb coil set using one radio amplifier, detector, and two audio amplifiers. This apparatus was installed in a small radio cabin about five feet square, located on the after deck of the ship. The small photograph shows this house, lashed down to prevent its being carried away. The antenna was strung between it and the top of the mainmast nearby. The upper part was fanned out

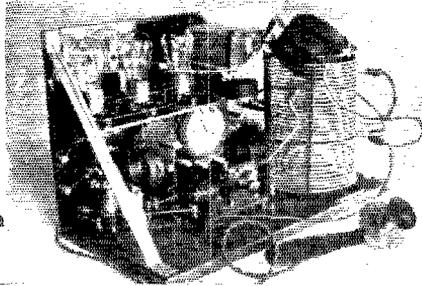
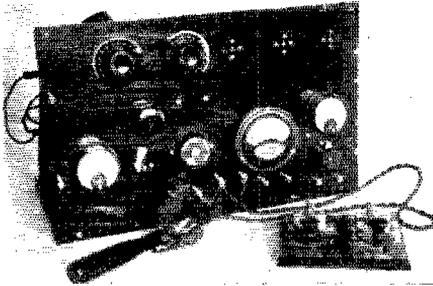
tears were heard. On the fourth day out, however, trouble was experienced with the high voltage generator which finally burned out entirely. Hard luck!

The next day the *Tahiti* arrived at Wellington, New Zealand, and the amateurs from all around were on hand to wish the expedition good luck and success, they willingly spent the day scouring the town for a high voltage generator instead. One was finally located and with the help of old 4AA, Frank Bell, it was installed and belted to the original motor shortly before the ship sailed.

One hour after leaving Wellington the set was started up and three 5-watt tubes promptly went to the land of eternal radiation. The two spare tubes were brought out, but one of them proved a "dud" so 2CDM was doomed to use *only one UV-202* in the sending set until the ship arrived at San Francisco.

The Five Watter Does It

In spite of the above handicaps, communication was maintained with Australia and New Zealand up to 1800 miles out, and a few days afterwards 6AKW was



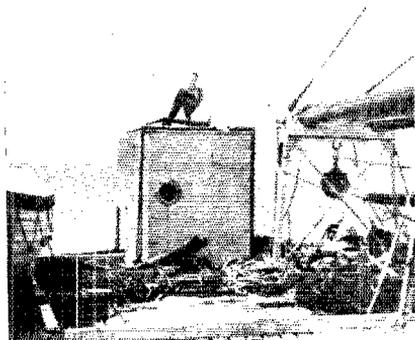
Two views of the sending set on the "Tahiti" used by Messrs. MacLurcan and Davis to communicate with amateurs while crossing the Pacific. This set is very similar to one of the sets at Australian 2CM at Sydney. It uses three UV-202 tubes connected in the well known reversed feedback circuit with parallel supply. Grid modulation is used for phone. It is a very neat and workmanlike job and shows more than ever that the Australian amateur knows more about short wave tube transmitters than does the average American ham.

and secured to a yard while the lower end was made into a small cage. A counterpoise was also erected on the ship. Plate power for the sending set was furnished by a small motor-generator set running on the ship's 110-V. D.C. supply. The filaments were heated by current from a storage battery.

Just before leaving Sydney the set on the *Tahiti* was tested and worked well. The transmitted wave length was 220 meters and the call 2CDM. The set continued to perform excellently on the first four days of the trip. 2CDM was in almost constant communication with amateurs in Australia and New Zealand by CW and by voice, while many U.S. ama-

worked at 1000 miles, reporting 2CDM as very QSA. While working 6AKW the set aboard the *Tahiti* using the lone 5-watt tube was heard by 9DSW at Fairmont, Minnesota, who reported his signals as very readable. Tho unable to reply on account of the limited power available, the operators on the ship heard Australian 2CM's signals up to 4300 miles on voice and 5380 miles on CW. It was only the terrific interference from U.S. amateurs as the ship neared the Pacific Coast of the United States that prevented 2CM from being heard QSA all the way to San Francisco. With less interference Mr. MacLurcan is confident that 2CM could be heard in the United States consistently.

The matter of wave lengths is important if U.S. stations are to be worked regularly from Australia. Because Australians are licensed to transmit on about the same waves as we, there is not a chance in the world of their signals being heard thru the QRM on this side. The use of wave lengths above or below those used by American amateurs is the only recourse



The special radio cabin on the after deck.

and Mr. Maclurcan intends to see what can be done about this on his return to Australia.

Many American amateurs were received on the trip over, as is shown by the list of calls heard that is published under the heading in this issue. In fact, so many are heard in Australia and New Zealand that their reception there is getting to be quite boring, according to Mr. Maclurcan. Excellent results were obtained in receiving American broadcasting during the voyage. Within just a few days after leaving Sydney, the carrier wave from KGO at Oakland was picked up in the middle of the afternoon, and, by listening steadily the signals gradually got louder as darkness crept over the earth. The modulation began to come through long before sunset and finally, one hour before sunset, a loud speaker was going on the deck, entertaining the passengers with concerts from KGO. Another station was picked up which turned out to be KHJ at Los Angeles.

The U. S. Is Reached

On arriving at San Francisco the Australian experimenters were met by Mr. A. H. Babcock, A.R.R.L. Director, and other radio men prominent in the Bay district. A large hamfest was held at the Engineers' Club where Messrs. Maclurcan and Davis were guests of the A.R.R.L. and at which those present learned much about amateur radio in Australia and the details of the trip across. Because of the short stay in San Francisco there was not time enough in which to visit very many stations or to gain much of an impression of amateur

radio as it is in the United States. Mr. Maclurcan and Mr. Davis did comment, however, on how we amateurs used so much of our time in useless calling and creating unnecessary interference when we should be listening, which, in their opinion, greatly decreases the effectiveness of our stations.

By this time the *Tahiti* has returned to Sydney. The experience of Messrs. Maclurcan and Davis in being the sponsors of the first amateur experimental station on shipboard has proven very interesting and instructive. The radio world greatly appreciates the work they have just completed, for the venture has been a step forward in the progress of amateur radio.

—H.F.M.



Somebody is gonna be sick.

War Service Records

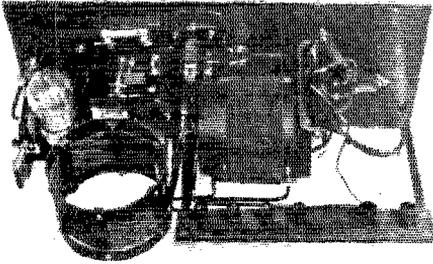
SAY, for the luvva μ , is it impossible for A.R.R.L. Headquarters to compile a trustworthy record of amateur wartime radio service? The response to our request is pitifully small; we can write from personal knowledge the records of almost as many men as have reported. This is not a matter of modesty, fellows—we want this record for the protection of Amateur Radio. You should do your part in its compilation by sending in your own record. Please see the questionnaire on page 37 of March *QST* (if you haven't a copy we'll send you a mimeographed one on request) and come across.

A Two Range Tuner With Low-Loss Coils

By J. J. McLaughlin*

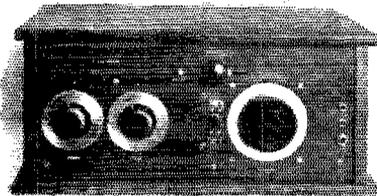
YOU say, O.M., that you have never seen a satisfactory way of adding a loading coil to the secondary of a tuner when you want to reach higher waves. Neither have I, but it can be done while still keeping the efficiency quite high.

You will notice from the photos and the diagram that the loading coil is cut in by



a camswitch which is placed between the load coil and the secondary to keep the leads short. When the load coil is "in" it is placed in the secondary circuit at the "low" side of the secondary. In some ways this is not quite as satisfactory as placed in the grid side of the secondary, but the switch is further down in the system and the losses are less. Certainly the efficiency is better than that of a lot of commercial sets.

The main difficulty comes in getting the tickler to work properly with and without the load coil. It took me a week to get a tickler that would work OK—I made 24 different types. The final one has 23 turns



and is tapped at the 11th turn for the short-wave range.

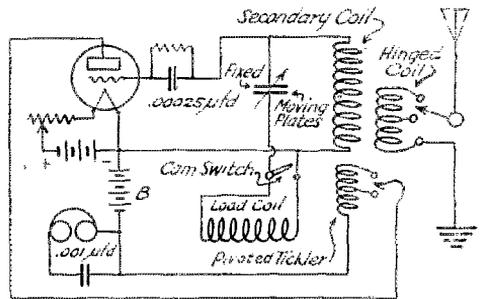
The circuit used is the plain "loose coupler with a tickler" that has been used in

most of the tuners recently shown in QST.

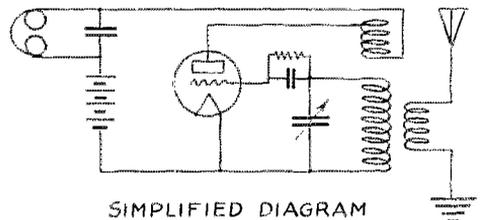
The primary consists of 10 turns of No. 16 D.S.C. held together with thread at 4 points, and tapped at the 5th turn for short waves. The coil is mounted on a bakelite block which is hinged and controlled from the front of the panel by the lever and link system shown in the photograph.

The secondary consists of 24 turns of No. 16 D.S.C. wound on a frame made of two bakelite rings and 6 bakelite strips. The turns of the coil are separated a distance equal to the thickness of the wire. The diameter of the coil frame is 4 3/4".

The tickler is wound with 23 turns of No. 28 D.S.C. wire tapped at the 11th turn for the short waves. The winding form



ACTUAL DIAGRAM



SIMPLIFIED DIAGRAM

for the tickler is made of a 3" bakelite tube with most of the tube cut away, leaving a skeleton. The winding is in two sections, 11 turns on one side of the shaft and 12 turns on the other side. The turns in each section are placed close together.

Both the tickler and the primary are at the low-voltage (or filament) end of the secondary.

The secondary load coil consists of 36 turns of No. 23 D.S.C., wound slightly

*c/o Hotel Savoy, Rochester, N. Y.

spaced on a frame much like the one used for the secondary but 4 1/4" in diameter.

The secondary condenser is of Allen D. Cardwell make, with a capacity of .00025 microfarads.

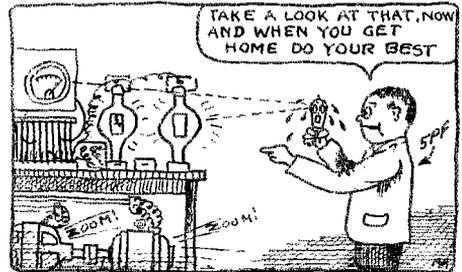
Wavelength Changes

The short-wave range of the tuner is from 76 to 225 meters. The upper range is from 200 to 420 meters. In going to this upper range it is necessary to cut in the entire primary coil, cut in the rest of the tickler, and add the loading coil to the secondary circuit. The loading coil is switched in by the camswitch which has been described before. The extra tickler turns may be switched in by means of a small switch on the panel or by using some of the contacts in the camswitch. The first plan is very much better electrically but the second is a little more convenient.

The extra turns in the antenna coil had best be switched in by using a clip on the primary coil, or by providing an extra primary binding post as indicated in the

diagram, the antenna lead being shifted as required. It is better to leave this adjustment independent as it is sometimes convenient to be able to get extremely sharp tuning on the upper range of the tuner by using only 5 primary turns.

Although a fixed grid-leak is shown, a Cutler-Hammer variable grid-leak with a .00025 Micadon condenser is now being used.



Financial Statements

IN accordance with instructions of the Board of Directors the following statements of revenue and expenses of the A.R.R.L., for the quarter ending Oct. 31, 1923, and for the two months ending Dec. 31, 1923, are presented for the information of the membership. The books were closed on Dec. 31, 1923, after a period of but two months, to comply with the new Constitution, which specifies the calendar year as the League's fiscal year. Future reports will be quarterly.

K. B. WARNER, *Secretary.*

CONDENSED STATEMENTS OF REVENUE AND EXPENSES

	Quarter ended Oct. 31, 1923	Two months ended Dec. 31, 1923	
REVENUE			
Advertising sales	\$19,622.47	\$15,325.36	
Newsdealer sales	8,290.05	5,775.10	
Dues and subscriptions	5,447.96	5,750.68	
Back numbers, etc.	644.33	328.58	
Emblems	472.00	326.00	
Interest on bank deposits	56.95	14.37	
Bad debts recovered	29.96	38.95	
		<u>\$34,563.72</u>	<u>\$27,569.04</u>
DEDUCTIONS			
Returns and allowances	3,016.40	2,715.69	
Exchange and collection charges	9.47	4.05	
Discount 2% for cash	260.87	220.18	
Allowance for probable newsstand returns		490.25	
		<u>3,236.74</u>	<u>3,430.17</u>
		<u>31,276.98</u>	<u>24,128.87</u>
EXPENSES			
Publication expense	12,126.96	8,784.44	
Salaries and commissions	11,667.16	8,810.29	
Forwarding expense	330.15	428.24	
Telegraph, telephone and postage	1,344.62	1,197.83	
Office supplies and general expense	3,145.56	1,581.19	
Rent, light and heat	711.34	238.86	
Traveling expenses to National Convention	1,171.93		
Traveling expenses, other	962.16	628.57	
Depreciation of furniture and equipment	96.02	69.96	
Bad debts written off	296.37	358.60	
Traffic Department field expenses	573.16	328.94	
Publicity Department field expenses	75.68	23.89	
R.O.W.H. buttons		100.00	
		<u>32,501.11</u>	<u>22,550.81</u>
Net Gain or Loss From Operations	<i>Loss</i> \$ 1,224.13	<i>Gain</i> \$ 1,578.06	

THE RECEIVING EXPERIMENTER



The Neglected Grid Leak

By S. Kruse, Tech. Ed.

NOTHING about a receiving set makes more trouble, and gets less attention, than the grid leak.

To be good, a grid leak *must* have the right resistance, *must not* change with the weather, and must make good contact. That is simple enough but many grid leaks do not do it.

The Pencil-Mark Grid Leak

The simplest grid leak of all is a pencil mark on a strip of insulating material as shown in Figure 1.

When making a leak of this kind do *not* use a fibre, paper or cardboard strip. These things are no good because they soak up moisture in wet weather. Every time it rains you have *two* grid leaks, the pencil mark and the fibre strip. A strip of hard rubber is good and one of Bakelite-Dilecto is the best of all. Sandpaper the strip so that it will take a pencil-mark.

Drill two holes thru the strip as shown. The size depends on the machine screws you intend to use. The distance between the holes can be half an inch or an inch.

Now begin with a "No. 2" or "B" pencil and make a good heavy "blob" around each of the drilled holes and running out toward each other as shown.

Then put the screws into place and clamp the tinfoil washers down hard on these "blobs". This makes sure of good connections.

Adjusting

Connect the leak into your set and turn on the tubes. Very likely the detector will be cranky in operation, will howl at the least excuse, and will give weak "tinny" signals.

Run a pencil mark between the two

blobs and listen again. Then make the pencil mark a little heavier. Finally the detector will settle down to business, the signals will have a "fuller" sound, and the tendency to squeal will not be so great.

Another way of telling if the resistance is right is by working the tickler back and forth. If the leak resistance is too high the tube will "bang" in and out of oscillation. As the resistance is reduced the action becomes smoother and less violent.

Using either scheme the resistance should be lowered until the tube behaves—but no more; too low a resistance will cause the tube to "play dead". It will oscillate easily but will not be sensitive.

Other kinds of leaks can be adjusted by the same rules.

Carbon Paper Grid Leaks

Carbon-paper grid leaks that are not sealed in glass tubes should not be used—they are generally unreliable and when they go wrong there is no way of adjusting them.

Sealed Grid Leaks

Of all the fixed grid leaks the best ones are those sealed into a glass tube. That does *not* mean that any grid leak in a glass tube is good—many of them are not sealed airtight and the connections to the little carbon-paper strip are carelessly made. These things are entirely unreliable, their resistance changes with the weather, they become noisy—throw them away.

There are several makes of good grid leaks, carefully sealed in and correctly labeled. Some of these use a carbon-paper strip with metal clips crimped on the ends, others have a thin grayish film of metal "flashed" onto the inside of the tube. Such leaks are almost always good.

Of course a good sealed-in leak is not useful unless it has the correct resistance. 1.5 megohms is a good average value but be sure to try several sizes on your tube; it may take a leak as low as .5 megohm or as high as 10 megohms. A gas tube like the UV-200 or C-300 sometimes does its best work with no leak at all.

Adjustable Leaks

Adjustable grid leaks are very handy because they can be very easily set to the right value for a particular tube. It is very important that the setting *stay put* after it has been made, otherwise the leak has to be tinkered with constantly. There are several excellent variable leaks on the market. Some of them fit the usual grid-leak clips, others mount on the panel. When using the panel-mounting type be careful! Don't mount them within several inches of any metal shields or grounded binding posts.

Concerning Tinkers

Directly opposite the man who forgets the grid leak is the man who "monkeys"

with it constantly. I watched one of these nervous chaps for a couple of hours one evening—whenever a signal was weak he “hiked” the leak resistance to make the tube more sensitive, and the next instant it had to be set back. The result was a rat concert.

There is no excuse for this—use a good sealed-in leak, a good adjustable leak, or a well-made pencil mark. Set it, and then leave it alone as long as the set works well.

Noisy Grid Leaks

All kinds of grid leaks get noisy in time, usually because there is a poor connection somewhere. If this happens with a sealed-in leak throw it away and use a new one. Make sure that the trouble really is inside, tho.

Accidental Grid Leaks

On some sets changes in the grid leak do not seem to have much effect, or perhaps no gridleak seems necessary.

This often means that there is an accidental leak somewhere. The grid side of the secondary circuit should be run so as to touch the fewest possible places and at these places it should be supported on the best possible materials. Such things as “moulded mud” sockets, panels, grid-leak mountings, etc., are very bad. I have seen composition gridleak mountings with a resistance of less than .2 megohms. Of course they entirely spoiled the working of the tube.

To be safe, use sockets of porcelain, rubber composition or bakelite, grid leak mountings of porcelain, rubber or bakelite, and stay away from everything else as far as possible. If you can help it, don't use a secondary switch.

Soldering “Dope”

It has been said a thousand times yet the majority of homemade sets (and many commercial ones) pay no attention to the rule that *nothing but rosin flux must be used in a radio receiver*. A set absolutely will not work decently with a thin layer of “dope” on the socket and the grid-leak mounting. If you make the set, use rosin. If you buy it and suspect soldering dope, try giving the suspected part a bath with alcohol and a toothbrush. After that go to the dealer who sold you the set and give him hades.

Poor Grid Condensers

Because a grid condenser is shunted by a grid leak, many operators think that “any old thing” will do as a grid condenser.

This is not true; a poor condenser changes with the weather. Use a good sealed-in mica condenser. Make sure that it is good by trying several, as even the best makes go wrong occasionally.

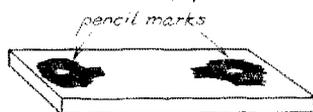
Above all things avoid these little paper contrivances containing a badly made paper condenser and a carbon-paper leak.

Mounting The Leak

A well-insulated adjustable leak like the Bradleyleak can be panel-mounted but must be located so that it does not come close to grounded shields, etc. It should also be kept 4 or 5 inches from tuning



Strip of Bakelite - dielcto
or hard rubber
Do not use fibre or paper



pencil marks
Ready for clamping



Adjust this line - Finished Leak
with pencil and eraser

CAUTION - Mount finished leak so that path of grid wire is reasonably direct

FIG. 1 MAKING A GOOD PENCIL-MARK LEAK

verniers, otherwise there will be hand-capacity trouble.

Clip-mounting leaks should be located to suit the circuit. Run the grid lead in a reasonably direct line from the tuning apparatus to the detector socket. Do not invite trouble by mounting the condenser or the grid-leak clip on a metal part of the set. Better go to the opposite extreme and support it in the air on the grid-circuit wiring, or else support from the grid post of the socket.

The Pan-American Tests

By F. H. Schnell, Traffic Mgr.

DON'T let the dust accumulate on your transmitter and receiver until you have put a signal into the South American countries and until you have copied a signal from down that way.

The Pan-American Tests are going to be a different order of tests. We appreciate the large look of dismay that looms up when we mention tests which require us to keep our junk sealed for so many hours per day right when we could be doing some good work. Cheer up; outside of the

regular "Quiet Hours" which we all must observe, there will be no request for quiet air during the tests. The heavy cloud of gloom can now go and jump in the lake or some other suitable place.

For a good many months we have been trying to get something on which to work tests with our southern neighbors and there has been a world of enthusiasm emanating from down there. We are now prepared to announce definite dates for these tests and we want to see a bunch of logs on reception. There will be no trouble to get the transmitters going—our weakness seems to be on the receiving end in all tests. We can transmit—no one will doubt that—but when it comes to receiving we have had to hedge a bit, not because we are incapable but because we are inclined to want to "do all the talking."

Here is the scheme:

Dates: May 19 to May 31, 1924, inclusive.

United States and Canadian amateurs transmit every night from Midnight to 3:30 A.M., E.S.T. Wave-lengths 105 to 125, and 150 to 200 meters. During this period all South American amateurs will listen.

South American amateurs transmit every night from 9:00 to 11:00 P.M., E.S.T. Wave-lengths 105 to 125, and 150 to 200 meters. During this period all North American amateurs are asked to listen. (Note these transmissions are on the same dates as the North American transmissions, which means they are on the following "nights".)

Through the good efforts and coöperation of *Revista Telegrafica*, the tests become a reality and it is up to us to carry out our program. We promised signals from about 5000 transmitters but that isn't the part to think about. What we want is your log of reception of signals from their stations—everything in connection with anything that looks like something from their stations. They may transmit in Spanish or Portuguese; whatever it is, please let us have it.

As a means of identifying your transmission, you are to select some code word or make it up yourself—not more than eight or ten letters. You are to change this code word each night, but be sure to keep a record of your transmission every night. Make your log complete, don't leave it in such a state that there will be some question of your transmission when it comes time to check up. Send a copy of your log to A.R.R.L. Headquarters.

There is no particular station to call. Call "South America" if you want to, but be careful of your sending—make it clean and keep your speed to about 12 words a minute. The idea is not to call all during the test periods; be sure to sign frequently so they will know who is doing the calling.

The proper method will be to send your code word three times and repeat your call three times. You may transmit as long as you like during the transmission periods. Good luck!

The Third Michigan A.R.R.L. Convention

ON February 28, 29 and March 1st, at the Tuller Hotel in Detroit, there took place the Third Michigan Annual A.R.R.L. Convention.

Men from Northern Ohio, Indiana, Illinois and Michigan were present and the usual gabfest, which is notably present at all ham meetings, showed that the annual get-together meetings are thoroughly enjoyed.

On Thursday, February 28th, registration and visits to amateur stations took the entire day and evening. The casualties on the trip consisted of one blown-out tire, two broken wheels and a crumpled fender.

On Friday, February 29th, John L. Reinartz—"Kewpie"—had the busiest day in his history. At 9:30 A.M. he gave his talk on short wave receivers and his thorough, detailed explanation of the various circuits was eagerly absorbed by everyone. From now on it is expected that Michigan will be full of high grade transmitters doing better work for the League.

In the evening, a burlesque broadcasting station, JAZ, caused much merriment with its "hay wire" operation and grotesque behavior—many humorous telegrams and letters from B.C.L.'s. hearing (?) the concert were read—spirits ran high!—Operator Mitchell of WCX was Chief Announcer.

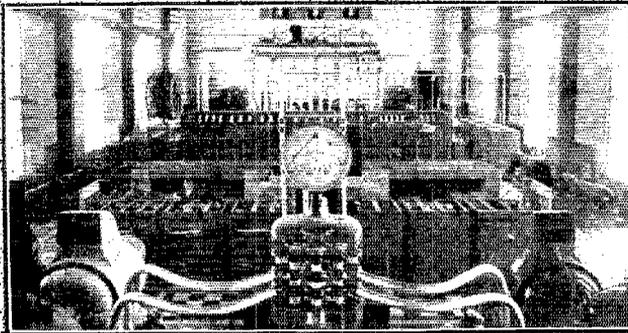
Saturday was given over to a traffic meeting in A.M. and to a special meeting for the Amateurs and B.C.L.s. in P.M. Radio motion pictures were shown at all meetings.

Saturday evening closed the big day with a banquet and speeches by various radio men. A number of prizes were awarded to the holders of lucky numbers. Among these prizes were a complete 100-watt transmitter, a receiving set and a mysterious 250-watt transmitting tube that was accidentally dropped just as it was being presented to Marco of 9CD.

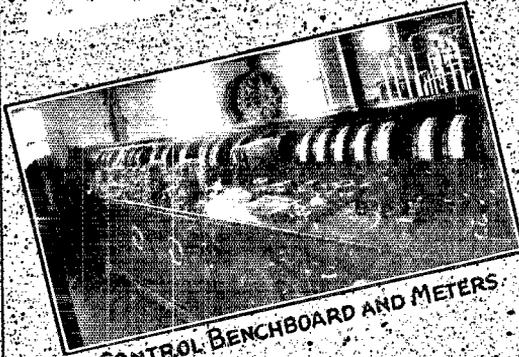
Later the Flint gang put on the Royal Order of Wouff Hong. This was splendidly done by capable men.

One outstanding feature of the banquet was a suggestion by friend Schweitzer, 9AAW of Chicago, that we get a silver cup and present it to the Club showing the most "men miles" attending national conventions. A subscription was taken and we've got the cup—who wins it?

Clyde Darr, 8ZZ, was Chairman of the Convention.



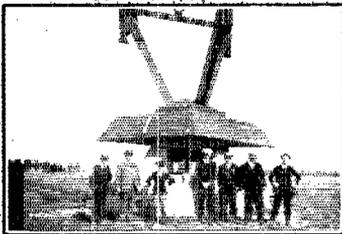
MAIN APPARATUS ROOM
 6000 cycle 750 K.V.A. generators in foreground with transfer switch between them. The current is converted to 11,000 or 44,000 cycles before being fed to the antenna.



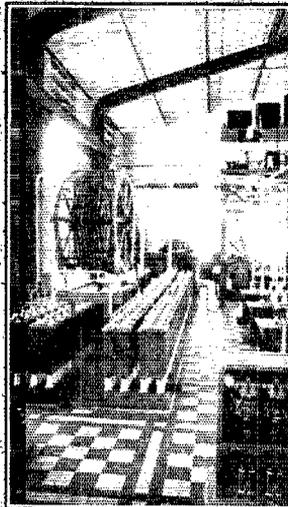
CONTROL BENCHBOARD AND METERS



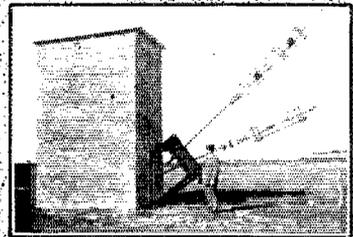
THE KEYING RELAYS



INSULATED MAST FOUNDATION ON THE GERMAN TYPE MAST



BANK OF CONDENSERS WITH TUNING INDUCTANCE



GUY ANCHORAGE

THE NEW INTERNATIONAL STATION LPZ AT MONTE GRANDE, ARGENTINE REPUBLIC.

There are ten towers, eight of which are 680 ft. high and two 710 ft. high. Six of these towers are the German type and four of the French type. Normal antenna current is between 400 and 500 amperes representing about 300 KW in the antenna.

Bowdoin Continues But Communication Poor

MAC MILLAN'S Arctic schooner "Bowdoin", WNP, frozen in the ice above Etah, North Greenland, is still on the job and is being heard occasionally, but with great difficulty, and really successful two-way communication has not taken place in about two months. On April 3d, as we write these lines, 7AIB in Port Angeles, Wash., has just wired a report of the reception this morning of a blind broadcast from WNP saying "ALL WELL DAYLIGHT HERE NOW".

At no time since the Bowdoin arrived at winter quarters have we been without some contact with her, but the past month has been even worse than February. No one seems to have entirely reliable information on her signals. True, reports have been received, but nothing in any details of value appear.

In answer to the appeal for a continuous watch for WNP, the gang did just as was expected—turned out in large numbers. Some hundred stations along the northern border and others scattered all over the United States and Canada got vigorously on the job. Probably because of this effort, the reports did start coming in, but no two-way communication was established nor was anything received from WNP other than faint calls or a "CQ", which Mix seems to have resorted to during the month.

On March 9 it appears that WNP called a station (2BD) in Aberdeen, Scotland, and thanked that station for a broadcast program transmitted during the tests with America. The report appears in *Wireless*

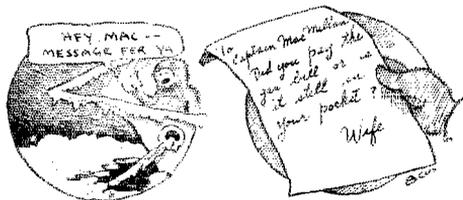
—weak and fading badly. 9DOE reports WNP on March 17, very QRZ and fading, but on March 18 he reports her very QSA, with no further details. 9EI logged WNP March 10 very weak and fading. 3HS reports Mix March 23. 8ES reports WNP on three occasions March 30, saying that Mix was calling a 6 or 7.

The California fellows have been equally unfortunate. WNP was fairly consistent there for several months, but lately signals have not been coming thru. 6AKW reports a very QRZ 500-cycle signal which he thinks was WNP, on March 23.

Of course there are many other reports—the gang is on the job—but we haven't taken traffic from Mix for two months and we are wondering whether the trouble is with WNP or whether some other condition has come up of which we know nothing. Be that as it may, the amateur spirit will not let Mix go for long without some contact and while we know there are many stations keeping the nightly vigil, we want to keep this before you until we know just what can be done and when we can be assured of good contact again.

Some reports have been received of chopper signals or pure C.W. from WNP, and the possibility exists that Mix has had trouble with his m.g. and has been using a low-powered set with dry-cell plate supply. Stations are asked to make particular note of the character of signals heard.

—F.H.S.



World & Radio Review for March 19. Canadian 4HH reports working WNP on March 3 when he transmitted three messages to Mix, which were acknowledged. A power leak prevented any reception other than the QSL for the messages. One of our old standbys, 9DKB, heard Mix on March 10, but too weak to read and signals fading badly. 7ADQ says WNP comes thru quite often but weak and fading. 9EFH reports hearing WNP on March 18

New England Holds Splendid Convention

ALTHO annual banquets have been a feature of First District amateur doings since before the war, and altho for years it has been the custom of the Division Manager to call an annual traffic conference of the O.R.S. men, the first real convention ever held as such in the First was the New England Division A.R.R.L. Convention in Springfield, Mass., March 28 and 29. About three hundred hams from all over the Division and a dozen or so from the Second District attended, and the affair was a genuine success.

It was a hammy, chummy convention, the kind where friendships are made and renewed, a glorious contrast to some conventions we have attended. No business was scheduled for the first day, the afternoon being given over to stunts, a Liar's

Contest, etc. (in both of which the Providence club members carried home the prizes), and in the evening a dance was held at the Hotel Kimball. Yes, an amateur radio dance! Many of the fellows had brot their O.W.'s, and A.D.M. McLean rounded up several dozen of the best looking Y.L.'s in Springfield, so the party was a jolly one. Lee Bates of IGY and his mean flute added lots of fun.

Radio Inspector Butterworth was there and held examinations the next morning, and there was a trip to inspect WBZ. In the afternoon Traffic Manager Schnell presided at a traffic meeting to discuss operating matters, and a very interesting technical lecture, illustrated with slides, was given by Mr. I. F. Byrnes, General Electric engineer. The banquet was held in the evening, A.R.R.L. Treasurer Hebert acting as Toastmaster. Among the speakers were Division Manager Vermilya, Assistant D.M. McLean, his Executive Assistant Miss Helen Daniels, who is a most charming and efficient young lady, Inspector Butterworth, "Paragon Paul" Godley, Lloyd Jacquet of *Amateur Radio*, H. W. Croucher of *Radio Relays*, J. O. Glennie of Dartmouth College, and Traffic Manager Schnell and Secretary Warner of A.R.R.L. Headquarters. The Second District boys formally presented a bottle of LePage's glue to the convention, with the



The Pied Piper —
Lee Bates

hope that the First and Second would always "stick together."

After the banquet the ballroom was cleared and the Worcester crew put on the first Wouff-Hong initiation held in New England, Huddy of III being selected to ride the goat. The work was well done and showed much hard work on the part of the Worcester team, who thruout the convention were the life of the party. One of their stunts was the inauguration of the Independent Order of Yellow Dogs, companion order to the A.O. F.L.E., and many hams were taken in as members of Worcester Kennel.

Great credit is due the men of Springfield, particularly A.D.M. A. S. McLean, and the Worcester R.O.W.H. team, particularly Master of Ceremonies L. A. Bates, for their hard and successful work.

—K.B.W.

U. S. Civil Service Exams

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

JUNIOR ENGINEER (RADIO)

The examination will be held throughout the country on May 7. It is to fill vacancies in various branches of the Government service, at an entrance salary of \$1,860 a year.

Applicants must have been graduated with a degree in engineering, preferably in radio engineering, from a college of recognized standing; or must be senior students in such course and furnish within three months from the date of the examination, proof of actual graduation. Applicants who have completed two full years of the engineering course may substitute for each of the additional years, one year of experience in radio engineering.

Competitors will be rated on general physics and chemistry, pure and applied mathematics, practical questions on radio engineering, and education, training, and experience.

ENGINEER—\$3800 to \$5000 per year.

ASSOCIATE ENGINEER—\$3000 to \$3600 per year.

ASSISTANT ENGINEER—\$2400 to \$3000 per year.

Applications received up to July 1st. Positions open at Bureau of Standards, Washington. Applicants may choose from following optional subjects: Electrical Engineering, Mechanical Engineering, Civil Engineering, Chemical Engineering, Radio Engineering, Materials Engineering, Ceramic Engineering. Competitors will not be required to appear for examination but will be rated on education and experience and on information submitted with application.

RADIO INSPECTOR—\$2400 per year.

Applicants must have accredited High School education and at least two years experimental special radio work, manufacture, adjustment, installation, operation or maintenance of commercial radio apparatus. Applicants may substitute one year in technical school for each six months of experience and may substitute six months of experience for each year of High School.

Full information and application blanks for the above 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 customhouse in any city.

Capacity and Inductance Measurements for the Amateur

By Frank Reid Stansel

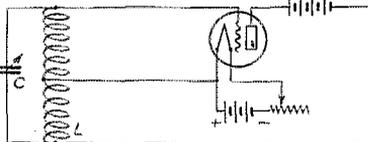
NOW and then the average amateur wishes to measure the inductance of a coil or the capacity of a condenser. Extreme accuracy is usually not necessary nor are precision instruments and standards available. The writer hopes in this article to show how the desired measurements may be made using only such instruments as one may expect to find in the average amateur's possession. Errors as high as 5% in the final result have been tolerated as this degree of accuracy is sufficient for most amateur work, but by careful procedure it is possible to secure final results that are more accurate.

Units of Capacity and Inductance

In the formulae in this article, capacity is always measured in microfarads and inductance in centimeters. 1,000,000 centimeters are equal to one millihenry, consequently 1,000 centimeters are equal to one microhenry.

The Apparatus Used

The necessary apparatus is a heterodyning wavemeter and an ordinary receiving set. Plenty of data on wavemeters have been published recently, but for some reason the heterodyning wavemeter has not been popular. This type of wavemeter is easily handled in conjunction with an oscillating receiver. It has one disadvantage: it uses an extra tube. However, since it is not necessary to use the wavemeter and the receiving amplifier at the same time,



L - 20 turns No. 14 D.C.C. on tube $\frac{1}{2}$ " dia. tapped at center.
C - .0005 μ fd. maximum

FIG. 1 - OSCILLATOR CIRCUIT

why not use the same tube for both purposes, taking it from the socket of one and putting it in the socket of the other? Of course, if you have an extra tube, so much the better.

The wavemeter used to obtain data for this article is nothing but a small Hartley oscillator stripped of all unessential parts. No grid leak or condenser need be used but the polarity of the A battery and the

location of the filament rheostat must be as shown in Fig. 1. The variable condenser preferably should have a maximum capacity of .0005 μ fd. A larger one may be used but the tube will not oscillate consistently through the entire range. A hard tube should be used and the plate voltage may be absurdly low—2 to 4 volts usually will be sufficient. In fact it is easy to make a UV-201 oscillate at sufficient strength by short-circuiting the B-battery posts and using for plate voltage nothing but the small drop across the filament rheostat. When doing this it is well to use a fully charged A-battery so that as much of the rheostat as possible may be in the circuit. A UV-202 will operate in this way but to date no success has been had with a UV-201-A, although it will oscillate readily with 4 volts on the plate. (This is not a mere stunt. In our experience steadier operation is obtained than with the usual 20-40 volt plate supply.—Tech. Ed.)

Calibration

If the wavemeter is to be calibrated from WWV or a similar source, the heterodyning variety has an advantage over any other type. It may be calibrated from one received wave at the announced wavelength and at half this value. As most amateurs know, an oscillating tube generates not only the fundamental frequency but a number of harmonics at one half, one third, one fourth, etc., of the fundamental wavelength. Of these harmonics the double-frequency or half-wavelength is strong enough to be useful. Tune the receiving set to WWV and carefully secure a "zero beat". Now start the heterodyning wavemeter into oscillation and tune it to the received wavelength (leaving the receiving set alone) until the heterodyning whistle from it disappears. Under some circumstances there may be a space of one degree in which the beat note is zero; the desired point of resonance is in the center of this space. Usually the adjustment is much sharper. This gives you the setting for the announced wave, as you now have zero beat between the oscillating receiver, the heterodyning wavemeter and the incoming signal. Record the wavemeter scale reading, and, *without changing the*

—Much trouble is caused by careless use of heterodyne wavemeters. The same tube, the same batteries and the same connecting wires must always be used, with everything kept in the same position. The best way is to fasten everything including the A and B batteries, solidly on a board, renewing the batteries with others of the same sort when their voltage drops even a little.

receiving set, reduce the capacity of the wavemeter condenser to about one fourth of its former value. You will find another beat note which also should be reduced to zero by carefully adjusting the wavemeter. This point is the setting for one half of the announced wave of WWV. Notice that you are setting to a harmonic of your receiving tube, not to a harmonic of WWV. It is therefore very important to leave the receiver alone while making the adjustment. As to the accuracy of the method, the writer once calibrated a wavemeter at 125 meters from a 250-meter wave and later in the same night re-calibrated directly from a 125-meter wave. The two calibrations agreed exactly.

In addition to the calibration of the wavemeter the calibration of the variable condenser should be obtained. This can usually be obtained from the manufacturers, but if a special calibration can be obtained, so much the better.²

Capacity Measurements

Measurements of capacity are very simple. Start the wavemeter and receiving set to oscillating and set them to resonance by the zero-beat method. Now shunt the unknown condenser across the wavemeter condenser as shown at C_x in Fig. 2 and retune the wavemeter to resonance, leaving the receiving set untouched. Now read the wavemeter condenser again. The unknown capacity is equal to the difference between the two capacities at which the wavemeter condenser was set.

Inductance Measurements

The method of measuring inductance is somewhat similar. Tune the wavemeter and receiving set to resonance. Read the wavemeter condenser and call this C_1 . Shunt the unknown inductance across the wavemeter inductance, as shown at L_x in Fig. 3, and by increasing capacity retune to resonance, without touching the receiv-

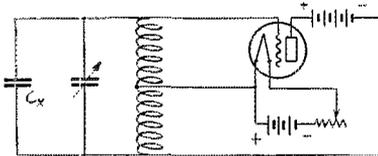


FIG. 2 CAPACITY MEASUREMENT

ing set. Read the wavemeter condenser again and call this C_2 . The unknown inductance, L_x , will be

$$L_x = \frac{K}{C_2 - C_1} \tag{1}$$

in which K is the value for LC, for the wavelength of the wavemeter at the first

setting, and C_1 and C_2 are the capacity of the wavemeter condenser at the first and second setting respectively. If the inductance of the wavemeter coil is known, the value of K may be calculated from

$$\lambda = 59.6 \sqrt{L C_1} \tag{2}$$

or easier still taken directly from an LC table such as found in Appendix 5 of the



FIG. 3 — INDUCTANCE MEASUREMENT BY METHODS OF FORMULAS 1 AND 3

second edition of "The Principles Underlying Radio Communication."

In Formula 1 the distributed capacity of the wavemeter coil does not have any effect.

Pure Inductance

Sometimes the pure inductance of a coil is wanted. To get this it is necessary to correct for the distributed capacity of the unknown coil. According to the Bureau of Standards the distributed capacity (in micro-microfarads) is about equal to the coil diameter in centimeters, provided that the coil is closely wound in a single layer. However, this value is not accurate enough to substitute as a correction. Formula 1, corrected for C_a , the distributed capacity of the unknown inductance, would be

$$L_x = \frac{K}{(C_2 - C_1) + C_a} \tag{3}$$

If the value of $(C_2 - C_1)$ can be made very large relative to C_a (which for the usual type of coils can be estimated as above) Formula 1 may be used, but otherwise a correction must be made. In general, it is recommended that Formula 1 be used if a value of $(C_2 - C_1)$ greater than .0002 $\mu\text{fd.}$ can be obtained. Notice that the greater the difference in the size of the unknown inductance and the wavemeter inductance the larger the value of $(C_2 - C_1)$ will be and the less the error introduced by neglecting C_a . With the size coils necessary on a wavemeter covering amateur waves, $(C_2 - C_1)$ will be greater than .0002 $\mu\text{fd.}$ only for very small values of the unknown inductance, and these facts lead to the suggestion that a larger wavemeter coil could be used and the measurements made on higher wavelengths. Since WWV is now sending calibrated waves up to 2000 meters, some experimenter might try this.

If the value of $(C_2 - C_1)$ is less than .0002

²—Such work is done by the Bureau of Standards and by the Washington Radio Laboratories.

uld. a different method will be necessary. First tune the wavemeter and the receiving set to resonance as previously described. Call this setting C_1 as before. Then shunt the unknown inductance across the wavemeter, reset the wavemeter condenser for resonance as before, and call this setting C_2 . Next decrease the wavemeter capacity, leaving the receiving set exactly as it was before, and bring the wavemeter in resonance with the receiving set's harmonic at half the wavelength. Let the value of the capacity of the wavemeter at this setting be C_3 . Then the *pure inductance* of the unknown coil will be

$$L_x = \frac{3K}{3(C_2 - C_1) + C_3 - 4C_3} \quad (4)$$

and the distributed capacity of the coil will be

$$C_d = \frac{C_2 - 4C_3}{3} \quad (5)$$

It will be noted in these formulas the accuracy of final result is dependent on the accuracy of the reading of the wavelength and of the capacity of the wavemeter condenser. The receiving set is simply used to furnish a constant frequency source of oscillations and any losses in it, except as they may effect the sharpness of the point resonance, *have no effect on the results obtained*. All of the formulas given are theoretically correct. If the distributed capacity of the coil is low enough to neglect, Formula 1 is preferable to Formula 4 since, being simpler, errors are less likely to become cumulative. At the most the error in the final results should never exceed 5%. This error may be made even less by measuring the value of the inductance several times on a different portion of the scale if possible, and averaging the results.

The derivations of the formulae have purposely been omitted. The writer will be glad to send them to anyone interested.

The Second District Holds Forth

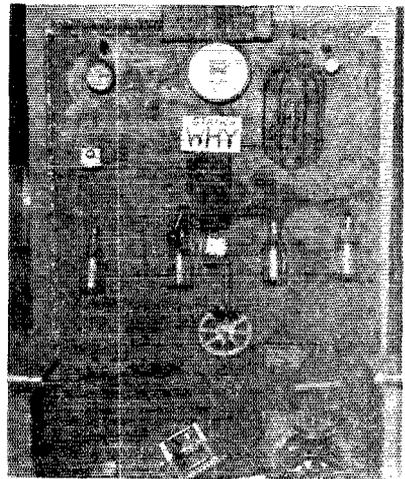
FROM March 4th to 7th, inclusive, the Executive Radio Council of the Second District held its annual affair at the Hotel Pennsylvania, New York.

The show, held in the main ballroom, was not vastly different than other radio shows. It was well patronized by the gang and the public, and we understand was quite successful financially. One of its most interesting features, we thot, was the series of club exhibits on the gallery surrounding the floor. Here various of the clubs comprising the Council put on displays. The Bronx Radio Club exhibited their successful Transatlantic receiving

station, and with maps and posters put on a very interesting record of their work and an eloquent tribute to the amateur. The Radio Club of Brooklyn exhibited their broadcasting station "WHY", the front bunkboard of which is illustrated in our photograph; note the "wave-trap", the "bottles", etc. The Fink transmitter in the booth of the Radio Club of Long Island was an attractive constructional job.

Aside from the club booths, about the only amateur activity was the banquet on the night of the 5th, and the R.O.W.H. conclave on the 6th. Of the banquet, we fear that the less said the better. Among the good things about it that stick in our memory, however, are Paul F. Godley's very helpful comments on amateur progress, George H. Clark's illustrated account of the activities of the Radio Corporation of Egypt, the funniest thing we have encountered in radio in years; and the announcement by the Council of the award of a medal annually to the amateur making the best technical contribution to the amateur art, the 1923 award going to John L. Reinartz for his development of the short-wave transmitter. About 600 were present, almost all amateurs.

David Talley as Master of Ceremonies staged a very successful Wouff Hong in-



The R.C.B. station, "WHY?" ("Foto Topics")

itiation, the Radio Club of Brooklyn being responsible for most of the work. The R.C.B. men deserve all kinds of credit, having had but three weeks' preparation. Dr. L. Dunn was M.O., G. R. Herbert O.M., F. R. Doscher O.D.O., U. D. Ross QRM, F. Wilson QRN, B. J. Fuld I.K.I.A., H. H. Bentman P.A., and D. F. Kirchek M.M., while 2BRB was the vicarious candidate. Congratulations are due the crew for its success in the face of obstacles.

A Sixty-Foot Featherweight Mast

By C. E. Dengler, 8KS

WHAT a suspicious lot of cusses we fellows are, anyway. A few months ago, in the description of an amateur station in *QST*, mention was made of the fact that the antenna was supported by a mast constructed from ordinary galvanized conductor pipe such as is used to drain water from roofs. Of course everybody said it couldn't be done as this was entirely too thin to support itself, let alone an antenna.

The writer had just finished many long days of work lowering, moving, painting and preparing to raise the old sixty-foot iron mast up into place again, and then just when it had started up nicely the middle section seemed to suffer with cramps and after the writer had taken a good look at the remains the stack of *QST*s were hauled out and the search started. Then that few lines about the gutter pipe mast, and the old flivver went rambling away as flivvers do. In a few minutes it returned with a bundle of conductor pipe tied to the starboard gunwale.

In a few short hours a sightly mast lay in the yard, ready to raise its head skyward.

The pipe was #26 gauge galvanized conductor pipe. The sections were joined by simply telescoping one piece into another for about 12 inches and then soldering the joint. A tin cap was soldered to the top. The guys from the old pole were fastened on by wrapping around the pipe and then soldering with a good blow torch.

A set of guys every 20 feet is more than sufficient and will support the mast rigidly.

It is not necessary to go into more de-

tail as no trouble will be experienced if a small part of the brain and brawn necessary to erect a heavy pole is used.

This mast easily supports my 70-ft. cage and has gone through some severe wind and sleet storms without a quiver.

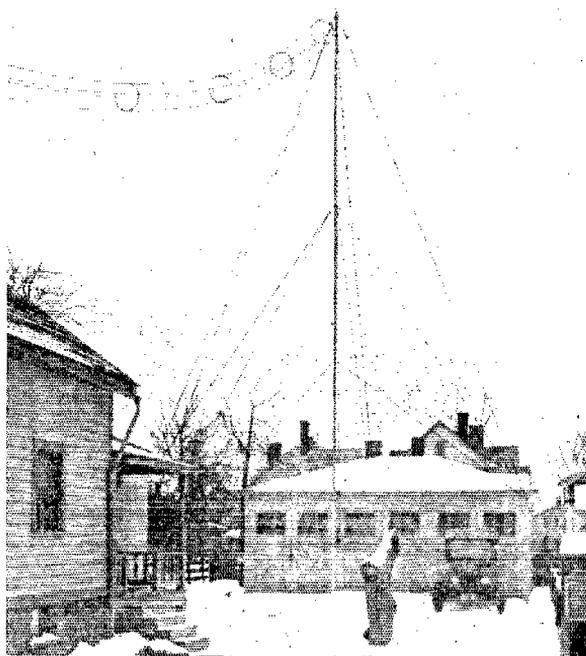
The old mast was made of extra-heavy black iron steam-pipe, ranging from 3-inch

at the bottom to 1½-inch at the top, and weighed about half a ton.—The new mast stands 58 feet above the ground, perfectly rigid and yet so light that one man could easily carry it when on the ground. There is no more cause to worry about how many of the neighbors' houses will be flattened out if the guys should rust out; and what seemed like bad luck when the old boy doubled up has really proved to be the best kind of luck and I have ridden myself of another white elephant.

So if you need a new pole, bury your suspicions and go to it.

It's sure FB here, OM. I will be glad to give any other information I can to anyone sending a self-addressed envelope for a reply.

(The first of the "tin" masts was erected at old 9DM, Lawrence, Kansas, about 1912. Those at 9LQ followed, then the idea escaped to Kansas City. All of these masts were guyed every 10 feet. The joints were made with the aid of 24" drive-fit sleeves, lock-seamed, from No. 24 gauge material. The ends of the sections were reinforced by No. 22 gauge discs soldered on. The guy wires were passed *through* the sleeves between ends of the sections and soldered. These masts never fell down, and there are real winds in Kansas.—Tech. Ed., "LQ").



That "Station Efficiency" Contest and the New American Amateur

By S. Kruse, Technical Editor

Many senseless things are going out of amateur radio. The rubber-stamp-message mania was quietly knocked in the head some months ago. The long-wave outlaws are thinning out rapidly, not because they are learning any better but because their neighbors have made life too miserable for them. Good tuners that really go down thru the amateur band are being built everywhere. Soon we expect to hear that a few CQ hounds have been fried over their own sending tubes by indignant members of the League.

A MERICAN amateur radio, about six months ago, had settled down to thinking that we knew it all now. A hard jolt was needed to cure us of this crazy idea.

Australia 2CM administered the required jolt—nothing that ever happened to American Amateur radio has so roused it as those remarkable distance records that Maclurcan hung up. We had never done

years in trying to see how powerful we could make our stations, and hadn't learned much of anything about radio transmitters while doing it. Most of us had not given a thought to efficiency—what did that matter as long as the meter went clear over to 6 amperes? Practically none of us paid the slightest attention to making the signals *readable* or *steady*; no, the main idea was to make a *noise*.

The Records That Have Come In

Station Sending	Station Receiving	Date	Local time at sending station	Plate Power				Miles per Watt
				Miles Distance	Volts	Mis	Watts	
Daylight records with confirmations								
9CMY, Emporia, Kan.	9EL, Council Grove, Kan.	Nov. 12	3:15 P.M.	20	25	3.5	0.062	319.
9BQP, Crawfordsville, Ind.	4EB, Palmetto, Ga.	Jan. 18	3:15 P.M.	500	400	70.	28.	17.8
9BQP, Crawfordsville, Ind.	9CLW, Burlingame, Kan.	Feb. 29	8:05 A.M.	500	400	70.	28.	17.8
8CF, Detroit, Mich.	8JJ, Washington, D. C.	Dec. 3	9:00 A.M.	400	—	—	34.50	11.6
Night records with confirmations								
4OY-4RJ, San Juan, Porto Rico	3BDO, Vineland, N. J.	Dec. 9	3:15 A.M.	1500	60	—	—	—
125-meter Canadian night records with confirmations								
3NI, Ft. William, Ont.	4XC, Atlanta, Ga.	—	—	750	45	8.	0.36	2080.
1BQ, Halifax, N. S.	British 20D	—	—	3000	—	—	20.	150.
1BQ, Halifax, N. S.	3RQ, Kitchener, Ont.	—	—	1000	—	—	0.80	1250.
3BQ, Kitchener, Ont.	1BQ, Halifax, N. S.	—	—	1000	—	—	1.40	711.
9BL, Halifax, N. S.	2BN, Montreal, Que.	Feb. 19	—	700	—	—	1.25	560.
Daylight records without confirmation								
9AHH, Eagle Grove, Iowa	9DES, Caney, Kan.	Dec. 17	12:40 P.M.	80	—	—	.6	133.
5ZK, Franklinton, La.	8DWK, Jackson, Mo.	Dec. 30	9:45 A.M.	400	750	90.	67.5	5.9
5AHD, Aitns, Okla.	—	—	—	400	—	—	50.	8.
Night records without confirmation								
8HJ, Elmira, N. Y.	1BVB, Westerly, R. I.	Nov. 9	5:00 P.M.	450	60	10.	0.60	750.
9AHH, Mankato, Minn.	9DQU, Decatur, Ill.	July 8	—	400	60	8.5	0.51	782.
6AWS, San Francisco, Cal.	7MN, Ketchikan, Alaska	—	—	1000	400	40.	16.	82.5
6AWS, San Francisco, Cal.	6CEU, Honolulu, Hawaii	—	—	2200	400	40.	16.	130.
6AWS, San Francisco, Cal.	8BDA, Parkersburg, W. Va.	—	—	1300	400	40.	16.	81.2
7AB, Port Angeles, Wash.	WNP, Etah, Greenland	—	—	—	—	—	35.	74.
3SM, Philadelphia, Pa.	Pacific Ocean	—	—	6500	—	—	185.	39.4
5HT, Ft. Worth, Tex.	7MN, Ketchikan, Alaska	Dec. 28	6:00 A.M.	2270	1700	300	510.	4.5
5HT, Ft. Worth, Tex.	6CEU, Hawaii	Dec. 26	3:35 A.M.	3200	1700	300	510.	6.3

Other records that were submitted cannot be used for one of the following reasons. Either the tube equipment was mentioned without giving the actual input in watts, the wavelength used was illegal, or no statement was given as to the station worked. Stations submitting such records were 9CPO, 9CKT, 4IU, 5SR, 1CMP, 6AJF, 1AWN, 5AIP, 7BJ, Canadian 5GO, Canadian 3WS, and some additional material from Canadian 3BQ; also Harry Wilkenscham, call not known.

anything to compare with that—we very evidently did *not* know all about it.

American Amateur Radio Wakes Up

American amateur radio sat up and began to think—if we had been beaten so badly there must be a reason. What was the reason?

The answer is very easy—we had *wasted*

We said at the head of this article that a lot of foolish things had passed out of amateur radio.

Now it is the turn of the "ether buster", the "watt burner", the lad whose ideal in life is to wreck the antenna ammeter.

In the place of this pest we will have the New American Amateur, whose ideal is not a *big* station, but a *good* station.

who does not care how far his station reaches but who will try to make it perform as perfectly as possible. Such a station will be on legal waves *always*, it will transmit a clean-cut steady signal that does not waver or wobble, and it will have an antenna that stays put thru storm and

by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

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

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

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

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

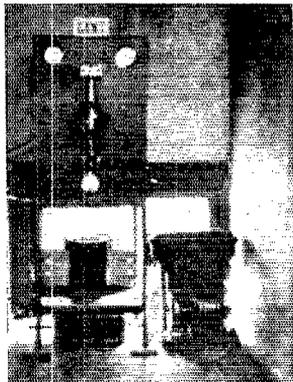
5. That the average number of copies each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is(This information is required from daily publications only.)

K. B. Warner.

Sworn to and subscribed before me this 17th day of March, 1924.

F. L. Pratt, Notary Public.

(My commission expires February 1, 1929.)



The Big Bottle That Burns 700 Watts as 6AWT or 16 Watts as 6AWS.

sleet. In the future the question will be—as the ad. men say—"Not how much, but how good."

Starting in the Right Direction

That isn't idle talk—it is straight fact. The interest in loose-coupled sets is increasing, we hope that the direct-coupled ones will be outlawed soon. And certainly there is no end of interest in the business of working better distances with low power.

Steady Waves

At least half of the men submitting logs say that their success with low power is due mainly to a good tone and a steady wave, secured by running the tubes conservatively.

Operation

Four of the men also point out that in low power work it is particularly necessary to call in an orderly fashion. No one will listen to a weak signal that makes 164 calls before signing.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of QST, published monthly at Hartford, Conn., for April 1, 1924.

State of Connecticut }
County of Hartford } ss.

Before me a Notary Public in and for the State and county aforesaid personally appeared K. B. Warner, who, having been duly sworn according to law, deposes and says that he is the business manager of QST and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required



Experimenter's Section Report

AT the time that this is in the hands of our members the long-promised letters giving details about the Experimenters Section will have been received by all those who signed up.

We have been very agreeably surprised at the large number and the excellent equipment of the laboratories which have offered their assistance. Amongst the men who have signed up for the Experimenters Section are some notables both in this country and abroad.

The intention is not at this time to initiate a complicated organization. We feel that the less organization there is, the better everything will operate. Our purpose is, as stated in the beginning, to act as a sort of clearing house between various experimenters, putting into touch with each other those men who are working on the same problems and presenting to the readers of *QST* whatever valuable conclusions may be arrived at.

Concerning Correspondence

Because the enrollment has been so much beyond expectations it follows that for a time correspondence will not be handled as promptly as we would wish. This will be remedied as rapidly as possible and all helpful suggestions will be very much appreciated indeed.

Current Work

One of the questions being worked on right now is the business of low-loss tuned circuits. This is being gone at from a number of angles and we will be pleased to put in touch with each other all of those who are interested in the following subjects: Most desirable material for condenser insulation.

Best disposition of this material.

The effect of frequency upon condenser resistance.

The effect of tube material and thickness upon coil resistance.

The effect of insulation and varnishes upon coil resistance.

The necessity for keeping coils away from metallic and insulating materials in the set.

It is impossible to go into the matter in more detail and it is requested that those wishing to do any specific work, or now engaged in that work, write us as to the people with whom they would like to be put in touch.

Transmission Experiments

The experiments conducted last summer at 8AQO have now been partially calculated and it is believed that some useful information has been gained regarding the

improvement of transmission as the wavelength is lowered for any given antenna. To prevent repetition, we will be glad to make suggestions to those who wish to work along this line.

Circuits which will be freer from key thumps, harmonics and the like, are in popular demand. There is much room and need for work on transmitters that will be very much superior to the things now in use by amateurs.

Filters

The filter question has not been satisfactorily settled for generators. Some additional work along this line is needed. One of the leading manufacturers of high voltage generators is now doing such work and will be pleased to hear of others who are interested.

Rectifiers

The electrolytic rectifier is still receiving attention. Three or four different lines of attack are now being followed by experimenters in this Section in three different countries.

The mercury arc rectifier is also receiving some attention and four of our experimenters are now working on it. Others are requested to write.

The synchronous rectifier has not performed satisfactorily in the past. Truly satisfactory filtering has not yet come to our attention. Several experimenters are willing to work on this matter if a reasonable line of attack can be suggested.

Counterpoises

The counterpoise is not at all well understood. So much remains to be done on it that the problem cannot be stated in this limited space. A circular letter of suggestions is available.

Special Coils and Helices

Very little seems to be known about helices. Rough experiments made recently indicate that for amateur work the so-called "pancake" of straight strip offers the best possibilities. It is possible in part to calculate the resistance of such coils but experimental checks are very much needed. Anyone having equipment for precision measurements of this type can assist greatly.

Power-Line Interference

A variety of methods for locating sources of interference on power lines has been suggested. We would like to hear of fields where they may be tried out, always being sure to mention someone who will be willing to do the work.

Dead Spots

A collection of information upon dead

spots is slowly being made. The response of the membership has been quite unsatisfactory so far, although some excellent replies have been received. The intention is to accumulate enough reports to gain some satisfactory bases upon which to plan a possible experimental investigation. Nothing active can be done unless many more reports are received. All members of this Section are therefore urged to get from their neighbors as many such reports as possible. For the present all that is needed is a statement of the location of dead spots, preferably indicating the wave lengths which were used. Address these to the Technical Editor.

Megger Available

Several meggers are available for measurements of extremely high resistances, such as insulation resistance. Anyone having a problem along this line should communicate with us as it may be possible to put him in contact with the owner of a megger. However, these usually are available in the laboratories of electric lighting companies.

Lunar Observations

For some time there has been an increasing feeling that radio transmission is affected by the moon. Some data are already available and those desiring to make systematic observations will find them of interest.

Receivers for C. W.

We have received two interesting suggestions as to possible methods for increasing the sensitivity of a continuous wave receiver. These methods are probably not useful for anything else.

They could best be attacked in a laboratory equipped for tube experiments.

Audio Amplifying Transformers

We are very anxious to get into contact with someone having experience in the design of audio transformers. The object is the creation of an audio transformer which shall give maximum amplification at 1000 cycles and drop rapidly to both sides. Such a transformer will be quite useless for telephony but will be ideal for signal work.

Short Wave Transmission and Reception

We have on hand a considerable list of station owners who desire to make particular tests on short waves, mainly below 30 meters. Others interested in this same thing may have the list on request.

Daylight Tests

We also have a brief list of stations which desire to make daylight tests, mainly at noontime. Some of these stations are operating on standard amateur waves, others are special licenses.

Comment and Suggestion

Members of this Section are invited to

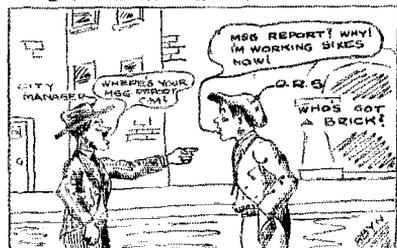
comment freely upon the problems that we should take up and the way in which they should be attacked. In doing this please take note that those problems relating purely to the traffic handling are not within our province but should be referred to the Traffic Manager.

—The Technical and Department Editors.

Affiliated Clubs

- THE A.R.R.L. takes pleasure in announcing the affiliation of the following radio societies at a meeting of its Board of Directors held March 8, 1924:
- Haverford College Radio Club, Haverford, Penna.
 - The Radio Club of the Boys Club, New York, N. Y.
 - Universal Radio Club, Bayonne, N. J.
 - Bronx Radio Club, Bronx, New York City.
 - Indianapolis Radio Club, Indianapolis, Ind.
 - The Phillips Exeter Academy Radio Club, Exeter, N. H.
 - Tulsa Council of the American Radio Relay League, Tulsa, Okla.
 - West Gulf Radio Club, Enid, Okla.
 - The Commonwealth Radio Association, Boston, Mass.
 - Downtown Radio Club, New York, N. Y.
 - Telephone City Radio Association, Brantford, Ont.
 - Glenville High School Radio Association, Cleveland, Ohio.
 - The West Hi Radio Club, Cleveland, Ohio.
 - Amateur C.W. Association of Spokane, Spokane, Wash.
 - Stanford University Radio Club, Stanford Univ., Calif.
 - The Citizen Radio Club of Omaha, Omaha, Nebr.
 - Associated Radio Operators of Denver, Denver, Colo.
 - Armour Radio Association, Chicago, Ill.
 - San Diego Radio Club, San Diego, Calif.
 - Dickinson Radio Club, Dickinson, N. Dak.
 - Radio Club of Long Island, Richmond Hill, L. I.
 - The Northern New Jersey Radio Association, Ridgefield Park, N. J.

PESTS WE CAN GET ALONG WITHOUT THE BIRD WHO WONT QSR ANY MORE.



An Amateur in the Lighthouse Service

OUT in the middle of Lake Superior, forty-five miles north of Marquette, Michigan, is Stannard Rock Light. The lighthouse itself is located on a submerged rock and is of massive reinforced concrete construction, built to withstand the worst of the winter storms. In order that the attendants would not be isolated from the outside world for weeks at a time during rough weather when no landing could be made, a small radio telephone set was installed at the lighthouse and another on shore at the Marquette lighthouse. This was early last summer. Not much success was had in working between these two stations, however, because trouble was experienced in covering the distance and it was not possible to keep a regular operator at the Marquette station.

During October, C. H. Wesser, who is the central figure in this story, prepared to install two larger transmitters for use at the Stannard Rock and Marquette lighthouses so that reliable telephone communication could be assured. Each of these new sets employed three 50-watt tubes; an oscillator, a modulator, and a voice amplifier. By the first of November all was in readiness to make the trip to Stannard Rock Light with the new set. Mr. Wesser writes as follows:

"Before leaving Marquette a schedule was made with Mr. R. S. Rose, 9DRR, in Marquette, Michigan, so as to have some one to test with and to communicate with in case anything might happen while out at the "rock", for there would be no other communication with shore until around the

5th of December when the lighthouse tender would come out and take us off.

"After a miserable trip in a 38-foot launch the Stannard Rock was reached and a landing made after some difficulty. I found the old set I installed last summer still there just as I had left it, and to my

surprise it still worked. It put 1.7 amperes into the antenna so the next noon I was able to work 9DRR, who came back with "QSA, F.B". During the next few days I tried running the new 500-watt motor-generator off of a gas - engine - driven D.C. generator but the big M-G was too much for it. This halted the work of installing the new transmitter so I immediately prepared to go ashore. This was easier said than done, however, for the wind had picked up so that lowering the launch which was laid up on the pier was impossible. We must wait for a calm day. The day did not come until the 22nd of Novem-



STANNARD ROCK LIGHT, from which Mr. Wesser operated NASK during the month he was stormbound there. The vertical antenna, 47 feet long, can be seen at the right. The light itself is 101 feet above water level.

ber.

"Had it not been for that small transmitter, and all the amateurs I worked, particularly 9DRR, I believe I would be in an insane asylum today. 9DRR gave me news and weather reports every day, handled traffic for our office, and if he could only have sent us something better than tea leaves to smoke, life would not have been so bad out there on the "rock" 45 miles from nowhere. Outside of 9DRR one other station, 9ZT, deserves credit for sticking to the schedules I made with him. He was worked dozens of times, even after sunrise, and quite a few messages handled.

"Reception out there was exceptionally

(Concluded on page 64)

Daylight Transcon at Last

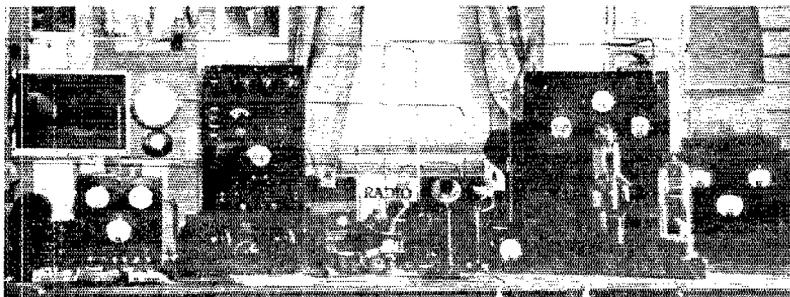
6XAD and 2ADM Work Thru the Sunrise

On the morning of January 12th 6XAD, of Catalina Island, Calif., and 2ADM of Schenectady, N. Y., held a chat by radio. At 6:36:30 A. M., Pacific time, they ran out of conversation and signed off. Neither one of them realized that they had made history—it wasn't till weeks afterward that accidental reference to the almanac showed that on the 29th the sun had risen on Catalina at 6:29—and that the daylight transcon jinx had been beaten at last!

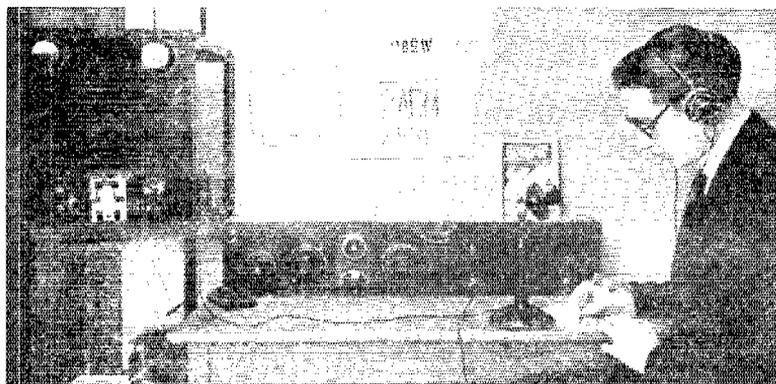
ALTHO the final accomplishment of daylight Transcontinental amateur work came when least expected there was nothing accidental about it. Much work had been done on the problem and the story of this work makes interesting reading.

In the past six months many an amateur radio man has crawled out in the chilly

this work was done on special wavelengths, which barred stations not having "X" licenses. Because of this, and also because the standard waves seemed to be harder to get over, one string of stations was formed to make the attempt with waves *above* 176 meters. Originally the string was—10A-1HX, 8AGO, 9AOG, 5XV, 6XAD. After a few weeks this had simmered down



6XAD, Major Laurence Mott, Catalina Island, Cal.



2ADM, Ernest Hobbs, 757 Chrysler Ave., Schenectady, N. Y.

hours of Sunday morning to "work thru the sunrise". The idea has been to connect with a distant station before sunup and then to work as far into the day as possible. In many cases the results were so good that stations tried noontday schedules and worked surprising distances on the standard amateur waves.

Daylight Transcon Attempts

Soon several groups of stations attempted daylight transcontinental relays. Much of

to 1HX-10A, 9AOG, 6XAD, with occasional help from 3APV, SVE, 9AAW, 9EHT, 5XV and 5XD.

For months this string of three stations connected up four mornings a week at about 6:30 A.M. (Eastern) and worked until signals faded out. If keeping at it would win, this string should certainly have worked—and several times it *almost* did. One morning 1HX-10A worked 9AOG until 8:51 (Eastern), and that had to be the

morning 6XAD was out of power. On another day 6XAD and 9AOG were QSO until 10:03 A.M. (Central), and that was the day there was a savage power leak in Hartford. Dozens of mornings things went beautifully until 90 minutes after sunrise at Hartford—then contact with 9AOG always broke. With the same tiresome regularity contact between 9AOG and 6XAD broke 90 minutes after sunup in Lawrence.

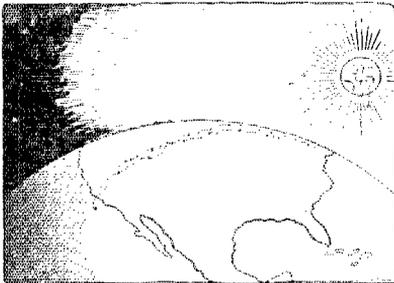
A few tests showed that this sort of thing could be dodged by getting down to 70 meters—but *that wasn't the game*.

Finally 1HX-10A-1XAQ had to be dismantled and the tests stopped, with nothing to show but 200 pages of detailed logs about sunrise signals, and a record of many messages handled.

6XAD and 2ADM put it Across

In these tests 6XAD had been the strongest station by far, and Mott kept at it after the relay string was abandoned. One eastern station after another was tried and finally 2ADM of Schenectady, New York, was picked on as being the most promising. A number of tests were held but always communication failed at the critical moment when the sun appeared.

On the morning of January 12th no real test was made—the conversation was perfectly casual, and neither operator paid much attention to the time. At 6:36:30 they ran out of talk—and quit. They seem to have lost faith in the chance of beating the daylight handicap, and neither one



seems to have noticed that they had actually done it. Imagine their astonishment and delight when later inspection of the almanac showed that they *had* actually done it—had actually “worked thru the sunrise”.

Just Keeping At It

The thing wasn't done by sneaking down below 150 meters; there wasn't anything freakish about the apparatus used. Both stations used their regular wavelength—2ADM at about 195 and 6XAD at 230 meters. We don't know just what power was used at Catalina but 2ADM used only a pair of UV-202 tubes running on 750 volts kenetron-rectified supply and generating an antenna current of 1.2 amperes.

A New Mark To Shoot At

In all of the League's Transcontinental tests it has been the rule that the day extended from sunrise to sunset. Therefore the 2ADM-6XAD record must be accounted as real daylight work. But it is pretty generally known that the full effect of daylight does not take place at once; good radio conditions last some time *after* sunrise and they start some time *before* sunset. It will be interesting to see if we can put a test over at *noon*.

Now it isn't noon all over the U.S.A. at once; we have a 3-hour time-difference to allow for. Before doing this it will be worth while to look at our past experiences. In the 1HX-10A, 9AOG, 6XAD tests some things were learned. By months of careful logging we found that real daytime conditions follow about 90 minutes behind the sunrise—excepting on cloudy days when they are sometimes 120 minutes behind. On ordinary days the very best west coast signals are received about 19 minutes after the sun gets entirely clear of the horizon, altho this may be delayed 20 minutes on a cloudy day. After that the signals begin to die down slowly and at the end of the 120 minutes mentioned above there seemed to be full noontime conditions.

Tests up and down the coast gave results of the same sort but the time was shorter. The signals then went out 35 minutes after sunup and they went out very suddenly at that.

The same thing appears to happen in the Central time belt.

To make sure that we are working under middle-of-the-day conditions we will allow 3 hours at both ends of the day.

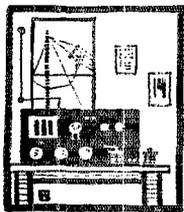
About the latest west-coast sunrise is at 7 A.M., sometime during January. With our 3 hour allowance this means that a full-daytime test cannot start until 10 A.M. Pacific time. At about 1:30 P.M. of the same day (we are still talking Pacific time) the sun will set on the New England coast and the test-day is over. With our three-hour allowance this means we must stop at 10:30 A.M., Pacific time.

That brings about the rather foolish requirement that the message must get over and the reply be returned between 10:00 A.M. and 10:30 A.M. Pacific time or in other words between 1:00 P.M. and 1:30 P.M. Eastern time.

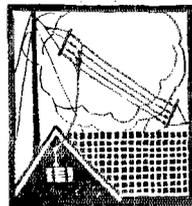
Of course that's making it too rigid and no one will object to a midday record that is made in any time between 9:00 A.M. and 11:30 A.M. Pacific time (in other words, between noon and 2:30 P.M. Eastern time), just so long as it is done on a *standard amateur wave* so that all hands have a chance.

We can name three stations that are going to try it.

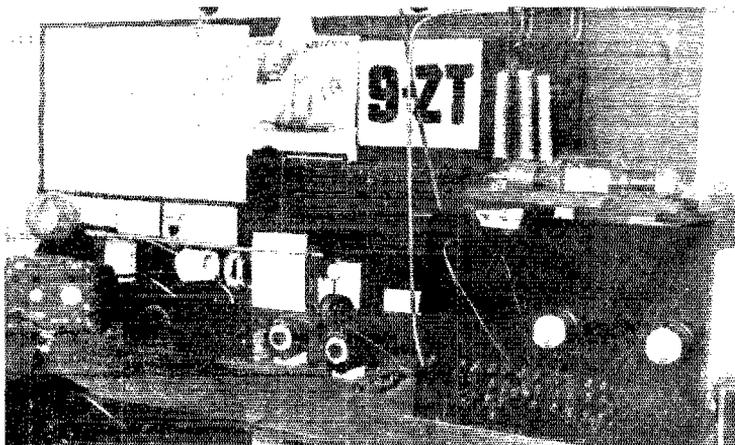
—S.K.



Amateur Radio Stations



Wallace Wins 1923 Hoover Cup



A General View of 9ZT-9XAX

DONALD CLAIRE WALLACE, of 9ZT-9XAX, Minneapolis, has been adjudged by the A.R.R.L. Board of Directors to have the best all-round home-made amateur station amongst those entered in the competition for the 1923 Department of Commerce Cup. This trophy, commonly known as the Hoover Cup, is an annual award of merit established by Secretary Hoover for the duration of his administration, and is awarded under the auspices of the A.R.R.L. It is one of the highest honors in Amateur Radio, and Wallace wins it fairly after years of hard work. E. L. Lester, 5NK, Houston, Texas, was runner-up in the estimation of the judges.

It is difficult to appreciate the amount of hard work and stick-to-it-iveness required to build and operate an amateur station which, after the test of a year's time, is adjudged "the best". Hence it is very fitting that Mr. Wallace describe 9ZT and tell its history and accomplishments in his own words.

A DESCRIPTION OF 9ZT

By Don C. Wallace

Station 9ZT is the near realization

of a lifelong ambition; namely to have a workable and useful amateur station. Compromises have had to be made; compromises between efficiency, practicability, workability, time of construction, and pocket book. It is part of the obligation of an amateur to have his station always in commission, somehow, some way. His masts may blow down, transformers burn out, and minor mishaps occur. 9ZT has been in commission always. Scarcely has any day gone by in the entire twelve months that this has not been true.

The entire set, in so far as is practical, was made by the operator himself. The station is operated by one man almost entirely. In a five-room bungalow, one bed room is designated as the "Radio Room". It likewise serves as a sewing room, nursery, and guest room. When visiting "hams" operate, they can "turn in" to finish the night in peaceful sleep.

The question has often been asked where the time for operation comes from. This was planned for long ago: first by selecting a location close to work, just one and one half miles from the center of downtown Minneapolis. The electrical efficiency of the station suffered thereby, but it was

this or no radio at all. A "flivver" allows the extra half-hour sleep in the morning and saves a half hour at night. By going to bed at nine, going to sleep promptly and getting up sometime after midnight for two hours, an average of eight hours sleep per night is had which helps in fitness for the day's work.

The Transmitter

The transmitter utilizes one 250-watt

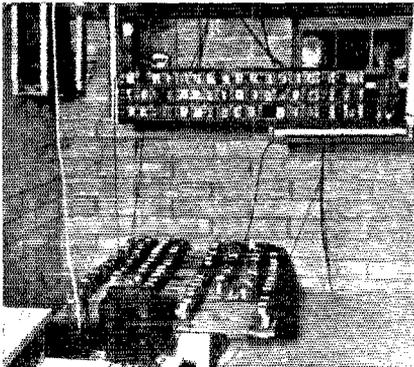


Fig. 2—The Plate Supply, In The Basement

Radiotron tube and the Hartley circuit. Simplicity exists thruout the entire layout. Extra apparatus is not connected in

two 50-watt tubes and in those days ICW and phone were cut in and out by the small D.P.D.T. switches. One now switches from high to low power, and the other cuts in a 1½ turn absorption loop for ICW or phone. The transmitting inductance behind the panel is wound with 33 turns of No. 9 wire five inches in diameter. Concentrated inductance has proven best, for though it gets hot, it delivers more antenna current than the larger inductances that now rest peacefully in the attic.

The tube is mounted so air will freely circulate about it. This allows an input 20% greater than could otherwise be used. The grid circuit is short, the UC-1806 .002-microfarad grid condenser being suspended in midair. A 200-turn honeycomb coil as a radio frequency choke is connected in series with the grid leaks as shown in the diagram. Four 5,000-ohm grid leaks are connected in series-parallel, giving an effective 5,000 ohms. The grid current meter, which in normal operation shows about 10 percent of the reading of the 0-500 plate millammeter, is a Jewell 0-100 milliamperere meter. The filament is heated from a Thordarson 300-watt transformer. The voltage developed was only 10.5 so additional windings were slipped around the core, care being taken to balance each side of the mid-tap. The filament voltage is maintained constant by a bakelite extension back of the key using

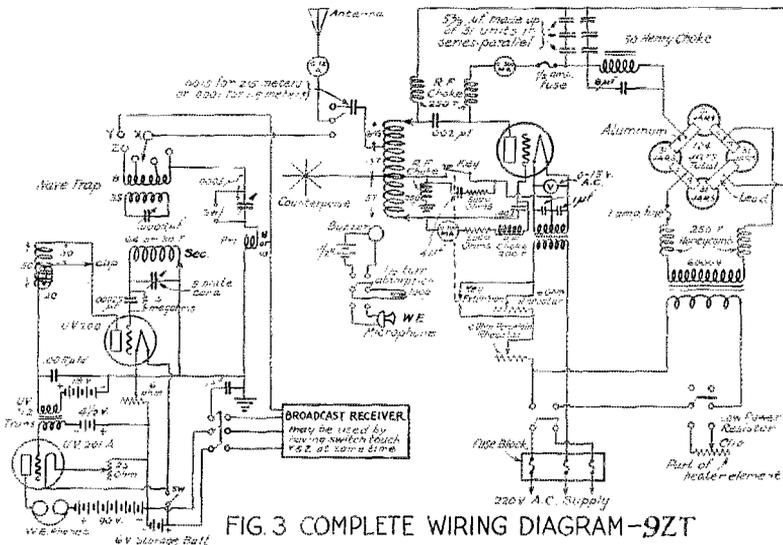


FIG 3 COMPLETE WIRING DIAGRAM-9ZT

or near the circuit to add to the many losses which we know already exist.

Figure 1 is a general view of the station, with the transmitter at the right. The panel originally housed a set using

"dime" contacts. The contacts on the extension short-circuit a resistance of a few ohms that is connected in series with the primary of the filament transformer when the key is down. Another feature of the

set is an anti-key-clicker. The combination shown in the diagram has a negligible click compared with the commonly used 1-microfarad condenser across the key.

The antenna ammeter is mounted at the center of the window pane to the right of the picture, through which the lead-enters. It is a Jewell 0-12 thermo-ammeter and when the key is down the needle hovers between 12 and the stop beyond. All meters and tubes are in clear sight of the operator; one glance tells all, and this feature has no doubt saved the tube on several occasions. The antenna and counterpoise leads are of $\frac{3}{8}$ -inch copper tubing, polished.

The send-receive switch at the lower left-hand corner of the transmitter panel is of the quick-throw type, connected as shown in the wiring diagram. By slowly pulling the switch the filaments are first heated; then the antenna connected to the transmitter, and the plate power put on. For receiving, the switch is simply pushed in.

It has been found poor policy to change waves, and except in rare instances, only two waves have been used; 215 meters and 115 meters. Those who wish to communicate with 9ZT can count on finding him on the same wave day after day. A General Radio wavemeter, special type, 75-2000 meters, is one of the most useful pieces of apparatus around the station. The antenna current is six amperes on 115 meters. Several months ago 9ZT secured permission to use low waves, but the last week in December 9XAX was received as a call for this work.

Plate current is furnished by a transformer-rectifier-filter system in the basement directly beneath the radio room. This apparatus is shown in Fig. 2. Radio-frequency choke coils, mounted on the back of the transmitter panel upstairs, isolate the set itself from the power supply. Each of the two choke coils is made by winding 250 turns of No. 28 D.C.C. wire on a cardboard tube 4 inches in diameter.

The plate transformer is an old 3-kilo-watt line transformer saved from the junk man. About 3500 to 4000 volts are applied to the plate of the tube. The electrolytic rectifier has 124 jars, and needs little attending. The submerged area of lead is 2 by $3\frac{1}{2}$ inches, and the submerged area of aluminum is $1\frac{1}{2}$ by $3\frac{1}{2}$ inches, the strips being six inches long in each case and bolted together. Once every eight months new aluminum is inserted and the solution is changed once in four months. The solution for the rectifier was all mixed at one time in a tub and consists of ten gallons of Chippewa Battery water with two pounds of "20 Mule Team Borax" dissolved in it and a teaspoonful of household ammonia added. After all settlements had gone to the bottom, the jars were filled.

The filter system consists of 5% micro-

farads of condenser across the high voltage line with a trap consisting of a Radio Corporation UP-1654 choke with 8 microfarads across it connected in the positive lead ahead of the other condenser. The conden-

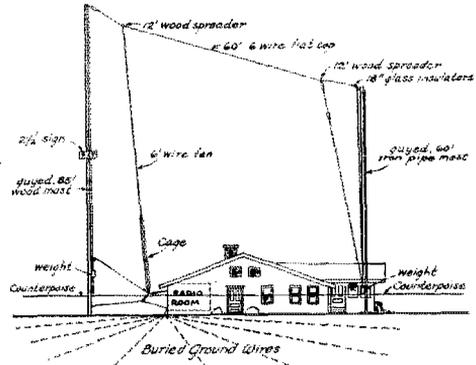


FIG. 4 THE ANTENNA AT 9ZT

ser across the line is made up of 51 UC-490 condensers in series-parallel, three in series being placed across the line.

In the upper left-hand corner of Fig. 2 can be seen the storage battery for the receiving set and the rectifier for charging it.

The Receiver

The general view of the station (page 43) shows the receiving equipment quite well. It will be recognized as a "low-loss" tuner, designed for selectivity, efficiency, and simplicity in operation. Such a receiver was the only answer to working through local interference, for there are many radio stations in a community such as the Twin Cities. A coupled wave-trap assists in weeding out stray key clicks and other interference. The sending antenna is used to receive with, although a single-wire antenna is often used. The wiring of the complete receiver, which includes a stage of audio amplification, is shown in the diagram.

A basket-wound coil of either 7 or 21 turns is used in the antenna circuit. When the larger coil is used the antenna circuit is tuned by means of a General Radio type 247 condenser connected in series with it. With the smaller coil it is left untuned. The secondary circuit of this set consists of a basket-wound coil with a Cardwell condenser, cut down to five plates, connected across it. The three rotary plates are cut so as to give a uniform wave-length increase as the dial is turned. The wave-length range with a 64-turn secondary coil made of No. 17 wire is from 135 to 235 meters. When a 30-turn coil is put in place of the larger coil the wavelength range is from 65 to 135 meters. An 18-

turn coil goes down still lower and 1XAM has been worked on 56 meters with ease. The primary and secondary coils can be seen in Fig. 1, suspended from the wooden rod in the left of the photo.

The plate inductance is wound on a cardboard tube with a small rotor in one end. It is not magnetically coupled to the secondary coil. The set oscillates freely over the entire range and little adjustment of the plate coil is ever necessary. Tuning either the primary or plate coil does not disturb the secondary tuning, so the secondary circuit can be calibrated quite accurately. The General Radio wavemeter comes in handy in finding the wavelength of stations received.

The UV-200 detector tube and UV-201 amplifier tube, with their associated apparatus, are mounted behind a hard rubber panel. Care has been taken to make all leads short and direct, thus avoiding losses. Western Electric phones are used.

The Antenna

Figure 4 is a general view of the antenna system, showing the arrangement better than the photograph, Fig. 5. All dimensions will be apparent from the drawing. The 85-foot wooden mast is very sturdy and well-guyed. Previous to the time it was erected 9ZT lost two masts in Minnesota storms, so this one was put up to stay. (The description of this mast, with the story of how it was put up, single handed, is a story in itself. We will tell about that later.—Dept. Ed.)

The flat top is of six wires, each sixty

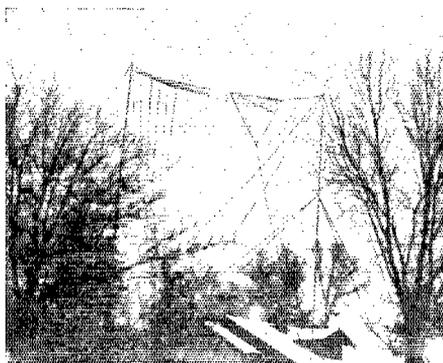


Fig. 5—The Antenna At 9ZT

feet long. The wires are 7-#22 enameled and stranded, on 12-foot wooden spreaders. Eighteen inch plate glass insulators are used throughout the antenna and counterpoise system. There is one of these at each end of the antenna where the halyard joins the flat top. These insulators are a feature of the station that cannot be

overlooked and their construction is illustrated in Fig. 6. The rubber bushing is omitted in the counterpoise insulators and those used to guy the lead-in. Using a broken three-cornered file, a brace, and

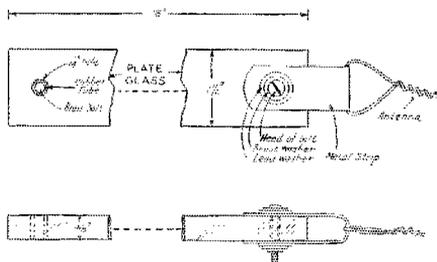


FIG 6 18" GLASS INSULATORS USED AT 9ZT

plenty of turpentine, the glass is drilled very easily.

This antenna was put up nearly a year ago and has withstood all storms since that time. The counterweight at one end lessens the strain on the system. A heavy wind storm will raise the weight, lessening the strain on the antenna, and sleet cannot break it down. The pulley line is flexible galvanized steel cable and will not freeze to the block as readily as rope.

The counterpoise has 23 wires and is more or less radial in shape. It is made mostly of cast off wire, the remains of earlier antennas. Arranged like the spokes of a wheel with the station at the hub, the covered circular areas is about 170 feet in diameter—thanks to the kindness of the neighbors. The 18-inch plate glass insulators mentioned above are used thruout. All joints in both the antenna and counterpoise are carefully soldered.

9ZT's "DX" List

9ZT's signals have been heard in Alaska, New Zealand, Australia, Hawaiian Islands, Mexico, Panama, South America, Porto Rico, Cuba, England, France, and aboard WNP. Stations in every Province of Canada and every state of the Union have been worked. WNP has been worked, and also French 8AB, the latter by the process of 1XW acting as the receiving station, relaying 8AB's transmission to 9ZT.

One Sunday morning seven districts were worked after arising at six. 5ZA at Roswell, New Mexico, was worked after 8:30 A.M., broad daylight at both places, and the distance was 1200 miles. Stations on the West Coast have been worked as early as 5 P.M. their time. All U.S. districts have been worked in one night, and up to eleven different districts, including Canadians of course, have been worked in a single night. On 115 meters,

using the call 9XAX, 1XAM is worked night after night. One year ago 1QP was worked night after night on 200 meters with the regularity of inter-city communication. That reliable work can be done in the summer time was proven when 9ZT worked 47 West Coast stations during last May. Stations on both coasts are worked consistently and regularly the year around. Examination of the station records and log confirm these records and show the remarkable consistency of 9ZT's signals.

Traffic

Exactly 2500 messages passed through 9ZT during 1923. Of these 1187 were sent and 1131 received. The lowest and highest number of messages handled for any one month was 106 in July and 308 in March, respectively.

A complete file of all messages is kept in the attic. Those for each month are kept in a separate bundle with the totals as checked and counted. Few realize the ease by which records of this sort can be kept. The routing of every message handled is known, where it was received from, date and time, where it was sent, delivered, or mailed, date and time.

A sample message, (taken from the files) is as follows:

6KM 1 8/28 Stockton, Calif.
 Mrs. Vic Adams Olney Ill RFD
 Greeting from your son by radio
 Kenneth
 442 A
 1 9BBC 740 P 8/28

It will be noted that there is no excess writing, yet the full story is told. Received from 6KM, number 1, August 28th, from Stockton, Calif. Received at 4:42 A.M. Sent to 9BBC as number 1 at 7:40 P.M. the same day.

All messages are written in pencil on a standard size of note paper with this simple, yet effective, data on them. Inexpensive blanks do not tend to reduce traffic as costly printed blanks are likely to do. When sending messages the time and date sent and other information is put on one message with a pencil in the left-hand while the next message is being sent, thus losing no valuable time.

The seven hooks in Fig. 1 on the wall are for messages and are labeled from left to right; N, S, E, W, St. Paul, Minneapolis, and File. Traffic is placed on the proper hook just as soon as received.

It is hoped that this brief resumé of an effective system of traffic handling will help others in our A.R.R.L. to improve without added burden.

The Station Log

Few stations keep a log that is easily interpreted for the entire year. 9ZT's log has been kept complete for the whole twelve

months, and therein lies its value. The log is kept in pencil in a ledger book. The time and date is indicated at the left-hand end of the line. The station call heard is next to the right, and then the call of the station he is calling. Because of the large easy-tuning secondary dial it is a simple matter to write the dial setting after the call of the station heard. This is often



The 1923 Hoover Cup, Won by 9ZT-9XAX

done and is a great aid in locating a station at some future time. When a station is worked, the call is underlined or 9ZT written opposite it. A notation such as "sent 2" or "recd 3" on the same line indicate the amount of traffic handled.

The log at 9ZT is a help rather than a burden because it is kept up to the minute, accurate, and complete. It helps wonderfully in the operation of the station.

Acknowledgment

9ZT feels indebted to QST, Ballantine's "Radio Telephony for Amateurs", Prof. C. M. Jansky, Jr., M. G. Goldberg, C. K. Fulghrum, F. H. Schnell, S. Kruse, K. E. Hassel, L. E. Dutton, and many others for the numerous suggestions that have been worked out for the betterment of the station.



Who's Who in AMATEUR WIRELESS



L. W. HATRY, 5XV

L. W. Hatry is the fellow who brought radio to Port Arthur, Texas, the town "where the oil and water mix." That he is a radio man there is no question, for look at the crease in his coiffure, where the head phones fit!

Previous to 1918 his life was uneventful and playing Indian and cowboy were the main methods of relieving the monotony. Also a bicycle. In 1918 the general placidity ended and chaos began, for radio bit him that year. The trusty bank was pried open, the six month's savings taken out, and eighty cents worth of "No. 14 hard drawn" was ordered. Thus in an honest manner did station 5XV have its beginning. Since then Mr. Hatry has worked at several radio and electrical

(Concluded on page 57)



MAURICE G. GOLDBERG, 9APW-9ZG

Maurice G. Goldberg was probably the first to upset the old idea that anything we might choose to put on the plates of our transmitting tubes could be changed to pure D.C. by a two-henry choke and a one-microfarad condenser. He saw that most of us who claimed we had filters on our plate supply were just kidding ourselves and set about to prove it. The article entitled "A Study of Filter Systems for Transmitter Tube Supply" which appeared on page 14 of *QST* for April, 1923, was the result. Since then he has been experimenting with loose-coupled tube transmitters and has unearthed some valuable and interesting information on that subject which appeared in a recent *QST*. Mr. Goldberg is one of the few amateurs who

(Concluded on page 57)



INTERNATIONAL Amateur Radio

Australian Reception Verified!

The reported reception in last *QST* of Australian 3BD by Mr. Y. Ito, 6ACW, of Moneta, Calif., has been verified. The receiver used was a one-tube set with a dry-cell tube and a single tuned circuit connected to an antenna 25 feet high and 55 feet long. The reception checks with 3BD's log for Thursday, November 8th, 7:45 p.m. Australian time. 3BD is the station of Mr. E. H. Cox at 5 Gibson Street, Elsternwick, Australia. This marks the first authentic reception of Australian amateur signals in North America.

Several amateurs have lately reported hearing New Zealand 4AA. The first report was from 9AVG at Eureka, Kansas. When written about it, Mr. Bell, 4AA, replied, "I only wish I had the nerve to fake my log so as to make it check. Hi! As it is I must regretfully plead 'not guilty'". Sorry, O.M.

The terrific QRM in America on amateur waves is largely responsible for the difficulty in hearing Australian and New Zealand amateurs, because they work on about the same wavelengths as ours. Interest on waves below the regular amateur band is starting over there, however, and that means we will hear more of their signals before long. We should wait until about five hours after sunset on the Pacific Coast to listen for them, thereby giving their signals a chance to make most of the journey in darkness.

Transatlantic Work Increases

Although no outstanding feats have been accomplished during the past month the number of stations both on this side and in Europe that have worked across the ocean has greatly increased. On March first the score in American and Canadian stations worked by some of the best English stations stood as follows: 2OD, 24; 2KF, 21; 2SH, 14; and 2NM, 12. Most of the

stations on this side that were worked were experimental stations using wavelengths near 100 meters or else were Canadian stations working on their 125 meter wavelengths.

British 6LJ with a two-tube set, detector and one audio stage, has logged 297 different American and Canadian amateur stations to date. The best reception was in hearing 6AWT, 6BR, and 6XAD, all in California. The well known calls from other districts on his list are too numerous to mention. The best reception for one night was done on a February night when 46 different North American amateurs were heard the last one being logged at 9:30 A.M., broad daylight in England.

Regarding the handling of traffic, American and Canadian stations should remember that English and French amateurs working on experimental permits are prohibited by their governments from handling private message traffic. Mr. Partridge, British 2KF, writes, "Any message relating to radio experiments or tests we may touch, but just as soon as we begin to get the 'Xmas greeting from Fred to Dora by radio' type of message we have to put the bars up."

In other European countries amateur transmitting stations are cropping up fast. New ones are on the air every week and most of them are able to work all over Europe with ease. Some of the new ones are Danish 7EC, 7QF, and 7ZM, Luxembourg 1JW, Finish 2NB, and XY at Geneva, Switzerland. PCII at Leiden, Holland, continues to work Transatlantic with ease.

Mr. Erkki Heino, 2NB, of Suomi, Finland, advises that amateurs in Finland are allowed considerable latitude. Receiving is permitted without a license fee and the wavelength allotted to amateur C.W. transmission is 300 meters with a power of 20 watts.

The loudest short wave signal to be heard from Europe is that of British 2YT at Poldhu, Ireland, on 94 meters. We understand his plate input is twenty kilowatts.

Considering the great advances made in amateur communication in England during the past two years, several of the British amateurs are looking forward to communication with Australia direct! Looking



back but two years, working a French or a Dutch station was quite a feat. Within a month of discovering how to really use the short wavelengths English amateurs are communicating with others up to 5,000 miles distant. It is prophesied that within two years, if not sooner, Australia will hear English amateurs direct and perhaps carry on two-way communication.

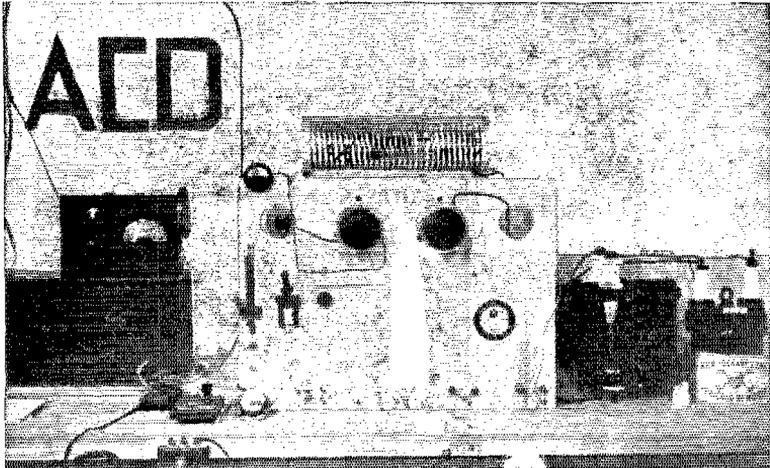
A Visitor From England

Mr. Gerald Marcuse, British 2NM, who has worked many American and Canadian stations, is going to make a tour of Canada and the States soon. He will arrive in New York about May 10th, and after coming to Hartford and shaking hands with all of the HQ bunch is planning to go across Canada to Vancouver, visiting all of the amateurs he can in all important Canadian

pioneers? Don't leave it to the other fellow.

ACD, Italy's Foremost Amateur Station

On the morning of January 21st, after a two minute call, Italian ACD was able to exchange calls with 1XW, thus marking the beginning of Italian-American two-way amateur communication. Four nights later ACD called American stations for five minutes and immediately got in touch with 2AGB at Summit, New Jersey, maintaining communication this time for over two hours. Since then many U. S. stations have had the pleasure of hearing ACD's signals and communicating with him. Mr. Ducati has succeeded in connecting with at least one American or Canadian station most every evening he has tried. On one occasion



The first Italian amateur transmitting set to be heard in the United States; built and operated by Mr. Adriano Ducati, ACD, at Bologna, Italy. Since January 21st, when Mr. Ducati succeeded after a two minute call in "raising" 1XW, many stations have heard and worked this Italian amateur station.

cities en route. He would like very much to hear from Canadian amateurs along the way in advance of his trip so as to insure meeting as many of them as possible. Address your letter right away to him in care of the QST factory, 1045 Main St., Hartford, Connecticut, to arrive here not later than May 12th.

Here's Your Chance!

The offer made on page 43 of the April QST still stands, fellows. No one has worked two-way with Australia or New Zealand yet, but some one is going to do it soon. Who will be the first to actually accomplish this feat and go down in the history of amateur radio as one of the

he reduced his plate input to 45 watts and was still heard very well by 1XAR in Atlantic, Mass.

Italian ACD is built and operated by Mr. Adriano Ducati, and is located in north central Italy. His complete address is 3 Via Garibaldi, Bologna (29), Italy.

It is not surprising to learn that ACD's transmitter is connected in the manner shown in Fig. 4 on page 27 of the January 1924 QST. This is the Hartley circuit with variable series condensers in the antenna and counterpoise leads and is very easy to adjust for good results on wave lengths very near to or at the fundamental. Two French tubes of 50 watts nominal rating each are employed in the transmitter. They are supplied with a little over 100 milliamperes at 2000 volts A.C., making a

plate input of 260 watts. The antenna current on 110 meters, which is the wave on which the transatlantic work was done, is 3.8 amperes. The wave can be lowered to 40 meters if desired and 1.5 amperes put into the antenna.

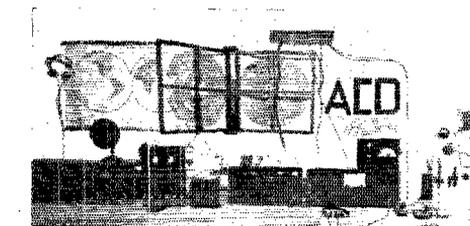
The transmitter that was successful in crossing the Atlantic is shown in the large



ACD's ANTENNA SYSTEM

photograph. Power transformers are to the right and the two variable series condensers in the radiating circuit are mounted on the front of the panel. By having the wavemeter adjacent to the transmitter as shown, the operator can check the transmitted wave in a few seconds without having to leave his chair.

The small photograph shows mainly the receiving equipment at ACD. On the left is a five-tube universal r.f. receiver (100-20,000 meters) used for broadcast reception only. London broadcasting is heard 300 feet from the loudspeaker on this set, the distance being about 700 miles. To the right of this set is a transmitter using two French 50-watt tubes that is heard over Europe regularly but which has not reached the U.S.A. as yet. It employs the reversed-feedback circuit and the two spiral coils for it are mounted on the wall. Next to this set is the short wave receiver that brings in the American amateurs. It has removable coils and works very well on wavelengths from 10 to 250 meters, using a detector and one audio amplifier. A five-tube set sits to the right of this and receives all waves between 80 and 800 meters. *The wavemeter seen on top of the latter set was calibrated on two points from WWV's transmission.* All receiving and transmitting sets are home-built. KDKA's



A General View Of Station ACD. The successful transatlantic transmitter is at the extreme right.

100 meter wave is received very well on a loud speaker using three tubes.

The radiating system at ACD is unusual

and very different from anything we employ in this country. Mr. Ducati uses two counterpoises, one below and one above the antenna. Or you can call it one counterpoise with an antenna above and below it if you wish; the result is the same. The dimensions of Mr. Ducati's radiating system are given in the diagram. The effective height and total resistance of such an arrangement are both quite low, though no tests or measurements have been made to determine just how it compares with the customary antenna-counterpoise arrangement. Some directional effects have been



Adriano C. Ducati, ACD.

noted, however. Here's a splendid chance for some of our experimenters to come to the front!

Foreign Radio Magazines

Foreign amateur radio is advancing so rapidly that it is very much to the interest of the American ham to subscribe to one or more foreign radio publications. Most of us will have to choose a magazine from the English-speaking countries, such as Australia, New Zealand or England, but those of foreign ancestry will derive a great deal of pleasure out of reading the radio doings in the "ould countrie." Incidentally, high school students will find the reading of a French, German or Spanish radio magazine about the only way to cause radio to aid, rather than hinder, these studies.

Below is given a list of several of the more important foreign magazines. The word in parenthesis after the name indicates the language in which it is printed. In each case the price of the magazine in the U. S. is given, unless otherwise noted. Canadian amateurs may find the prices on English magazines to be cheaper to them, so should write the publishers of the respective magazines for more information. Money can be sent by international money order, obtainable at your local post office.

England

"The Wireless World and Radio Review" (English). The official organ of the Radio

Society of Great Britain. A good magazine for the radio man who wishes to keep in touch with radio in England. Published weekly at 12-13 Henrietta St., Strand, London, W.C.2, England. Single copies 5 pence. Yearly 20 shillings.

"Experimental Wireless" (English). A journal of radio research and progress. A good magazine for the serious radio experimenter. Published monthly by Percival Marshall & Co., Ltd., 66 Farringdon St., London E.C.4. England. Single copies 1 shilling 3 pence. Yearly 15 shillings.

New Zealand

"The New Zealand Wireless and Broadcasting News" (English). A live publication containing up to the minute amateur news. Published by L. T. Watkins, Ltd., 15 Taranaki St., Wellington. Sin-

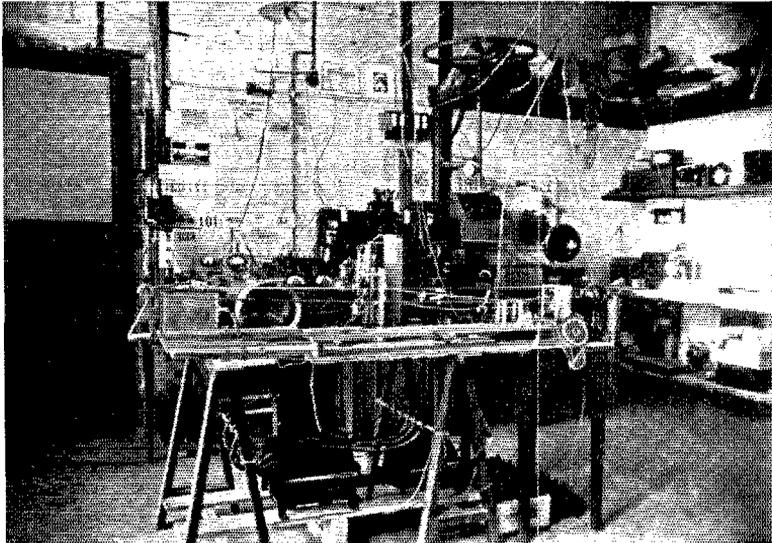
J. Maclardy, Publicity Press, Ltd., 33-37 Regent St., Sydney, N.S.W. Single copies 3 pence in Australia.

"The Wireless Weekly" (English). Official (English). A popular magazine for the radio enthusiast. Published monthly by W. Pierpont Black & Co. Ltd., 304 Kent St., Sydney, N.S.W. Single copies 1 shilling 6 pence. Yearly 15 shillings in Australasia.

"Radio" (English). A popular wireless review. Published twice a month by The Wireless Press, 97 Clarence St., Sydney, N.S.W. Single copies 6 pence. Yearly 12 shillings 6 pence.

France

"La T.S.F. Moderne" (French). Official organ of the French Society for the Study of Radio, and other French Society for the Study of Radio, and other French, Belgian



A GLIMPSE OF FRENCH SBF, SECOND FRENCHMAN TO WORK AMERICA
Many readers have heard this station and will be glad to send it cards: the owner is J. Pierre Louis, 8 Rue de la Mouillere, Orleans, France, member A.R.R.L., SBF first worked 1MO with an input of 110 watts into two 50-watters, D.C. supply, producing 0.8 amp. in the antenna. The station also has a 1 k.w. set using a Marconi MT-4 tube supplied with 25-cycle current at 8000 volts, secured from a converter, putting 3.8 amp. in the aerial at 195 meters, 1.8 at 108 meters. (Antenna ammeter considerably removed from voltage node.) Antenna: 6-wire L cage 55' long, 48' and 60' high, 9-wire fan counterpoise, also earth connection; fundamental of system, 175 meters. The short-wave oscillator uses an untuned-aerial-circuit arrangement evolved by Deloy, f8AB. The apparatus on the table in the photo is an electrically-driven automatic sender used during the last T/A tests, made from Meccano parts and a perforated piece of movie film. SBF's 1 k.w. sender can get down to 40 meters.

gle copies 1 shilling. Yearly 12 shillings 6 pence in New Zealand.

Australia

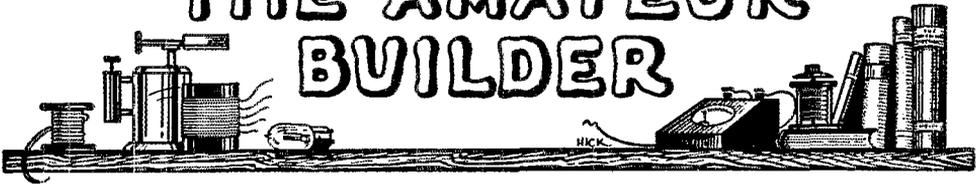
"The Wireless Weekly" (English). Official organ of the Australasian Radio Relay League. A live little magazine written in popular style. Published weekly by W.

and Luxembourg radio clubs. A semi-technical review, probably closest in nature to "QST" of all the French magazines. Published monthly at 11 Avenue de saxe, Paris 7, France. Single copies 3 francs. Yearly 30 francs.

"L'Onde Electrique" (French). Pub-

(Continued on page 57)

THE AMATEUR BUILDER



SMALL TRANSFORMERS FOR THE AMATEUR—I.

Simple Fundamentals and Design

By H. F. Mason, Department Editor

THERE is a need for some good reliable data in tabular form giving dimensions and winding details for transformers covering the wide variety of requirements to be met in amateur stations. These will be given in this article. Some practical information on winding the coils and constructing the transformer will be given in this department next month.

Let us first review a few of the more important elementary facts about transformers. A transformer is an electrical device for changing electrical power at a high voltage and a small current to power at a small voltage and large current (*step-down transformer*) or vice versa (*step-up transformer*). A small amount of power is lost in making the change so a little less power comes out of the device than was put into it. A transformer is *efficient* when the lost power is small. If the loss in watts is 5 percent of the input, for instance, we can say that the transformer efficiency is 95 percent.

A transformer generally consists of several coils or windings of insulated wire placed on an iron core. The *primary winding* is the input winding that is connected to the source of supply while the *secondary winding* is the output winding connected to the load, which may be a tube transmitter or other electrical apparatus.

Most transformers that amateurs make are for use on 110-V. 60-cycle supply. If the frequency and supply voltage are known, the number of turns to put on the primary winding will depend solely on the area of a cross section through one leg of the core, and the number of magnetic lines of force we wish to have per square inch of this cross section. The number of magnetic lines of force per square inch of cross section is called the *flux density*. The flux density that may be used is determined by the quality of the iron employed and the frequency. A flux density of 50,000 lines per square inch for the average transformer iron or

silicon steel operating at 60 cycles is used as a basis for the tabular data in this article.

The size of wire which must be used in the primary winding depends mainly on the primary current. It is convenient and customary to use a unit called the *circular mil* in figuring the size of wire to carry a given current. A circular mil is a unit of area. It is the area of a wire one thousandth of an inch in diameter. Such a wire would be so small that 1,000 of them would be needed to carry one ampere of current. This is just another way of saying that 1,000 circular mils are necessary to carry one ampere. This is the proper density to use in the windings of C.W. transformers built for intermittent use over short periods where moderate heating is not objectionable. If the transformer is for a battery charger where it must be left in circuit for a long time, 1500 circular mils per ampere should be allowed, which means that a larger wire should be used.

The number of turns in the secondary winding is governed by the number of turns in the primary and the desired secondary voltage. Before the number of turns for the secondary can be ascertained it will be necessary to find how many *turns per volt* there are in the primary. This can be found by dividing the primary turns by the primary voltage. The number of turns for the secondary can now be found by multiplying this turns-per-volt figure by the desired secondary voltage. The size of wire in the secondary is dependent on the secondary current, and the proper size to use can be found in the same way as for the primary wire.

A fraction of the power put into the transformer does not get through to the secondary circuit because it is used in heating the windings and the core. It is not possible to build transformers that are 100 percent efficient; consequently every transformer is bound to heat somewhat. A transformer can be built with a great deal of iron in its core and a small amount

of copper in its windings, or vice versa. One with a large core and a small amount of wire is better from the amateur's standpoint, for wire, especially in the smaller sizes, is much more expensive than transformer core material. In the table accompanying this article an effort has been made to proportion the transformers so the ratio of iron to copper will be good.

When a transformer is switched in and

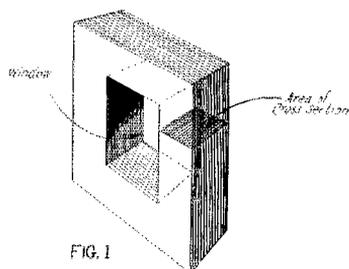


FIG. 1

a constant load applied to the secondary, the core and windings will gradually warm up to a certain value above the room temperature and stay there regardless of how long the transformer is left on. The transformer should be designed so that this steady temperature is well below that which will damage the insulation. Because transformers that run warm can be built much cheaper and smaller than ones that run comparatively cool, a certain amount of heating is not objectionable. This does not mean, however, that the design should be skimpy.

When no current flows in the secondary circuit of a transformer only enough current flows in the primary to supply power to make up for the small losses that occur in the core and primary winding. If the input to a small transformer is over one ampere in the primary circuit when nothing is connected to the secondary you can be sure that there is something wrong with the design; the core is poorly put together, or there is a leak somewhere. The transformer is not a wasteful device; it takes from the line only as much as you use out of the secondary, with just enough extra to make up for its losses and no more. Good transformers will stand 50 percent overload for short periods without harm, but these short periods should not be made continuous.

The secondary voltage of a transformer will be pulled down somewhat when the full load current flows in the secondary winding. The drop in secondary voltage between no load and rated load, expressed as a percentage of the no-load secondary voltage, is called the *voltage regulation* of the transformer. For instance, if the secondary voltage of a transformer is 15 with no load, and it drops to 12 when the rated load is applied to the secondary, the drop

is 3 volts. Because 3 is one fifth of 15 the voltage regulation is one fifth or 20%.

A transformer has good regulation when the voltage at the secondary terminals holds practically constant whether current flows in the secondary or not. In a transformer with very poor regulation the voltage across the secondary will sometimes drop to one-half its former value when the load is applied. The voltage regulation depends on the resistance of the windings and the magnetic leakage between the windings. Good regulation can be had by compactly arranging the transformer so the turns of wire lie close to the core and the primary and secondary windings are adjacent, which reduces the magnetic leakage. The total length of the magnetic circuit (meaning the path around the core that the lines of force travel) should be short and the joints in the core must be good. The resistance of both windings should be low. Some arrangements of the core and windings of core-type transformers for good and poor regulations are shown in Fig. 2. The arrangement in Fig. 2-H is a useless refinement for small C.W. transformers, though it is used in large power transformers. Figure 2-E is good enough for most purposes, is easier to make, and will give less insulation troubles.

Transformers for spark sets are purposely designed to have poor regulation so that when the secondary is short-circuited by the spark gap the secondary voltage will drop and prevent a large secondary current from flowing. This in turn prevents an excessive demand of power from the line. C.W. transformers should have good regulation so that the secondary voltage will not change much when the key is pressed.

A Practical Example

In the accompanying tables data are given to assist the amateur in planning the construction of a transformer for his particular needs. Let us take a typical case and find the dimensions and winding details of a transformer to supply plate voltage for one 50-watt tube, type UV-203.

The first step is to decide what the secondary voltage and current shall be. The general amateur practice is to supply one of these tubes with about 170 milliamperes of plate current at about 1200 volts. Allowing 300 volts drop in the rectifier and filter, which is not unusual, 1500 volts will be required at the secondary terminals. To take care of greater plate current than we anticipate it would be well to make the transformer capable of delivering 240 milliamperes (0.24 amperes) without overloading. The watts output then will be $1500 \times 0.24 = 360$. A home-made transformer of this size will be about 90 percent efficient which means that 360 watts is 90 percent of the input. Dividing 360 by 9

and multiplying the quotient by 10 will give 400 watts as the input.

Table 1 gives data on transformers of various powers for use on a 110-V. 60-cycle line. This table gives the cross-section dimensions of the core and the number of turns and size of wire for the primary for several different transformers. The

for the secondary that will safely carry 0.24 ampere. The nearest we can come to it is to use No. 27 wire. Two windings of 2945 turns each will be needed; making a winding of 5890 turns with a center tap.

Now that we have the wire sizes and the number of turns and size of wire for

Input (Watts)	Approx. Efficiency	Size of Primary Wire	No. of Primary Turns	Turns Per Volt	Cross-Section Through Core
50	75%	23	528	4.80	1 1/4 "x1 1/4 "
75	85%	21	437	3.95	1 3/8 "x1 3/8 "
100	90%	20	367	3.33	1 1/2 "x1 1/2 "
150	90%	18	313	2.84	1 5/8 "x1 5/8 "
200	90%	17	270	2.45	1 3/4 "x1 3/4 "
250	90%	16	248	2.25	1 7/8 "x1 7/8 "
300	90%	15	248	2.25	1 7/8 "x1 7/8 "
400	90%	14	206	1.87	2 "x2 "
500	95%	13	183	1.66	2 1/8 "x2 1/8 "
750	95%	11	146	1.33	2 3/8 "x2 3/8 "
1000	95%	10	132	1.20	2 1/2 "x2 1/2 "
1500	95%	9	109	.99	2 3/4 "x2 3/4 "

figure in the second column "approximate efficiency" was used in the paragraph above to find how much greater the input would be than the output. The third and fourth columns tell us that for the 400-watt transformer we are figuring on, the primary winding should consist of 206 turns of No. 14 wire. The sixth column tells us that the core should be 2 inches by 2 inches in cross section.

The next step is to find how many secondary turns will be required for 1500 volts, which was the figure decided on at the start. In the fifth column of Table 1, on the 400-watt line, is given the number of turns per volt in the primary winding. This figure multiplied by 1500 will give the number of secondary turns; i. e., $1.87 \times 1500 = 2805$. Five percent of 2805 should be added to it to make up for the voltage drop that is bound to occur when the full load is applied to the secondary because of the transformer losses and regulation. This will give a final result of 2945 secondary turns for the 1500 volt winding under full load.

In supplying plate current through a rectifier it is usual to rectify both halves of the cycle by using a separate secondary winding for each half cycle. This will require two 1500 volt windings or one 3,000 volt winding with a center tap. Theoretically it would be possible to use a smaller wire in the secondary winding because each 1500-volt section is passing current half of the time. In practice, however, it is far better to stick to the figure of 1,000 circular mils per ampere and be on the safe side.

The current-carrying capacity of copper wire is given in the seventh column of Table 2. We are looking for a size of wire

both primary and secondary, and know that the cross-section of the core should measure 2 by 2 inches, all that remains

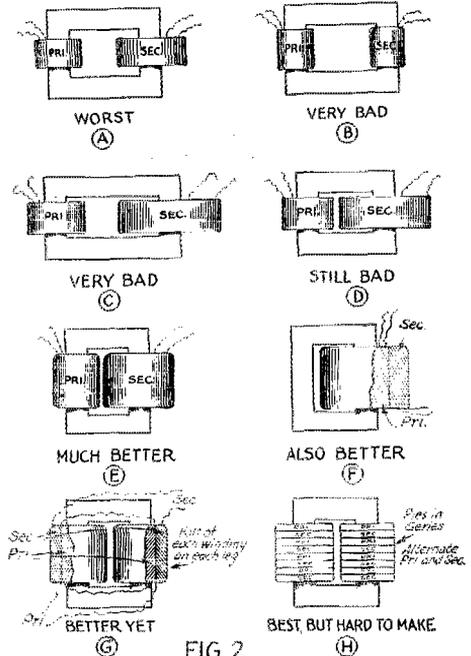


FIG. 2
HOW THE ARRANGEMENT OF THE CORE AND WINDINGS AFFECTS THE VOLTAGE REGULATION OF CORE TYPE TRANSFORMERS

is to build a core with this cross-section that will have an opening or window in it just large enough to get the windings

on. See Fig. 1.

The best way of finding what the size decide on a tentative length of winding.

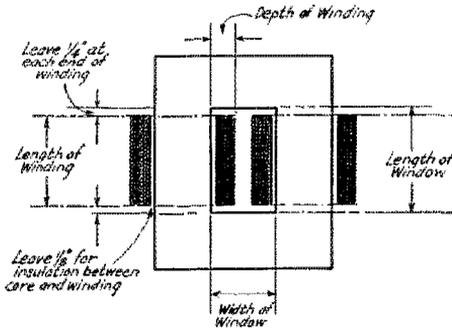


FIG. 3

make a full size drawing of the transformer on a sheet of paper. When finished it will look somewhat like Fig. 3. First

Leave a full quarter of an inch between the end of the winding itself and the adjacent leg of the core as shown in Fig. 3. Then find how many layers will be needed to get the required number of turns. The depth of winding can next be ascertained, leaving at least 1/8 inch for insulation between the core and the inside layer of wire. Allow for insulation between layers, if there is to be any. Having finished these computations you can draw the primary winding in, full size, on your drawing and see just how it is going to look.

The next step is to figure the depth of the secondary winding in the same fashion, using the same length of winding as was used in the primary. If enamelled wire is to be used in the secondary, be sure to allow enough room for a layer of heavy paper between each layer of wire. When the depth of primary and secondary windings has been found, their sum, plus about 1/4 inch for good luck, will give the total width of the window in the core. If the drawing of your transformer now begins to

TABLE 2—COPPER WIRE

Size of Wire B.&S. Gauge	Area in Circular Mils	Turns Per Inch		Feet Per Pound		Carrying Capacity	
		D.C.C.	Enamel	D.C.C.	Enamel	at 1000 C.M. per Amp.	at 1500 C.M. per Amp.
8	16510.	7	8	19.6	19.9	16.5	11.0
9	13090.	8	9	24.6	25.1	13.1	8.7
10	10380.	9	10	30.9	31.6	10.4	6.9
11	8234.	10	11	38.8	39.8	8.2	5.5
12	6530.	11	12	48.9	50.2	6.5	4.4
13	5178.	12	13	61.5	63.2	5.2	3.5
14	4107.	13	15	77.3	79.6	4.1	2.7
15	3257.	15	17	97.3	100.	3.3	2.2
16	2588.	16	19	122.	125.	2.6	1.7
17	2048.	18	21	151.	160.	2.0	1.3
18	1624.	20	24	192.	202.	1.6	1.1
19	1288.	22	26	240.	254.	1.3	.86
20	1022.	24	30	298.	319.	1.0	.68
21	801.1	27	34	373.	402.	.81	.54
22	642.4	29	38	464.	506.	.64	.43
23	509.5	31	42	575.	638.	.51	.34
24	404.0	34	47	711.	804.	.41	.27
25	320.4	37	53	878.	1010.	.32	.21
26	254.1	40	60	1080.	1280.	.25	.17
27	201.5	44	67	1330.	1610.	.20	.13
28	159.8	48	75	1630.	2030.	.16	.11
29	126.7	52	83	1990.	2560.	.13	.084
30	100.5	55	93	2420.	3220.	.10	.067
31	79.70	59	106	2820.	4050.	.079	.053
32	63.21	62	119	3500.	5100.	.063	.042
33	50.13	66	133	4160.	6420.	.050	.033
34	39.75	70	147	4920.	8080.	.039	.026
35	31.52	73	167	5760.	10200.	.032	.021
36	25.00	77	185	6660.	12800.	.025	.017
37	19.83	80	208	7600.	16100.	.020	.013
38	15.72	83	233	8450.	20300.	.016	.010

decide on a tentative length of winding. From column 3 of Table 2 (No. 14 double cotton covered wire will be used in the primary) see how many turns per layer can be obtained in the primary winding.

look like Fig. 2D instead of 2E, then use a different value for the length of winding and begin figuring the size of window all over again. Be certain that the window is large enough to get the windings on, but

do not make it any larger than necessary or the regulation of the transformer may be impaired.

The design of the transformer is now complete. How to build up the core, wind the coils, and mount the transformer will be told in the second part of this article in the June QST.

WHO'S WHO

L. W. Hatry

(Concluded from page 48)

stores, sold the bicycle, and joined the A.R.R.L. In 1919 he bought one of the old familiar Audiotrons with the double filament and the easily broken connections. Upon hearing old 8ZG he became determined to build a transmitter for himself. After a lot of spark-coil work which was work and usually did not work, he tried his hand at an Amrad quenched gap and a half-kilowatt transformer.

When Mr. Hatry became interested in C.W. transmission, "try it and see" was his motto. He is therefore a born experimenter. His experiments with a 5-watt tube transmitter as chronicled in his articles "How to Make a Five-Watt Tube Reach Out" and "Some C.W. Experiments and Results" in past issues of QST contain a wealth of information on this subject that has been invaluable to many amateurs. As a result of these experiments he now has a transmitter that is regularly heard throughout the greater part of the country. His station, transmitting on a 75 meter wave, is one of the best of the chain of A.R.R.L. Broadcasting Stations. Mr. Hatry holds a first grade commercial license and has operated commercial and broadcast land stations.

Regarding his viewpoint on amateur radio, "I hope I will always stay in this delightful trance," he was heard to remark at the Second National A.R.R.L. Convention. Attending that convention was the biggest event in his life, he says.

WHO'S WHO

Maurice G. Goldberg

(Concluded from page 48)

always keep about one jump ahead of the rest of us in the improvement of amateur radio and thereby lead the way toward better apparatus, better efficiency, and better DX.

On the air he is known as 9APW-9ZG. The station is located at his home at 711 Dayton Street, St. Paul, Minnesota, and has been heard throughout the country. Mr. Goldberg first broke into the radio game in 1917 wondering why the door bell would not work right when the push button, batteries, and bell were all connected in shunt. He received his first license in 1919 and started up with a one-kilowatt

spark that reached far enough to burn up several fixtures and weld various pull-chain sockets in the neighborhood. C.W. was installed the following year. Since then 9APW-9ZG has been heard in ten countries and on three seas, despite an unfavorable location for the transmitter. The carrying power of the signals has been due in great part, no doubt, to the use of pure direct current on the plates of the tubes.

Mr. Goldberg has always taken a prominent part in radio club and A.R.R.L. activities in and around the Twin Cities. He is a past president of the Y.M.C.A. Radio Club of St. Paul and is now Vice President of the Twin City Radio Club and a member of the Twin City Executive Radio Council. He ably handles the office of District Supt. of Minnesota Dist. No. 3, while his station is an Official Relay Station and an Official Broadcasting Station. Mr. Goldberg is a graduate of the University of Minnesota Electrical Engineering College. He is a Second Lieut. in the Officers' Signal Reserve Corps and has spent two summers at Camp Alfred Vail, New Jersey, absorbing the latest dope on army radio.

INTERNATIONAL AMATEUR RADIO

(Continued from page 52)

of the Society of Radio Friends. A technical journal similar to the I.R.E. Proc. in this country. Published monthly by Etienne Chiron, 40 Rue de Seine, Paris. Single copies 3 francs. Yearly 35 francs.

"Radio Electricite" (French). A practical radio review written in semi-technical style. A technical bulletin is included as a supplement from time to time. Published twice a month at 98 bis, Boulevard Haussmann, Paris 8. Single copies 2 francs 50 centimes. Yearly 45 francs.

Spain

"Teleradio" (Spanish). Official organ of the Radio Club of Spain. A semi-technical magazine for the radio fan with many articles written in popular style. Published monthly by F. Perez Martinez, Palacio del Banco o de Bilbao, Alcaid 16, Madrid, Spain. Single copies in Spain 1 peseta; or one year for 10 pesetas in Spain.

Netherlands

"Radio-Nieuws" (Dutch). Organ of the Netherlands Radio Society. A semi-technical journal, the "QST" of Holland. Published monthly by N. Veenstra, Laan van Meerdervoort 30, Den Haag, Netherlands. Single copies 25 francs. Yearly 10 francs.

"Radio Wereld" (Dutch). A weekly sheet for the radio enthusiast written in semi-technical style. A real live publication. Published monthly by Engers and Faber, N. Z. Voorburgwal 250, Amsterdam, Netherlands. Single copies 25 francs. Yearly 10 francs.

(Continued on page 63)

Strays



SATR, of Rochester, New York, is all fixed for Railroad Emergency work. He has installed an auxiliary five-watt set operating on an indoor antenna from storage batteries and a dynamotor, thus permitting his station to remain in commission even when outside power is cut off and the regular antenna down. FB, OM, vy.

One of the loyal members of the R.O.S. has just sent us a list of the officers of their worthy organization. Grand Exalted Sucker, Howard T. Cervantes, 2ACT; Vice Grand Exalted Sucker, Harold M. Marquis, 9AGV; Secretary, E. J. Possett, 9BWP; Treasurer, D. Tally, 2PF; Grand Czar, Leo Topolinski; Surgeon of Arms, T. E. Nikirk, 6KA; Chief Grave Digger, T. F. Pheiler, 9EHS; Guardian of QRN, C. W. Lyden, c3MM; Chief Wind Jammer, R. H. G. Matthews, 9ZN. The above will bring pleasant memories to those who attended the Chicago Convention last summer.

P.S.: Are there any more railroad certificates?

Regarding President Coolidge's holiday greetings message to WNP, the routing of which was given on page 27 of the March 1924 QST, the following has been received from 9ZT: "I received the message from 9AIM on December 25th at 6:15 A.M. All through the next morning I battled with it until finally after the room was full of smoke from my filament rheostat, which gave up that morning, Canadian 5GO, OK'd for it at 4:21 A.M. Was this the way it got to 5GO?" Really, this message was handled by so many stations that a complete story will probably never be known, but the above correction will help clarify the history of the message as given in the March issue.

At this stage of the game wouldn't it be nice if someone would invent some kind of a lingo-former; a transformer gilhicky into which the signals of foreign stations could be fed, delivering English at the secondary terminals, or vice versa when used in the transmitting set? By suitable plug-in arrangements on your set you could easily plug in the proper lingo-

former for the language of the country you are working at the time. This is just an idea for inventors to work on. Such a device would do away with the necessity for an international auxiliary language also.

Speaking of lingo-formers, "LQ" has a little loud speaker that has only been over from Germany for two weeks, yet it can talk perfect English. What do you think of that?

The highly insulated filament transformer that must be used in conjunction with kenotron rectifiers can be obtained by connecting an old 110-2200 volt pole transformer up backwards, feeding 110 volts to the 2200 volt winding and connecting the filament to the 110-volt winding. It will then deliver about 11 volts to the filaments, through the rheostats as usual. This gives a filament transformer insulated for 2200 volts.

9CTC finds it possible to use a rectifier bulb that is burned out by connecting it to the battery in the usual way and then applying 300 volts from his C.W. power transformer to the filament momentarily. The filament was of course burned out beforehand. After the initial flash at the broken filament the tube will start to rectify and the filament will remain heated of its own accord.

Doesn't anyone know the identity of JUPU? This C.W. station, that was worked by 7HG on amateur waves, has now been reported heard in Ohio. QRA?, OM pse.

It will be an excellent idea for A.R.R.L. representatives in each city to have the League's name put in the telephone directory and city directory, likewise to notify the Chamber of Commerce and the Postmaster of the League's existence and local representation. This would not only help visiting amateurs and others to get in touch with the local A.R.R.L. men, but would facilitate the delivery of mail as well.

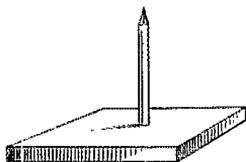
By the use of loops as direction finders an unlicensed amateur station in Oakland,

Calif., operating under the fictitious call "6LL", was located by the Supervisor of Radio recently. We hope this will serve as a warning to others who think they can "get by" without a license, even if for only a few days. Neither the Department of Commerce or the A.R.R.L. have any patience with an outlaw station.

The two-ampere battery charging outfit described on page 46 of last month's QST can be used for charging storage B batteries by connecting it as shown in the accompanying cut. The charging rate, which should never exceed a quarter of an ampere, is determined by the size of lamp connected in series with the battery and the voltage of the battery being charged. For charging a 45-volt battery a 75-watt

The General Radio Company of Cambridge, Mass., have purchased a tract of land adjacent to their present factory and will start construction at once on a four-story concrete building. This new unit will have the same capacity as their present building, thus doubling their production facilities.

3PH could not find the nodal point in his antenna system after much hard work and experimentation so Wadsworth, of 3JJ



NODAL POINT, 3PH

fame, made one and presented it to him. It looks something like this and he is highly pleased with it.

Notice to all Hams: All amateurs in favor of having an Indiana Convention of the A.R.R.L. in the near future please write to A. H. Barnett, DAKO, 33 Kiwanis Apt., Fort Wayne, Indiana. Come on, gang, lets go!

The Board has adopted black and gold as the official A.R.R.L. colors.

Miss Margaret M. ("Peg") King, QST bookkeeper and cashier (reviewed on page 53, QST January—Copies available from the Circulation Dept.)—hi!) is now Assistant Treasurer of the A.R.R.L., by recent action of the Board.

STATION KINKS

For those who are nutty on plate glass insulators: To drill the holes in the ends, take a 1/4 inch diameter rat tail file and

carefully make a chisel end on it with an emery wheel. Use a regular brace; a speed drill is n.g. A board with a hole in it is fine for keeping the drill in one spot till the hole gets started. Keep the drill lubricated with 3-in-1 oil or turpentine. It should take only about two or three minutes to drill a hole through a 1/4 inch plate of glass if the drill is good and sharp.

Amateurs Know Nothing About Dead Spots

We have just made an unpleasant discovery—that the amateur does not know anything about the dead spots in the ether. This is indeed quite a jolt as we thought our members would know the location of hundreds of dead spots. Yet it seems that from the results of various requests for this information that 9AMZ is about the only man in the League who knows anything about the matter—or who can locate a single dead spot. What's the matter with the rest of you?

Nodal Point on Inductively Coupled Sets

Many of our members have just awakened to the fact that the adjustment of the nodal point in a transmitting set is too essential to overlook any longer. If their tubes run hot and their sets do not "get out" the trouble in most cases can be remedied by properly locating the voltage node as explained on page 11 of the September, 1923, QST. What to do about adjusting the position of the elusive node in an inductively coupled set makes them scratch their heads, however. The answer is that in an inductively coupled set it will probably not make much difference where the voltage node is as long as it is somewhere in the antenna inductance coil. If a single series condenser is used and a counterpoise, put the condenser on the antenna side of the coil. It is on a conductively coupled set that the location of the nodal point really counts.

Re Low-Loss Tuners

There seems to be some misunderstanding regarding the antenna coil on a tuner such as was described in the article "Low-Loss Tuners" in the February, 1924, QST and how it affects the operation of the set. An important advantage of the tuner described is that when properly built the antenna coil position need not be changed with different positions of the secondary tuning condenser, if the natural wave length of the antenna coil is outside of the working range of the tuner and if it is coupled rather loosely to the secondary coil. Of course the proper inductance or shortening-capacity to put in the antenna circuit, so the natural wave length of this circuit will

(Continued on page 62)

Some Traffic Facts

By F. H. Schnell, Traffic Manager

AFTER listening to all sorts of arguments about what happens to our messages and how none of them ever reach their destination, but without deriving any real constructive suggestions on what to do about it, I took a bunch of correspondence (we get it in bunches at Headquarters) and answered it by radiograms. I was sure all of these replies would get through, because as soon as a message left 1XW, a duplicate copy was mailed direct to the addressee. When a message was on its way, a tracer message (sort of questionnaire) was mailed to the first station to which the message was sent from 1XW. As soon as the first tracer came back with the required information, another tracer was mailed to the next station handling the message, and so on right through to the addressee. This gave a double check on delivery and one of them had to work.

Nearly every message in this record was delivered. Some were delayed entirely too long, which is inexcusable, and others were garbled, for which no excuse can be manufactured. The business of garbling a message is a sure sign of weakness on the part of somebody. Either the transmitting operator has a bum fist (in which case the receiving operator should not QSL for a message until he is sure it is perfect copy) or the receiving operator hates to admit that he cannot copy everything, no matter how rotten or at what speed it is sent. When contact is established between stations there is no excuse for garbled copy. If the receiving operator is not sure of himself, he should not be ashamed to ask for repeats. It is not a crime to ask for repeats—it is far worse to let yourself think you have perfect copy when you are in doubt.

About delivery, the only thing we can say is this: *When a message has been on your hook for 48 hours, don't hold it any longer—MAIL IT.* A card will do it. Some of the delays which appear in the "Facts" are worse than third-class mail.

Here is what has taken place with some of these messages:

All messages were started from 1XW-1MO. The numbers appearing are for reference only and must not be confused with the actual number of each message as it was transmitted to the various stations. In each case complete address was given, the date was transmitted, and no abbreviations were used, but to save space we will have to shorten them a bit in the reporting.

Message Nr. 1, addressed to Mr. Tuttle, San Francisco, Calif. 1XW to 6BCL 2/20 10:55 P.M., EST. 6BCL mailed it and it reached the addressee in the first mail of 2/21.

Nr. 2—Washington Herald, Washington, D.C. 1XW to 3EH 2/20 7:50 P.M. to 3PZ 2/21 7:30 P.M.

After two unsuccessful attempts to deliver by phone on 2/21 and 2/22, 3PZ finally delivered it in person 2/23. It was addressed to an individual but we don't understand why 3PZ didn't leave it with somebody at the office.

Nr. 3—A. B. Goodall, 3AB. 1XW to 3CKJ 2/21 6:32 P.M. No further record—3CKJ reports his log destroyed and Goodall has not advised that the message was received by him. What happened to it?

Nr. 4—B. J. Kroger, 3APV. 1XW to 3CKJ 2/21 6:35 P.M. No further record—same status as Nr. 3.

Nr. 5—F. T. Wilcox, 9AAL. Looks like it might have gone thru a concrete mixer. 1XW to 3PZ 2/21 11:51 P.M. EST, to 8VE 2/26 11:51 P.M., EST, to 9BBI 3/1 12:07 A.M., EST, to 9CNO in person 3/4, and thence by mail to 9AAL on 3/5. In the first place the text of this message was as follows: "I have received your acknowledgement to my letter regarding the interference in St. Louis and await further reports from the secretary of the Radio Transmitters Association which I hope will be forthcoming within the next week or ten days", but here is a copy of the text as 8VE reported back after taking the message from 3PZ: "Have received your ans to my letter regarding the interference in St. Louis and await further within the next week or ten days." 3PZ or 8VE or both are to blame for garbling this, as no other station handled the message up to this point, and if 3PZ had trouble in copying from 1XW he should not have QSL'd the message. Five days delay at 3PZ is inexcusable—why wasn't the message mailed after holding it 48 hours? 8VE held it over 3 days and accounts for the delay as being very QRW school work. Why wasn't it mailed? 9BBI blew a tube while trying to give it to 9AAL, but then he held it until March 4 before he carried it over to 9CNO who finally mailed it. Part of it got to Wilcox all right—but who butchered that message?

Nr. 6—E. B. Westervelt, 8ZD. 1XW to 3PZ 2/21 11:45 P.M., EST, to 8KBH 2/25 7:36 P.M., to 8FM 2/26 6:15 P.M., EST, thence mailed special delivery to addressee 2/27. 3PZ also gave it direct to 8VE 2/26 5:24 P.M., EST. Five days from Hartford to Pittsburgh by radio! 3PZ can have the leather medal for this one. 48 hours or mail!

Nr. 7—Supervisor of Radio, Boston. 1XW to 1CMX 2/21 7:40 P.M. to 1XJ 2/22 1:45 A.M., mailed and arrived at destination 2/25. Uncle Sam must have delayed this one as it was mailed at noon of 2/22.

Nr. 8—W. Moore, 9DES. 1XW to 9EFH 2/21 6:59 P.M. EST, to 9AJE 2/22 12:15 P.M., CST, and mailed to addressee 2/23, but we doubt if it ever reached 9DES because the address became scrambled and it went to Kansas City instead of Caney. Who garbled it?

Nr. 9—W. T. Gravely, 3BZ. 1XW to 3CKJ 2/21 6:29 P.M., EST. 3CKJ reports his log destroyed and record is not complete. The message was received by Gravely 2/23 but the text read like this: "Havent heard ur sigs since my card," although it left 1XW like this: "Unfortunately I have not heard your signals since my card stop please keep going OM and we will connect up soon." Don't know where to fix the blame for the garbling and delay. Better keep a log, 3CKJ, and hold your messages for a month so you can trace them when asked.

Nr. 10—Radio 4BL. 1XW to 3CKJ 2/21 6:41 P.M., EST. 3CKJ log destroyed but the message got to 4KU and was mailed from there, arriving at 4BL 2/23 9:00 A.M. Badly garbled as only 13 words were received by 4BL and 29 were started from 1XW.

Nr. 11—H. L. Reid, 4KU. 1XW to 3CKJ 2/21 6:37 P.M. Log destroyed but message was delivered by 4MB 2/24. Routing unknown.

Nr. 12—Oakland Tribune, Oakland, Calif. 1XW to 6XBC 2/22 3:35 A.M., EST. Delivered by mail and reported back 2/27.

(Concluded on page 63)

Radio Communications by the Amateurs

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



QRB?

926 Michigan Ave.,
Evanston, Illinois.

Editor, QST:

Many amateurs have a rather exaggerated notion of the distance to some station which they have worked. In radio, distances should always be measured along the shortest path on the earth's surface, which is along the arc of a great circle; for short distances it is practically a straight line. This is much shorter than the distance by road or railroad.

The most convenient way of measuring distances to DX stations in an area the size of the United States is to get a large, accurate map, and then with your own station as center draw circles with radii of 100, 200, 300, etc., miles, in accordance with the scale of the map. Then, when another station is located on the map, you can immediately see which circles it lies between and estimate the distance to the nearest ten miles; or the distance from the station to the nearest hundred-mile circle may be transferred with dividers to the scale printed on the map.

To find the distance to a foreign station, or to find distances in the U. S. more accurately, the following formula from spherical trigonometry is convenient:

$\cos a = \cos b \cos c + \sin b \sin c \cos A$,
where a is the required distance, b and c are the co-latitudes (90° minus the latitude) of the two stations, and A is the difference in longitude. This formula gives the distance in degrees of arc. One minute of arc equals one nautical mile or 1.152 statute miles. One degree of arc equals 69.08 statute miles.

The latitude and longitude of each station may be taken from a large scale map and used in the above manner to find the distance between them. Figuring to the nearest minute is more accurate than necessary, for a minute of arc on the earth's surface is about a mile, while a second is only about 100 feet.

—E. W. Kimbark, 9AMZ.

Another Record

4909 Fletcher St.,
Chicago, Ill.

Editor, QST:

I hereby make all claims to the most

"miles per watt", "miles per dollar", etc., etc. The first liar "aint go no" chance.

Received a card from PCTT, of Noordwyk, Holland, stating he heard my A.C. C.W. sigs "fine and steady" on Feb. 27. As I have not had my transmitter in operation since about October, I take it for granted that he heard my receiver oscillating! My receiver consists of a Zenith with detector and two stage a.f. amplifier and phones won at the National Convention. The detector tube used at the time was borrowed from a local B.C.L. (hi!) and the storage battery set me back \$18 just two years ago! Think this record beats Aussie 2CM's and any other record you care to bring forth. In awarding any Transatlantic prizes, please ship me those "ventilated vacuum tubes" via airplane mail-Gosh, even if I do say it myself, didn't think I could get to Holland on a UV200.

—Beverly Dudley, 9BR.

Edison Batteries the Berries for Plate Supply

Timmons, Northern Ont.

Editor, QST:

I have tested out the Edison B batteries I recently bought through an ad in QST and beg to submit my report on same. The set I have here now has been working one month. It uses four 5-watt tubes on C.W. and two of them are modulators when using phone or I.C.W. The set has been used steadily every morning from 2 A.M. to 8 P.M., six solid hours. The average space current has been around 175 milliamperes. Have often used phone steady for 20 minutes and kept up this series of 20 minute phone talks for three hours, stopping only long enough between times for the other guy to come back at me.

After a four or five hour run like the above the Edison battery would begin to fall off and then the boys around about would begin to say "some QSS now." Then I know it's time to call it a day. Of course you can see it on the set too, as the antenna current will start out good when starting to talk and fall away in sympathy with the voltmeter on the Edison batteries, which ship away fast when the load is piled on. That's a good sign she's "down," so I close down the work at daybreak.

On observation I find that she gives a

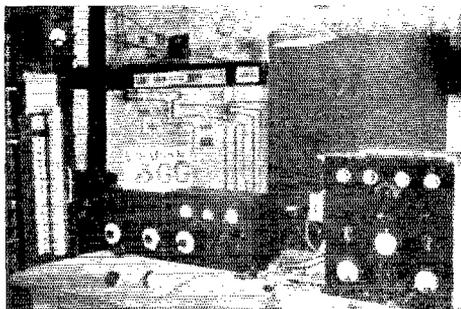
good 500 volts when she is right up and fully charged. The actual figures given below were taken under working conditions.

Voltage of 400 cells when fully charged.....	650 volts
When a 175 m.a. load is applied	620 volts
When 175 m.a. is applied for 5 minutes	600 volts
After battery has rested 10 minutes while other guy has his say.....	630 volts
When I put load on again...	600 volts
After running 5 minutes.....	585 volts
After resting 10 minutes.....	600 volts
After working two hours.....	530 volts
After working four hours....	490 volts
After working six hours.....	430 volts

She is "done" now. But Boy, Oh Boy! when she is *right up* to solid full charge, all I have to do is to step on her and the boys start to holler for me. The antenna power is 30% higher when I start out than at the end of a 5 or 6 hour run.

Have been reported in 30 states in 27 days, (and I have to go 400 miles before I hit a state, too). DX on phone is 1,000 miles "perfect in every syllable", they say, and 2400 miles on C.W.

So—I am rigging her up now so I can



CANADIAN 3GG. The Edison Storage batteries that supply the plate circuit, with the charge-discharge switch and plate voltmeter, are seen at the left of the picture.

throw her over for a charge each time I throw the aerial change-over switch. Howzat for keeping her *full o' pep*?

—M. J. Caveny, Can. 3GG.

Long Waves QSA in P.R.

Box 660, San Juan, Porto Rico.
Jan. 12th, 1923.

Editor, QST:

In looking over QST for January I saw your "Stray" concerning long wave reception. I have always followed with interest all articles concerning long wave reception.

To start I might state that fairly constant signals from the high powered European stations are heard all the year around

here in P.R. The antenna employed at this station is in the form of a V consisting of a single strand of copper wire taken from an old power transformer, being about one eighth inch in cross section. Tests have been made to determine the best type of ground connection for receiving purposes and I have found that a good ground is absolutely necessary for good results. At this station the ground consists of a square skeleton wooden framework with about five hundred feet of number fourteen gage wire wound around it and buried at a depth of six feet. In addition another straight stretch of wire is used and connections have also been made to the water pipes.

There is nothing extraordinary about the receiver in use at this station. It is the conventional three-coil honeycomb receiver used in conjunction with a two step amplifier. All tubes used are hard tubes as I have found that a soft tube is NG for long wave reception. I am more or less addicted to the use of but one tube.

I believe one thing that cannot be emphasized too strongly is the fact that it takes time and patience to acquire the knack of handling honeycomb coils correctly.

As to results at this station: LY at Bordeaux has been received strong enough at this station on one tube to copy his press on a mill! LCM, UFT, MUU and POZ are also quite strong on one tube although of course they are much harder to read than LY due to their shorter wavelength. As to the naval stations, they also are copied quite nicely, such stations as NBA, NPM, NPL and NDD being copied regularly. NPL has also been tuned in strong enough to copy him on one tube on a typewriter. LPZ, the new Swedish stations, has been heard, although not regularly.

I hope that this will be of interest to others who are interested in long-wave reception.

—Francis McCown.

STRAYS

(Continued from page 59)

be just outside the operating range, will vary with the antenna used. The wave length to which the antenna circuit is tuned will be indicated by the wave length adjustment on the secondary condenser where abnormally tight tickler coupling is required for oscillation, or else at which the set will not oscillate at all. If there is such a point on your tuner, then put a loading coil or a shortening condenser in series with the antenna to put this point outside of the band of wave lengths covered by the secondary tuning dial.

The "Brooklyn Standard Union" says

that the name of the King of Burmah, Siriraribhavanadityapaprapanditasudhamarajamahadahipatimarapatisithu, can never be broadcast. We are certain, however, that we have heard it being tried.

A prominent amateur on the West Coast is having a hard time figuring out whether any H's are lost in the conversation when a Yank works an Englishman. Perhaps some of the stations working across the Atlantic can explain this for the enlightenment of the rest of us. Hw?

5QF saw a bird sitting on a limb, and being of a cussed nature, threw a rock at it. The little bird only jumped to higher limb and chirped: "— . — ."

If your letter to QST has not been answered you probably put your address on the envelope but *not* on the letter—or maybe you signed your call instead of your name. We have a whole file of such "dead letters."—The Editors.

SOME TRAFFIC FACTS

(Concluded from page 60)

Nrs. 13, 14, and 15. Routing not completed; will be reported later.

Nr. 16—Ester Picker, 6ZH. 1XW to 6XBC 2/22 2:56 A.M., EST. No further record. Up to 3/9, 6XBC reports he is unable to raise anybody south of Los Angeles. 48 hours, then mail 'em, OM!

Nr. 17—Len Weeks, 9DKB. 1XW to 9CGB 2/22 4:46 P.M., EST, to 9BRI 2/22 6:30 P.M., CST, thence by mail 3/1. 9BRI explains his delay due to blown tube, but that answer is N.G. Why didn't you mail it after you held it 48 hours?

Nr. 18—D. C. Wallace, 9XAX. 1XW to 9CGB 2/22 6:52 P.M., EST, to 9XAX 2/22 7:40 P.M., CST. Hurrah! A message got through in one night even though it had to go through another station.

Nr. 19—B. A. Ott, 9ZY. 1XW to 9CGB 2/22 6:55 P.M., EST, to 9XAX 2/22 7:45 P.M., CST, and mailed 2/25. When a message lands at 9ZT, 9XAX, it doesn't linger 48 hours. Wallace moves them, or mails them; the rest of us are supposed to, too.

Nr. 20—M. E. McCreery, 6LJ. 1XW to 6XBC 2/22 3:04 A.M., EST. Delivered in person 2/24 2:00 P.M. 6XBC reports it was delivered in person by him 2/22. One or the other is wrong.

Nr. 21—K. P. Frederick, Los Angeles. 1XW to 6XBC 2/22 3:09 A.M., EST. Delivered in person 2/23 5:00 P.M., PST.

Nr. 22—Major Borrett, Canadian 1DD. 1XW to 1XAR 2/23 7:15 P.M., EST, to Canadian 1DD 2/26 7:00 P.M. You held it a day too long, 1XAR!

Nr. 23—Toronto Star, Toronto, Ont. 1XW to Canadian 303 2/24 5:46 P.M., EST, to Canadian 9AL 2/24 8:00 P.M. and delivered 2/25 4:00 P.M.

Nr. 24—E. F. MacDonald, Zenith, Chicago. 1XW to 9XBA 2/25 7:47 P.M., EST, delivered 2/26 10:00 A.M., CST.

Nr. 25—H. L. Gooding, 6FP-6ZZ. 1XW to 5AIC 2/26 12:11 A.M., EST, to 6ZZ 2/28 5:30 P.M., CST.

Nr. 26—K. E. Hassel, Chicago. 1XW to 9XBA 2/25 7:45 P.M., EST. Message was phoned 2:26 10:00 A.M., CST, but Hassel didn't get it until 3/3 stating that 9XBA gave the message to his sweetie over the phone but she held it several days. We have to take Hassel's word for it. Better tell

your sweetie about holding messages longer than 48 hours, "FJ"—can't afford delays like that, OM.
Nr. 27—P. T. Bennett, Dallas, Tex. 1XW to 5AIC 2/25 11:54 P.M., EST, to 5ZC 2/26 4:30 P.M., CST, who delivered it in person 2/26. The only startling thing about this is the pleasant surprise that old Kid Corlett is back on the air again. PB, 5ZC!

Nr. 28—W. E. Schweitzer, 9AAW. 1XW to 9XBA 2/25 7:51 P.M., EST. Mailed 2/26 10:30 A.M., EST. Delivered 2/27 OK.

Nr. 29—A. H. Babcock, San Francisco. 1XW to 8FM 2/28 11:09 P.M., EST, to 9EEA 3/3 1:00 A.M., EST, and mailed from there 3/3 9:00 A.M., MST, delivered 3/5 OK. 9EEA reports receiving this one from 8FM at 3:00 A.M., MST. Either 8FM or 9EEA is wrong as the two hours difference in time is the other way 'round.

Nr. 30—Routing not completed; will be reported later.

Nr. 31—G. L. Bidwell, Washington, D.C. 1XW to 3PZ 3/17 7:59 P.M., EST. Delivered 3/18 3:39 P.M. 3PZ has improved his delivery already—FBI!

There is the story, fellows; no razzing is meant for anybody. The facts just happen to be as you see them and the complete file is being preserved. One thing is brought out very plainly—our messages seem to get through if you give them enough time and don't care what they look like when they arrive. It is going to pay some of you to keep a decent log and preserve records of the messages you handle for a month or two. Some of you might be a bit more careful with your sending and receiving—don't acknowledge a message at which you have merely taken a wild guess—get it right. And when you haven't relayed it within 48 hours, for the love o' Mike don't let it lay around accumulating moss while you are repairing your soldering iron or something—MAIL it!

Sooner or later some more of you are going to run afoul one of these messages which are being traced, and it will be to your advantage to be able to supply the information asked for, because this is t-o-b-e c-o-n-t-i-n-u-e-d.

INTERNATIONAL AMATEUR RADIO

(Continued from page 57)

Italy

"L'Audion" (Italian). Organ of the Radio Club of Italy. A semi-technical journal of Italian radio progress. Published twice a month at Via dell'Aloro 19, Firenze, Italy. Single copies 2 lire. Yearly 50 gold francs.

Argentina

"Revista Telegrafica" (Spanish). A very interesting semi-technical review of radio and electrical progress. Has a section devoted to Radio Club of Argentina. Published monthly at Calle Peru 135. Buenos Aires, Argentine Republic. Single copies 40 cents. Yearly \$2.00 o/s (Argentine money).

"Electron" (Spanish). An interesting radio telephone review. Has section devoted to Radio Club of Argentina. Pub-

lished monthly at Av. de Mayo 1035 Buenos Aires, Argentine Republic. Single copies 70 cents (Argentine money).

Brazil

"Radio" (Portuguese). A semi-technical review of radio information; the official organ of the Radio Society of Rio de Janeiro. Published twice a month. Editor, Carlos Sussekind de Mendonca, Rua de S. Jose n. 114, Rio de Janeiro, Brazil. Single copies 2.500 reis. Yearly 50.000 reis.

Germany

"Der Radio Amateur" (German), organ of the German Radio Club, an organization representing the transmitting and receiving amateurs in Germany, which was organized to promote interest in these things and to eventually secure the opening of a band of wave lengths for amateur transmission. The contributors number many of Germany's foremost radio men. This magazine is the "QST" of Germany. Published monthly for Eugene Nasper by Julius Springer and M. Krayn, Berlin. Subscription price adjusted in accordance with prevailing rate of exchange.

"Telefunken Zeitung" (German), the house organ of the Telefunken organization. It is splendidly printed, its contributors are internationally famous members of the organization, and the articles, while centered about Telefunken activities, are invariably informative and valuable. Distinctive departments are a book department confined to the review of German books and a monthly world-wide review of radio conditions in all lands, a unique and valuable feature not duplicated anywhere else. Published at Telefunkenhaus, Berlin S.W. 11, Hallesches Ufer Nr 12. Six issues per year. Price determined by multiplying 1 German mark by the current factor of the German Society of Bookdealers.

"Der Deutsche Rundfunk" (German). Purely a broadcasting magazine. Articles, however, have a technical tendency and are contributed by prominent engineers. Published monthly by Rothgiesser & Diesing A. G., Prinzenstrasse 98, Berlin S. 42. Price per year in America about \$3.00.

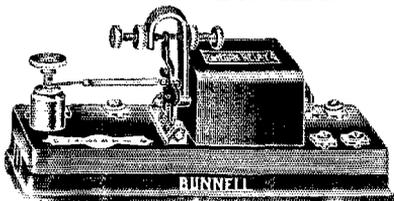
"Radio" (German and some Spanish). Primarily a trade journal with interest mainly centered in Germany and Spanish America. The advertisers are German. Published twice a month by Rothgiesser & Diesing A.G., Prinzenstrasse 98, Berlin. Price in America \$2.00 per year.

AN AMATEUR IN THE LIGHTHOUSE SERVICE

(Concluded from page 40)

good, but unfortunately my list of calls heard was lost. I would surely like to hear from any of the fellows I worked, or who heard NASK's signals, and will gladly QSL. My present address is 125 East-lawn Ave., Detroit, Michigan."

GHEGAN RADIO RELAY



Taps permit tubes of various impedance to be used. With Bunnell Register this Relay will copy telegraphic signals at a speed of 60 to 90 words per minute.

With Siphon Recorder speeds up to 200 words per minute have been obtained. Normal operating current is $\frac{1}{2}$ to 2 Milli-Amperes. Send stamp for catalogue No. 45 Q., Ghegan Radio Relay \$40.00
Special Price to Dealers.

J. H. BUNNELL & CO., 32 Park Place, New York.

"Wouldn't trade my

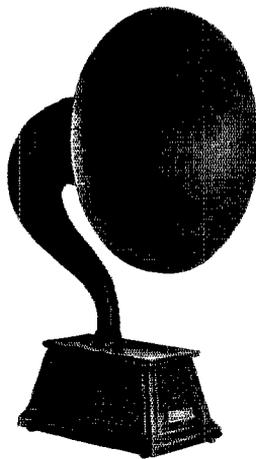
THOROPHONE

TRADE MARK REG. U.S. PAT. OFFICE

for a Rolls-Royce"

says HARRY H. HECKMAN

High
Power
Model
S-5
\$45.00



COMPARISON tells. Listen to the Thorophone and learn how perfect a loud speaker can be. Every tone, every note is given its true value. You would think speaker or musician were right before you.

Make the Thorophone your permanent loud speaker investment—you'll never want to change it. The Thorophone makes any set sound better.

Made by America's oldest manufacturers of loud speaking devices. A power horn, taking only one ampere from a 6-volt storage battery. It actually amplifies weak signals, yet handles the greatest possible volume with the same natural quality—quality that satisfies.

Write for booklet

WINKLER-REICHMANN CO.

4801 S. Morgan Street Chicago, Ill.

“See! Dad
how much stronger
it’s coming in
since you bought
me Burgess Radio
Batteries.”



BURGESS **RADIO BATTERIES**

SOMETIMES it’s Dad who does the buying for his radio family, but you may be sure that that youngster of his sits in on the advisory board.

In all events, whether it be the boy or his father who buys receiving set equipment, the service of Burgess Radio Batteries provides a most satisfactory and economical means to greater enjoyment of the evening’s radio entertainment.

“ASK ANY RADIO ENGINEER”

BURGESS BATTERY COMPANY

Engineers - DRY BATTERIES - Manufacturers

FLASHLIGHT RADIO IGNITION TELEPHONE

General Sales Office: Harris Trust Building, Chicago

Laboratories and Works: Madison, Wisconsin

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 PITTSBURGH ST. LOUIS NEW ORLEANS

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Approved By Over 200 Experts New Crosley Engineering Achievement

A three tube set with five tube efficiency—the greatest selectivity with the minimum effort—positive calibration to any wave length between 200 and 600 meters. These are only a few of the many advantages offered in the remarkable new Crosley Trirdyn Radio Receiver.

It was only after a year of constant experimenting, that our engineering department perfected this exceptional receiver. Thorough tests proved to us that it would out-perform any receiver ever before produced. But we were not satisfied with our own opinion. So we shipped out 200 of these sets to experts in every part of the United States. Their criticisms are

one and the same—"tried out your new Trirdyn Receiver Saturday night and logged 13 stations, among them Cuba, New York and Omaha, between 9 and 10 o'clock. The set was very selective. During the time this test was on, local station KSD was operating and we went through them without any difficulty or interference whatever. The range of the local station was not more than three points variation in the dial setting."

"Tried one of these sets out and obtained wonderful results. Were able to log all stations which we heard very successfully. This set should go over big." "The set has wonderful volume and is selective"—etc.

Licensed under Armstrong
U. S. Patent No. 1,113,149

CROSLEY
Better-Cost Less
Radio Products

Largest Builder of Radio
Receiving Sets in the World

See this new wonder at your dealers

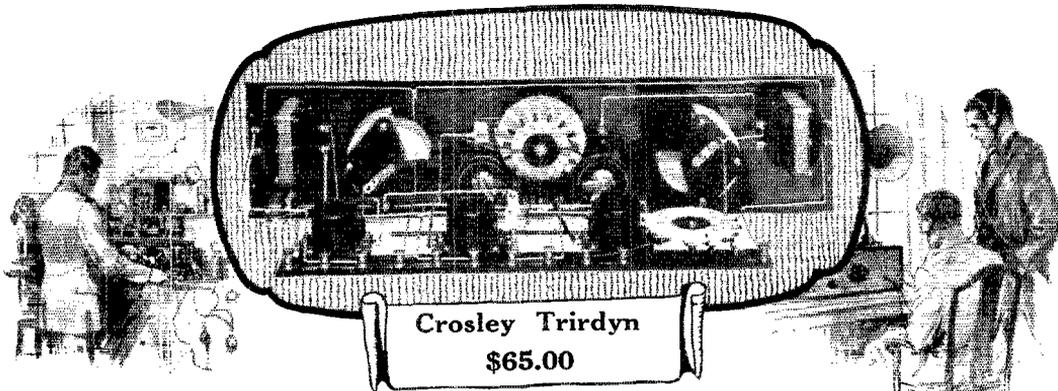
THE CROSLEY RADIO CORPORATION

Powel Crosley, Jr., President

Formerly The Precision Equipment Company and Crosley Manufacturing Company

518 ALFRED STREET,

CINCINNATI, OHIO



Behind the Trirdyn Panel

Where the Extreme Efficiency is Built-in

This new Crosley triumph is called the Trirdyn because of its original combination of the three "R's"—Radio frequency amplification, Regeneration and Reflex. The first tube incorporates non-oscillating, non-radiating tuned radio frequency amplification; the second tube, a regenerative detector, reflexed back on the first tube for one stage of audio frequency amplification. Then it has a third tube which acts as a straight audio frequency amplifier. It uses the ultra selective aperiodic antenna circuit and external selector coil, which adds to its wonderful selectivity. The Crosley Trirdyn in range, volume and selectivity is the equal of

any five tube receiver on the market. Greater volume will, of course, be obtained through the use of storage battery tubes, but it will function well in any type and can be used with either indoor or outdoor antenna.

The opinions of many experts have convinced us that the Trirdyn is the best receiver ever offered the public regardless of price.

Practically every radio dealer can furnish you Crosley Radio Sets including not only the Trirdyn, but the Model 51, a two tube set for only \$18.50; the Model V, a single tube receiver at \$16.00; the Model VI at \$24.00; the Super VI at \$29.00; the Model X-J at \$55.00 and the Super X-J at \$65.00.

*Licensed under Armstrong
U. S. Patent No. 1,115,149*

CROSLEY
Better-Cost Less
Radio Products

*Largest Builder of Radio
Receiving Sets in the World*

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THE CROSLEY RADIO CORPORATION

Powel Crosley, Jr., President

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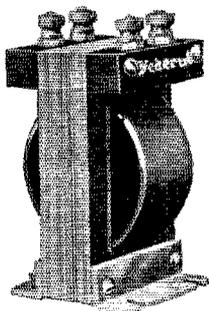
518 ALFRED STREET,

CINCINNATI, OHIO

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

The set you build will please you more

if you use — **FEDERAL**
Standard Radio Products



The now famous No. 65 Audio Frequency Transformer is but one of over 130 radio parts designed, manufactured and guaranteed by Federal.

\$7.00

Federal parts are made with but one purpose in mind—to deliver the utmost in radio service. Years of research and hundreds of experiments are often necessary before some of them have reached that standard of perfection demanded of all of Federal's more than 130 parts.

Remember, too, that a set built with a few good parts and some not so good, will only be as dependable as the inferior parts. For unqualified pleasure and satisfaction you must use good parts all through.

Federal will meet these requirements precisely. They are designed and built to work together—all as parts of a single unit—"that set that will please you more."

Federal Telephone and Telegraph Company

Factory: Buffalo, N. Y.

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Bridgeburg, Canada

Philadelphia

Chicago

San Francisco

Pittsburgh
London, England

*This may be the trouble
with YOUR set—*

You can probably change
your grid leak for higher
Detecting Efficiency

The highest efficiency can
only be obtained by changing
both resistor and condenser

Can You Do This ?

RESISTOR



THE DAVEN COMBINED RESISTOR-
CONDENSER MOUNTING DOES BOTH

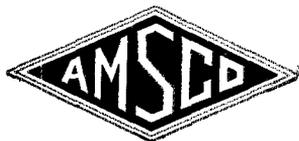
If your dealer cannot supply you
write

Daven Radio Company

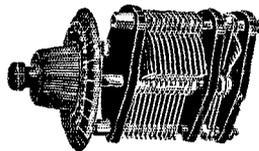
"Resistor Specialists"

11-13 Campbell Street Newark, N. J.

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



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

"THE AIR IS FULL OF THINGS YOU SHOULDN'T MISS"



Get ready now for summer radio

A GREAT radio summer is at hand. To enjoy summer radio at its best, equip your receiver with the best batteries you can get. Put in new Eveready Radio "B" Batteries and see what wonderful, long-lived service they will give.

Made especially for radio use, Eveready "B" Batteries will operate the loud speaker at maximum volume for long or short periods, depending on how rapidly the current is taken out of them. Packed full of pep and punch and go, Eveready "B" Batteries pour out their power the moment you turn on the tubes.

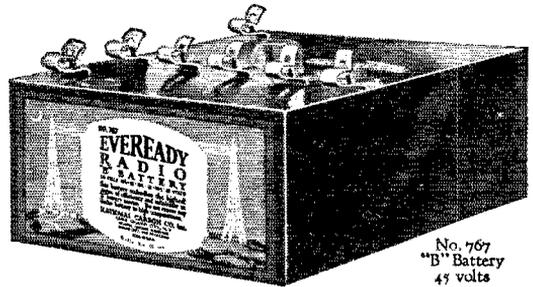
Eveready "B" No. 767 is the standard amplifier "B" Battery, and gives 45 powerful, dependable, zippy volts. Five sturdy Fahnestock Clips make this big "B" Battery available for detector tube use as well—varying the voltage from 16 1/2 to 22 1/2 as required.

Insist on Eveready "B" Batteries, remembering that they are the product of thirty years of experience and know-how in battery making. For maximum battery economy and service buy Eveready Radio Batteries—they last longer.

Manufactured and guaranteed by

NATIONAL CARBON COMPANY, Inc.
Headquarters for Radio Battery Information
New York San Francisco

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No. 767
"B" Battery
45 volts

Storage
"A"
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No. 766
"B" Battery
22 1/2 volts



No. 7111
Dry Cell
"A"
Battery



No. 704
"B" Battery

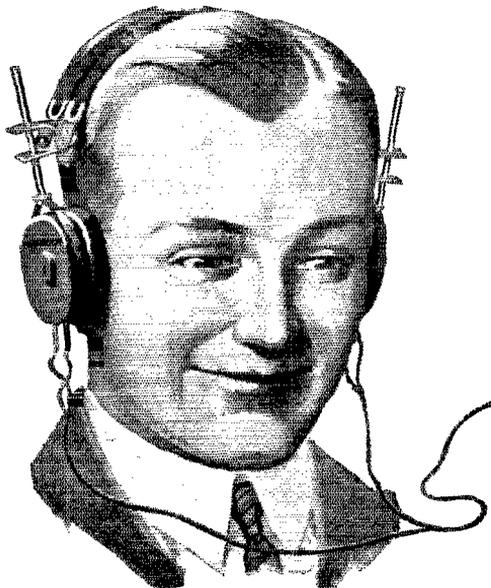


No. 771
"C" Battery

EVEREADY Radio Batteries

—they last longer

Informative and money-saving booklets on radio batteries sent free on request. If you have any questions regarding radio batteries, write to G. C. Furness, Manager, Radio Division, National Carbon Co., Inc., 124 Thompson Avenue, Long Island City, N. Y.



Get 'em All, local and DX with Murdock's

MURDOCK Radio Phones are extremely sensitive to distant radio signals. This makes them an ideal phone for DX work—where clear, volume reproduction are essential.

The new improved flat headband enables you to wear Murdock's for hours without discomfort.

An important feature—Murdock's are built, not assembled. The parts are firmly embedded in moulded insulation—and they can't get out of adjustment.

Get a pair of Murdock's today and test them out. They get all stations, local and DX, clear as bells. They are fully guaranteed.

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

MURDOCK RADIO PHONES

Standard since 1904

WM. J. MURDOCK CO.,
343 Washington Ave., Chelsea, Mass.
Gentlemen: Send me without obligation your
booklet, "The Ears of Radio."
Name
Address

How to Get the Best Results from Your Radio Set

First of all, remember that *good panels* are absolutely necessary — because the greater the volume and surface resistivity of the panels, the less surface-leakage and power-loss in your set.

Also remember that to get the best results you should use a new, *sharp* drill with *slight* pressure.

There is no longer any incentive to buy inferior panels, for the best panels made—



TRADE

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RADIO PANELS

can be bought at any good
Radio Dealer's Store

At 25 to 50% Less
than any other standard panel

Electrasote is one of the "Sote" products of world-wide fame introduced by THE PANTASOTE CO., INC.

All Standard Sizes

JOBBER'S AND DEALERS:

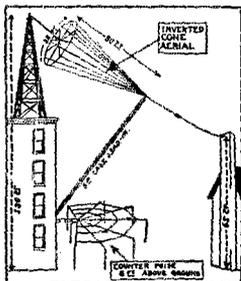
Write for our interesting proposition.

M. M. FLERON & SON, INC.

Exclusive Sales Agents for
Electrasote Radio Panels.

Trenton, New Jersey

Another wonderful testimonial for ACME Transformers



Haverford College Radio Club

Haverford, Pennsylvania

BROADCASTING CALL
WABQ

AMATEUR CALL
3-BVN

Affiliated with the American Radio Relay League

February 5th, 1924

Mr. G.E.M. Bertram, Chief Engineer,
Acme Apparatus Co.,
Cambridge, Mass.

Dear Sir:-

We believe that you will be interested to know how well one of your 500 watt OW transformers stood up at a critical time during the broadcasting of the Haverford College Alumni Dinner from WABQ on February 2nd.

As we wished to reach alumni throughout the East, we used high power for the first time, and consequently over-loading the transformer. After the set had been in continuous operation for over an hour the transformer became so hot that the paper turned dark brown. We could not interrupt the program, so we decided to run it to the limit, as we expected the program to end within a short time. After an hour and a half the set was still "going strong" but the old transformer was smoking like a locomotive, and it seemed about to blaze up at any minute. The control operator in the dining-hall told us that the program would be over in fifteen minutes, so we hastily rigged up a little electric fan and turned it on the transformer, which by this time was nearly black from the intense heat. The fan helped, and we managed to keep the transformer going until we signed off, after more than two hours of continuous operation. During this time the transformer was heavily over-loaded, much more so than in any amateur station where the load is on for only a short time.

It is needless to say that we thanked the powers-that-be for the sturdiness of the transformer--and never again will we use high power for a two hour program.

Yours truly,
W. S. Halstead

W. S. Halstead, Station Mgr.

ACME

for
transmission

Send this Coupon

ACME APPARATUS CO.
Dept. 38, Cambridge, Mass.
Gentlemen: Kindly send me your latest catalog of:
 Transmitting Apparatus
 Receiving Apparatus
 Booklet on Amplification without distortion.
(Enclose 10¢)

Name _____

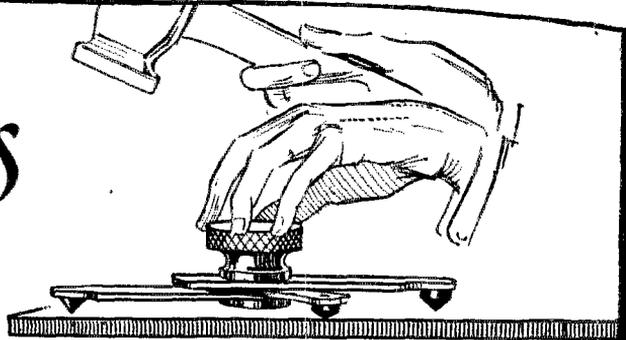
Street _____

City _____

State _____

**Just
three taps**

*and you're
ready to drill
accurately!*



**The Church
AUTOMATIC TEMPLATE**

WHY run the risk of spoiling your panel when the Church AUTOMATIC TEMPLATE makes it so easy to drill holes exactly where they should be drilled? No rulers, no scribers, no dividers—just three taps and the work is done! The Church AUTOMATIC TEMPLATE should be in your radio tool kit. If your dealer cannot supply you write us!

\$ 1
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1 East 42 Street, N.Y.C.

**ARE YOU A 1923 MAN ?
IF YOU ARE—GET OUT OF THE RUT**

Radio has improved with leaps and bounds since last year—to be a 1923 man is to be satisfied with last year's results—Broadcasting and CW will accomplish wonderful results this year and for you to share in these coming successes—both receiving and transmitting—you need a good set, made from the latest and most improved parts.

ROSE RADIO HAS IT !!
(and I don't mean maybe)

ROSE RADIO AND ELECTRICAL SUPPLIES
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De Luxe
Contact

NA-ALD

De Luxe Socket

The laminated phosphor bronze contacts of the Na-ald De Luxe Sockets 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.

Na-ald DeLuxe
No. 400

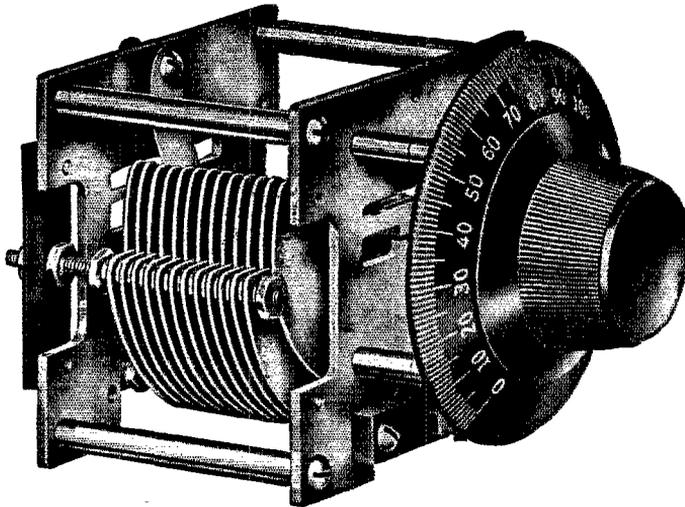
CATALOG L-25-148
PAGES
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Super-Hetrodyne—Neutrodyne
New Complete Branston Kits Including
Oscillator Coupler, Antennae Coupler,
3 Inter. R.F. Trans. and Special Trans-
fer Coupler. Complete Kit Lists \$36.50
Acme 30 KiloCycle R.F. Trans. 5.00
All American 2,000 to 10,000 Meter
Trans. \$6.00. Hilco Antennae Coupler.
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Fada Neut. Parts. 5 tube. \$65.60. 4
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AMERICAN RADIO MFG. Co.
WHOLESALE DISTRIBUTORS
Dept. T 6 WEST 14TH ST. KANSAS CITY, MO.

THE NATIONAL PERFECT VERNIER CONDENSER TYPE DX

Maximum
Signal
Strength



Minimum
Loss

Tests Prove This Design Most Efficient

DESCRIPTIVE DATA

Capacity—maximum—MF	.001	.0005	.00035	.00025
Capacity—minimum—MF	.000018	.000016	.000014	.000014
Price, complete with Vernier Dial	\$7.00	\$6.00	\$5.75	\$5.50
Number of plates	45	25	17	13
Thickness of plates	.032	.032	.032	.032
Overall depth, panel to end	4.6"	3.3"	3"	2.75"
Height	3"	3"	3"	3"
Width	3.25"	3.25"	3.25"	3.25"
Weight with dial	18 oz.	15 oz.	13 oz.	12 oz.
Weight without dial	13 oz.	10 oz.	8 oz.	7 oz.
Rotor & Stator Plates	Aluminum			
Shielding plates	Special Alloy			
Shaft Diameter	.25"	.25"	.25"	.25"
Insulating Material	Low loss hard rubber			
Bearings, front & back	Double automatic and ball thrust adjustable			
Rupturing voltage at 60 cycle AC	1200 volts			
Equivalent series resistance at 89 meters (3380 kilo cycles)	less than 1 ohm*			

*No absolute value can be given as probable error in measuring apparatus was greater than the magnitude of the probable loss in the condenser.

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,

Your pilot over the RADIO WAVES

Whatever the radio course you have set for yourself, here is your one best guide.



JUST
OUT
—
514
PAGES

Compiled by HARRY F. DART, E.E.
Formerly with the Western Electric Co., and U. S. Army
Instructor of Radio.

Technically Edited by F. H. DOANE

THIS is what you want in a radio book. It answers your every question as it occurs to you. Look up the thorough index, turn to the page, and there you are! The most complicated facts about radio and electricity explained as easily as the most simple ones.

Everything included. Compiled by an expert formerly of the Western Electric Co., the organization that knows most about radio in the world, and edited by another famous engineer. Understood by thousands of laymen because written especially for them. Yet—and here is the real marvel of this book—the advanced amateur, constructor and experimenter also find in it the data they need for calculating the constants of transmitters, receivers and associated apparatus for all radio purposes.

SOME OF THE FEATURES: Electrical terms and circuits, antennas, battery construction and maintenance, generators and motors, vacuum tubes (really explained), many receiving hook-ups, radio and audio frequency amplification, broadcast and commercial receivers, super-regeneration, codes, license rules, etc.

Send \$1 to-day and get this 514-page I. C. S. Radio Handbook—the biggest dollar's worth in Radio. Money back if not satisfied.

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Box 6133-B, Scranton, Penna.

I enclose One Dollar. Please send me—post-paid—the 514-page I. C. S. Radio Handbook. It is understood that if I am not entirely satisfied I may return this book within five days and you will refund my money.

Name.....

Address.....



MAHOGANITE Dials that match the set

Like all other distinctive products, Mahoganyite has its imitators. But, these imitations are on the surface only. Mahoganyite is not a surface finish. The electrical values of Mahoganyite extend through the material.

The only way to assure yourself of genuine Mahoganyite Panels, or Dials which match the panels is to make sure that the RADION Trademark is on every one that you buy.

21 Stock Sizes Mahoganyite and Black

6 x 7	7 x 14	8 x 26
6 x 10 1/2	7 x 18	9 x 14
6 x 14	7 x 21	10 x 12
6 x 21	7 x 24	12 x 14
7 x 9	7 x 26	12 x 21
7 x 10	7 x 30	14 x 18
7 x 12	7 x 48	20 x 24

RADION

The Supreme Insulation

PANELS



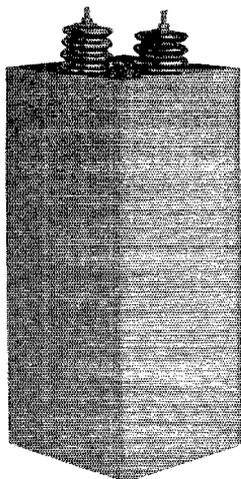
Look for this stamp on every genuine RADION Panel. Beware of substitutes and imitations.

AMERICAN HARD RUBBER CO.
11 MERCER ST. NEW YORK

Static Condensers

High-Voltage Direct Current

Specially Adapted for Radio "Filters"



3500 VOLT DIRECT-CURRENT UNIT

A Good C.W. Note or Clear Speech Transmission

depends upon uniform plate voltage.

A static condenser must be placed in the circuit, between the source of direct-current supply and the plate, to obtain satisfactory results in speech transmission or a good C.W. note.

Westinghouse Electric has developed a static condenser which meets fully all requirements of radio transmission.

Westinghouse Electric & Manufacturing Co.
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United States and Foreign Countries

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DUPLIX

**SERIES
"FR"**

TRADE MARK
NONE OTHER

Designed for grounding the rotor—Wider wave band reception and transmission.

We feel that we have accomplished the supposedly impossible—produced a condenser which is mechanically perfect with immeasurably small electrical losses.

Following is our final test with our 21 plate condenser at one of the foremost Universities, tested at 400 to 530 meters:

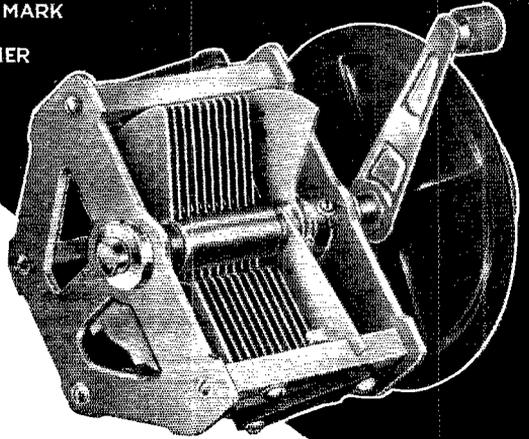
Dial Setting	Capacity Mfds.	Resistance in Ohms Less Than	Phase Difference Less Than
100 with Vernier	.000547	.01	10 Seconds
100 without "	.000529	.01	10 "
75 " "	.000417	.01	10 "
50 " "	.000278	.01	10 "
24 " "	.000132	.01	10 "
0 " "	.000012	.01	10 "

At 1,000 cycles—resistance 10 ohms. Phase difference—10 seconds.

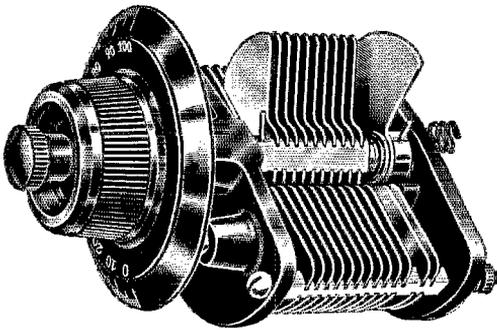
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Write for booklet "Facts for Fans on Condensers."

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32 Flatbush Avenue Extension, BROOKLYN, N. Y.



PATS. PEND.



SEXTON CONDENSERS Double Knob Vernier

Most Compact Vernier Condenser Built. Furnished with 3 inch Black Bakelite Dial. Separate Button for Vernier Control. Ball Thrust Bearing Insures Perfect Action.

Also Made in Balanced Types with Half-Capacity Switch

Write for literature and name of nearest distributor.

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106 Pages—260 Radio Questions and Answers—92 Illustrations—Radio Terms, Laws, Regulations, Symbols and Equations. List of Latest Broadcasting Stations—Explanations of All Types Receiving and Transmitting Sets. Over 10,000 sold—

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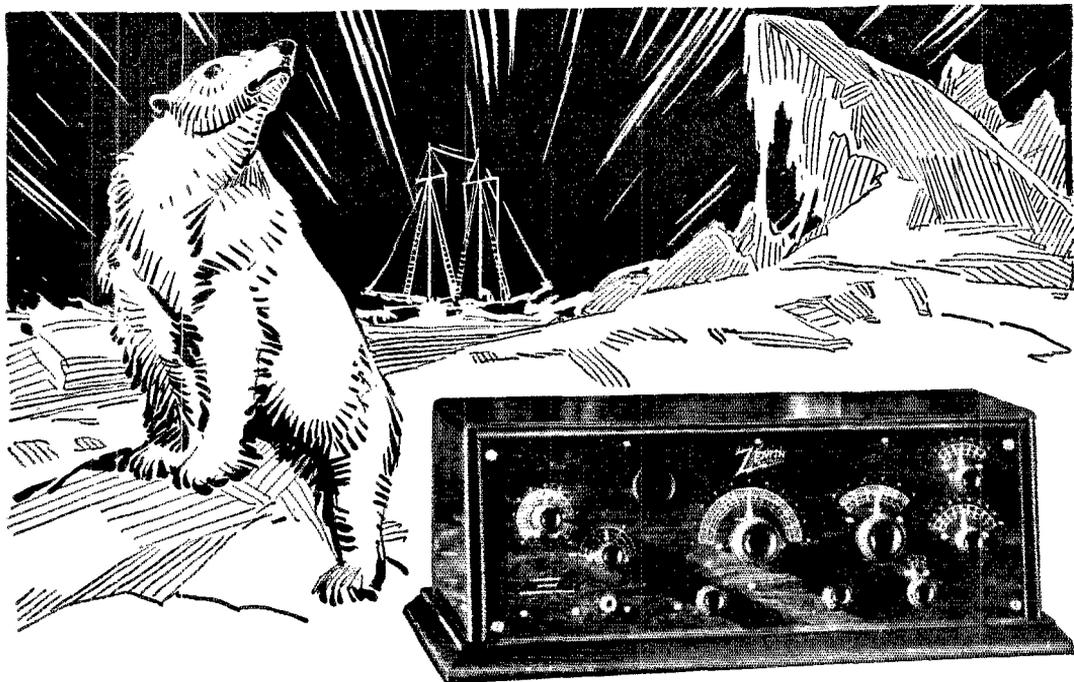
FROST-RADIO

Ask Your Neighbor



No. 140 Best value in a Two-Fone Plug ever offered. Holds fone cord tips under set-screw. Used with two pairs head fones or one pair and loud speaker. At your dealer's.

HERBERT H. FROST, Inc.
New York CHICAGO Kansas City, Mo.



Licensed under Armstrong U. S. Patent No. 1,118,149

Eleven Degrees from the North Pole

Ice—endless miles of ice, as far as the eye can see. And frozen fast in the ice, amid the deadly stillness and the unearthly lights of the Arctic, a staunch little eighty-nine foot schooner! But Donald B. MacMillan and his band of brave explorers are not alone tonight.

Under their ice-bound hatches they listen eagerly to the news of the outside world, broadcast to them from the Zenith - Edgewater Beach Hotel Broadcasting Station, Chicago—to violins in Newark, Schenectady, Los Angeles—to singers in Atlanta—to a lively orchestra in Honolulu.

Stations in all these cities—and in several hundred others—they have readily tuned in; yet the Bowdoin tonight is only eleven degrees from the North Pole!

Out of all the radio sets on the market, Dr. MacMillan selected the Zenith exclusively—because of its flawless construction, its unusual selectivity, its dependability and its tremendous REACH.

And you can do all that Dr. MacMillan does, and more, with either of the two new models described at the right. Their moderate price brings them easily within your reach. Write today for full particulars.

Zenith Radio Corporation
McCORMICK BUILDING, CHICAGO, ILLINOIS



Model 3R The new Zenith 3R "Long-Distance" Receiver-Amplifier combines a specially designed distortionless three-stage amplifier with the new and different Zenith three-circuit regenerative tuner.

Fine vernier adjustments—in connection with the unique Zenith aperiodic or non-resonant "selector" primary circuit—make possible extreme selectivity.

2,000 to 3,000 Miles With Any Loud-Speaker

With the new Zenith 3R satisfactory reception over distances of 2,000 to 3,000 miles, and over, is readily accomplished in full volume, using *any ordinary loud-speaker*. No special skill is required. The Model 3R is compact graceful in line. **\$160**

Model 4R The new Zenith 4R "Long-Distance" Receiver-Amplifier comprises a complete three-circuit regenerative receiver of the feed-back type. It employs the new Zenith regenerative circuit in combination with an *audion detector* and *three-stage* audio-frequency amplifier, all in one cabinet.

The Zenith 4R may be connected directly to any loud-speaker *without* the use of other amplification for full phonograph volume, and reception may be satisfactorily accomplished over distances of more than 2,000 miles **\$85**

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 Gentlemen:

Please send me illustrated literature on Zenith Radio.

Name

Address.....



MARLE

Radio & Audio Frequency
TRANSFORMERS

"The Heart of a Good Receiver"

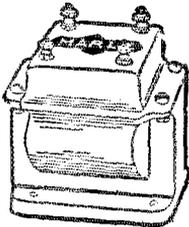
EQUAL to the widest range of reception requirements. *Marle Transformers* amplify the weakest broadcasting over frequencies all the way up to 3500 cycles without variation. Perfect tone quality. Utter absence of howling or distortion. To get the most out of radio—use *Marle Transformers*.

Specially adapted to the latest circuits, the SUPERDYNE, SUPER-HETERODYNE, FOUR-CIRCUIT TUNER, NEUTRODYNE, INVERSE DUPLEX and any circuit that makes high requirements of a transformer.

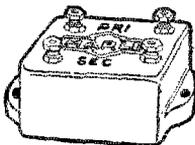
Type A4
Audio F
Coretype
Ratio 3 3/4 to 1
\$3.75

Type A9
Shelltype
Ratio 5 to 1
Audio F
\$6.00

Type A6
Audio F.
Coretype
Ratio 5 to 1
\$4.25



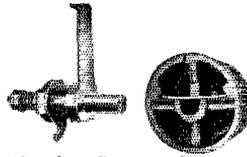
Audio F
Coretype
Type A7
Ratio 3 3/4 to 1
\$4.50



Radio F
Types
R1 and R2
Coretype
\$4.00

MARLE
Engineering
Company
Orange,
New Jersey

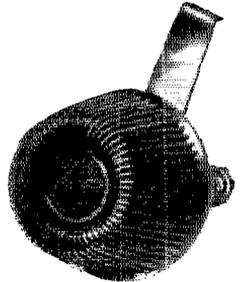
Kellogg Inductance Switches



Showing Construction and adaptability

the shaft and a spring which is locked in place by two nuts, keeps the proper tension of the arm on the switch points at all times. The knob is of unique design and matches the knob of the Kellogg dial and rheostat.

Kellogg inductance switches are of unusual construction. The switch arm is silver plated to insure minimum resistance. The arm mounts securely on



No. 445 Switch

Write for our Bulletins on Kellogg Radio Apparatus Use—Is The Test

Ask your dealer for Kellogg Radio Equipment

KELLOGG SWITCHBOARD & SUPPLY COMPANY

1066 West Adams Street
Chicago, Ill.



Some pippin!

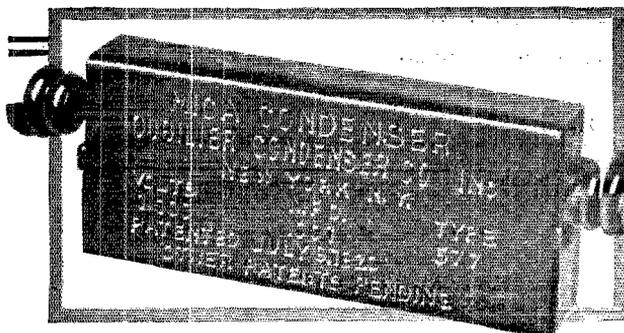
A Celoron Radio Panel gives a snappy, professional appearance to the home-built set. Its high dielectric strength helps instruments give the best results. Celoron, a bakelite product, is approved by the U. S. Navy and Signal Corps and used by leading radio manufacturers.

Celoron panels come in nine standard sizes, in black, mahogany or oak. Other sizes cut to order. *Ask your dealer.*

DIAMOND STATE FIBRE COMPANY
Bridgeport, Pennsylvania
Branches in Principal Cities

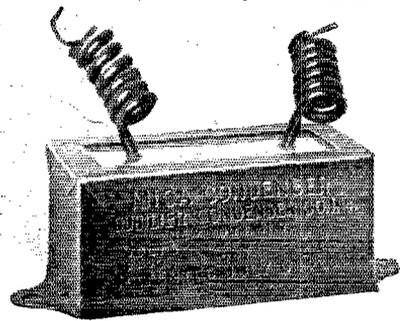
Toronto, Canada

London, England



Type 577 designed for use in radio and audio frequency circuits; for receiving equipment (especially super-heterodyne); self-rectifying circuits; d.c. and other tube transmitters up to 100 watts. An excellent grid, plate by-pass and antenna series condenser.

Type 580 is designed for low-power continuous-wave telephone and telegraph transmission. It is used also as a tuning or coupling condenser, as a series or tuning condenser in the antenna circuit, or as a grid condenser.



Dubilier Condensers for efficient Amateur Transmission

Dubilier Condensers Types 577 and 580 are preferred where low losses and accurate capacity condensers are essential.

The Dubilier patented method of manufacture embodied in these condensers assures permanent capacity under all service conditions. They are suitable for use as laboratory standards in precision circuits and for low power C.W. transmitters.

Type 577		Type 580	
Capacity in mfd.	Voltage	Capacity in mfd.	Voltage
.00025	1000	.001	5000
.0005	1000	.002	5000
.001	1000	.005	2500
.002	1000	.01	2500
.005	1000	.02	2500
.0075	1000	.0003	These 3 capacities combined in one condenser
.01	1000	.0004	
		.0005	

Other transmitting condensers are made to your specification for broadcasting purposes.

Complete information will be supplied on request.

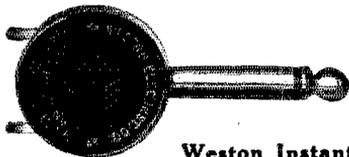
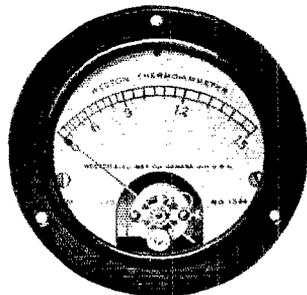
DUBILIER CONDENSER AND RADIO CORP.

42-50 WEST FOURTH STREET, NEW YORK

The Weston Antennae Ammeter—one of seven especially valuable to A.R.R.L. Men

A.R.R.L. men want the best there is in the market. In radio instruments, this means Weston. The Weston Electrical Instrument Company has pioneered the development and manufacture of electrical indicating instruments for 35 years in every branch of the electrical industry. Every instrument is guaranteed. One distinguishing feature of Weston instruments is that they

are not only correct at zero and at full scale deflection, but at every other part of the scale as well. This Weston Antennae Ammeter eliminates all troubles encountered in hot wire types—has no zero shift and is thoroughly compensated against changes in temperature. It is the adopted standard in commercial and government work. Flange diameter $3\frac{1}{4}$ in.



Weston Instant Change Plug

Antenna Ammeter Weston Instant Change Plug

Interchangeable in two seconds. Shove cables in to connect. Press triggers to pull cables out. No tools. The choice of A.R.R.L. men everywhere.

Circular J is an attractive 24-page booklet that explains in detail all Weston Radio Instruments and shows instrument connections for both transmitting and receiving sets. Sent free on request.

WESTON ELECTRICAL INSTRUMENT CO., 158 Weston Ave., Newark, N. J.

Electrical
Indicating
Instrument
Authorities
Since 1888

WESTON

STANDARD - The World Over

The long-life tube!

Since their inception, radio Vacuum tubes have been fragile. To knock or drop one incurred the expense of a new tube. But now there are

MYERS TUBES

Practically Unbreakable

—so protected by their unique design that they have been dropped on the floor without injury.

But their sturdiness is only one feature. They are the most perfect detectors and amplifiers obtainable. Smaller capacity and no bunched leads mean less interference—more clarity and greater amplification. Actual tests, all over the world, have proved their supremacy.

Two Types—Dry Battery and Universal (for storage battery). At your dealers' or send price and be supplied postpaid.

Write for free circuit diagrams.

Made exclusively by

F. B. Myers Co. Ltd.
Radio Vacuum Tubes

240 Craig St., W.,
Montreal, Canada

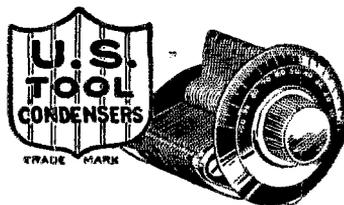


($\frac{1}{2}$ size)

\$5

EACH

Complete with clips ready to mount on your set; no sockets or extra equipment required.



Approved by Public Demand

The huge sale of U. S. Tool Condensers proves that these condensers are RIGHT.

100% Guaranteed

End Plates of CELORON

For Superheterodyne, Superdyne Inverse Duplex, Four Circuit Tuner

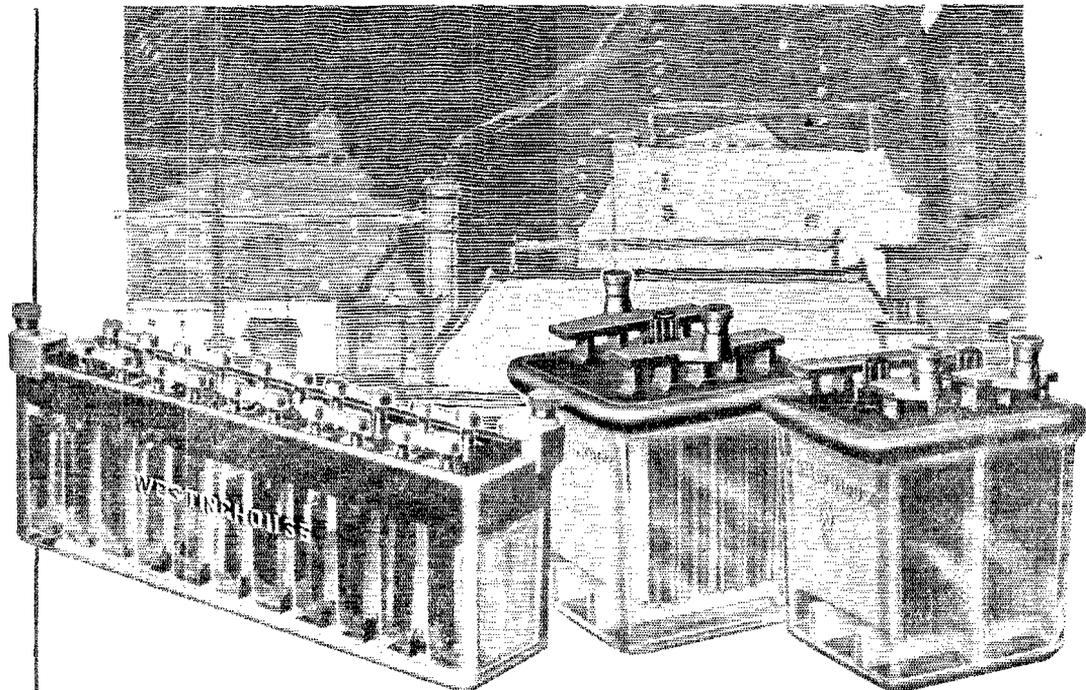
Use Vernier Cap. .00057 Mfd (24 Plate)

or
Plain Cap. .00055 Mfd (23 Plate)

Condensers of recommended capacity for all known circuits are also carried in stock by leading radio retailers.

Write for Booklet

U. S. TOOL COMPANY, Inc.
112 Mechanic St., Newark, N. J.



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 bat-
teries.

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.

.....
.....
.....



PATTERN No. 95

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

BRANSTON KIT No.-R-99



Contains 1 Oscillator Coupler, complete with mounting brackets, bank wound inductance and adjustable coupling coil with locking device; 3 Intermediate Radio Transformers. Very sharply tuned and completely shielded; 1 Special Transfer Coupler for first or last stage of Intermediate Frequency; and 1 Specially designed Coupler for using Antenna. \$36.50.

BRANSTON - GUARANTEED

This apparatus is of standard Branston Quality, rigorously tested and proved better than anything heretofore obtainable. Its efficiency and superior performance will delight you.

Our Book

"SUPER HETERODYNE CONSTRUCTION" An up to the minute guide written by a leading authority on Super Heterodyne Construction. Just what it's name implies, a working hand book explaining the construction and operation of a Super Heterodyne Receiver. No lengthy discussions. No perplexing technicalities. No red tape. Completely illustrated with working blue prints. (One Dollar.)

The amateur can easily make a complete and efficient Super Heterodyne Receiver that will be extremely selective, give remarkably fine quality of tone and be noticeably free from interference. See your dealer at once, or write us today for all information.

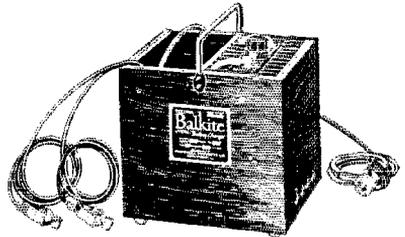


Add miles and smiles! With Branston Radio parts.

Chas. A. Branston, Inc.

823 Main St., Buffalo, N. Y.
In Canada—Chas. A. Branston, Ltd., Toronto, Ont.

Tested and Listed as Standard by Underwriter's Laboratories



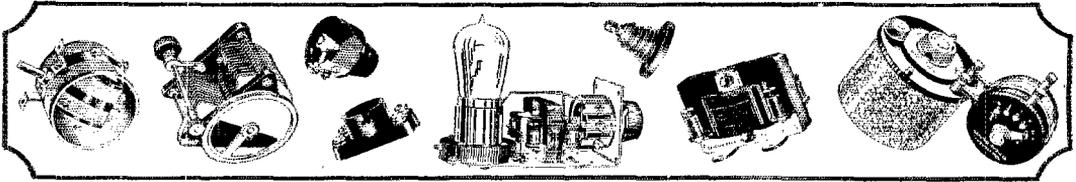
FANSTEEL
Balkite
PATENTS APPLIED FOR
Battery Charger

NOISELESS and INDESTRUCTIBLE

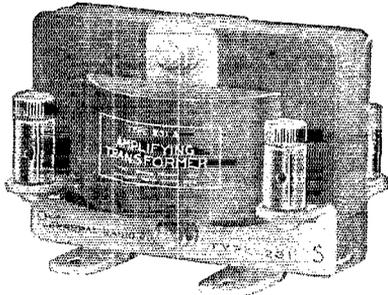
A new battery charger for Radio "A" (6 volt) batteries. Entirely noiseless. Has no moving parts, requires no attention or adjustment, and cannot get out of order. No bulbs to break. Simple and unfailing in action. Can be used while the radio set is in operation. A positive economical charger for home use. Can also be used to charge "B" and automobile batteries. If your dealer can't supply you, sent direct on receipt of price. Money back guarantee.

Price \$19.50 (\$20 West of Rockies)

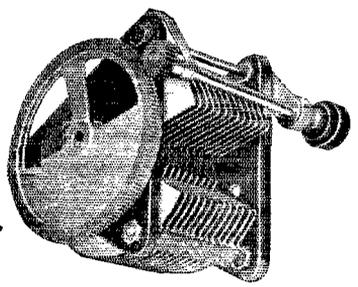
Dept. Q4 Fansteel Products Co., Inc.
North Chicago, Illinois



Standards of Excellence



"Products of Proven Merit"



Type 231-A Audio Transformer

The first closed core transformers on the market available for use in broadcast receivers were built by the GENERAL RADIO COMPANY, nearly a decade ago.

Today the type 231-A is the standard of excellence in transformer construction.

Thousands of these transformers are in use by fans throughout the entire radio world. They have proven a source of delight to "listeners-in" everywhere because of their volume and quality of amplification.

Many of the leading manufactured broadcast receivers are using GENERAL RADIO CO. transformers as standard equipment—because of their unflinching satisfaction.

Whether you are building a set or buying one, the question of "Quality Amplification" will be settled once and for all if you insist upon the GENERAL RADIO CO. transformers.

PRICE—\$5.00

Winding Ratio 3.7 to 1.

Type 247-H Variable Condenser

The 247-H geared variable condenser is the product of extensive laboratory research by skilled radio engineers.

In its design are incorporated features which promote the utmost electrical and mechanical efficiency.

Its method of vernier adjustment is particularly commendable.

By using the counter-balanced gear, operated by a pinion, capacity may be accurately controlled to a minute degree—thus making possible extreme selectivity.

Its bearings are smooth running and its dielectric losses are low.

Due to its critical capacity control and general over-all efficiency, the 247-H condenser is readily adaptable to use in a wavemeter and filter as well as in the receiver circuit.

Capacity of the 247-H condenser .0005 microfarad.

PRICE—\$5.00

Impedance Ratio 10 to 1.

Write TODAY for our Instructive Folders on "Quality Amplification" and "Quality Condensers" and our new Radio Bulletin 917-Q

GENERAL RADIO Co

Manufacturers of
RADIO AND ELECTRICAL LABORATORY APPARATUS
Massachusetts Ave and Windsor St.

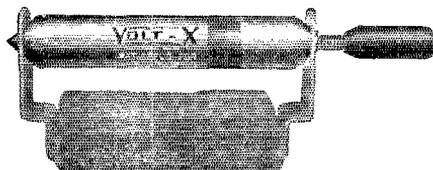
CAMBRIDGE

MASSACHUSETTS

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

VOLT-X

TRADE MARK

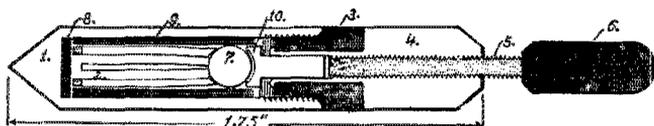


Ball Bearing—Variable Grid Leak

Range— $\frac{1}{2}$ —to 15 megohms

Once Set—it “stays put”

Operation smooth—Resistance unit cannot wear or tear



Price \$1.00

1. Metal Case
2. Compressor
3. Insulating Bushing
4. Metal Cap
5. Compression Screw
6. Screw Cap
7. Steel ball
8. Insulating thrust plate
9. Resistance unit (tubular)
10. Ball follower.

USE A VOLT-X TONE FILTER FOR CLEARNESS. PRICE \$2.50

Sold—Through The Jobbers—By
BURTON-ROGERS CO.

26 Brighton Ave.,

Boston, Mass.

Distributors for

HOYT—Radio Peep-Hole Meters, “B” Battery and Dry Cell Testers, Switchboard Meters

The New

METALECTRIC SOLDERING IRON

Operates on any electric current with the simplicity and efficiency of a writing instrument.

Accepted as the logical solution to radio soldering problems by leading amateurs and manufacturers.

Ample heat capacity.
Handle always comfortably cool.
Renewable tips.



Now
Only
\$3.75

An indestructible all-metal quality instrument with a worth-while guarantee.

If your dealer cannot supply you, order direct or write for descriptive circular. We will ship in exchange for remittance or by P.P. C.O.D.

Post Electric Co., Mfrs. (Section Five) 30 E. 42nd STREET NEW YORK

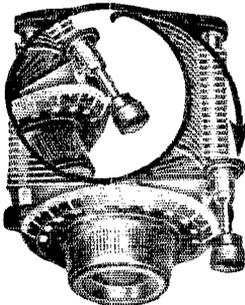
HEATH RADIANT CONDENSERS

precise, when you examine them at the store and, still more important p-r-e-c-i-s-e always. Plates made PERMANENTLY FLAT.

by the Heath process of stamping and hardening.

Micrometer-Adjusting

Geared Vernier Reducing gear, engaging with teeth cut into the outer rim of the vernier plate, affords infinitely delicate adjustment.

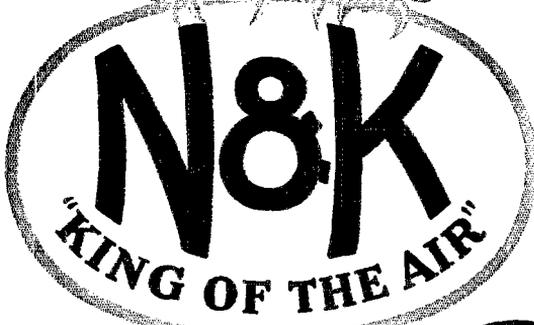


Jobbers and Dealers: Write Immediately for Proposition.

HEATH RADIO & ELEC. MFG. CO.
207 First Street, Newark, N. J.

Exclusive Canadian Distributor: Marconi Wireless Telegraph Co., Ltd., Montreal, Canada.

clearer Tone!



TRADE MARK

PHONES



N&K Head Set, Model D, 4000 ohms, is a remarkable example of skillful workmanship. Made of nicked brass, with hard rubber ear caps, accurately machine threaded to insure proper seating of diaphragm. A special device insures uniform spacing between diaphragm and magnet poles. Magnets of finest German steel, wound by entirely new method. Sanitary headband, covered with genuine leather. Six foot cord. Price, \$3.50.

N & K Phones are designed for just one purpose—the *natural reproduction* of musical tones. They are sold under a guarantee to reproduce both high and low tones more clearly, with greater naturalness and mellowness. They will not increase the loudness of weak signals—because *all* the tones, high and low, have to be kept in *natural proportion*, to secure such mellowness as N & K gives. It's the job of your radio set to give volume.

Fans and mere beginners alike are enthusiastic over N & K's wonderful clearness. Out of several hundred amateur stations that tested N & K Phones last year, a full 90 per cent pronounced them the best they had ever used.

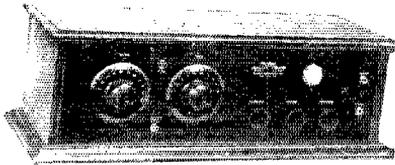
"Entirely free from mechanical sounds" says Station 1PX. "Exclude noise of visitors moving around operating room" says Station G. R. R. "Tone soft and clear as a bell" says 1FI; and so on. We will gladly send you our new folder reproducing other comments from fans and telling the real reasons why N & K Phones reproduce more clearly than other phones. *Write now.*

TH. GOLDSCHMIDT
CORP.

Department Q5
15 William Street
New York, N. Y.

DEALERS:—N & K Phones are being backed by a wide advertising campaign that is already bringing a big increase in sales. Until the announcement of our complete distributor organization, we will see that

you are promptly supplied with N & K Phones if you order direct from us. N & K comes packed in cartons of ten with advertising display cards for window and counter and leaflets. Write or wire for carton today.



MU-RAD RECEIVER

MA-15

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

BRISTOL

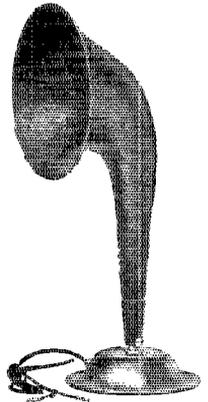
TRADE MARK

AUDIOPHONE

REG. U. S. PAT. OFFICE

LOUD SPEAKER

This is known everywhere as the Loud Speaker with the quality tone. Not only is the tone natural and without mechanical distortion, but is sufficiently big in volume to be easily heard in a large room or all through the house. Comes to you ready to use—no auxiliary batteries are required.



Made in three models:

Audiophone Senior
Price \$30.00

Audiophone Junior
Price 22.50

Baby Audiophone
Price 12.50

Bulletin AX-3014 describes these Loud Speakers.

This is the Baby Audiophone equipped with the Fiber Horn which is now standard and supersedes the metal horn previously used. Price \$12.50

THE BRISTOL COMPANY
WATERBURY, CONN.

"I would not use any other Battery after K I C - O"

says Frank W. Harris, a Radio Fan of Ottawa, Canada. KIC-O Storage "B" Batteries will improve any Radio set. Try one on yours. Our Guarantee protects you. The life is unlimited. Recharge from any 110 volt A.C. line with small home rectifier.

GUARANTEE

Your money back on any KIC-O Battery if not satisfied within 30 days' trial. Write for full information on "A" and "B" Batteries. KIC-O Storage "B" Batteries, Long Service. Low Cost.

Volts	Price Plain	With Panels
22	\$5.50	\$
32	7.25	11.75
48	9.50	14.00
68	12.50	17.00
100	17.50	22.50
145	23.50	28.50

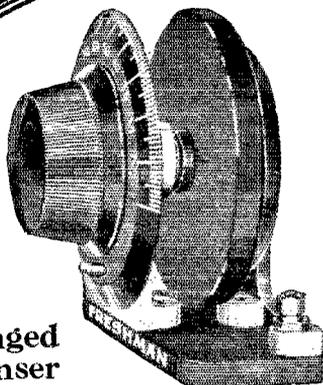
Unmounted Rectifier.....\$1.00
Mounted Rectifier.....\$2.50

KIMLEY ELECTRIC COMPANY, INC.
2666 Main St., Buffalo, N. Y.



I am able to go for distance at any time I desire to do so - irrespective of local stations

—writes a man who has just changed one 23 plate condenser and another 43 plate condenser to



“FRESHMAN SELECTIVE” VARIABLE CONDENSERS

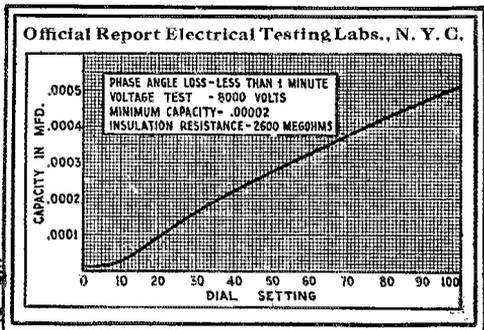
THIS is only one of the many unsolicited letters we are receiving from people who have changed from the ordinary plate type condenser to the Freshman Selective. You are missing fully 50% of the real thrill and enjoyment of radio if you have not equipped your set with Freshman Selective Variable Condensers. Engineering tests have proved their high efficiency, low phase angle loss, high insulation, freedom from leakage. These tests have been substantiated in actual practice in Neutrodyne, Super-Heterodyne, Reflex and other popular circuits.

For Transmission or Reception

Attractively compact.

Quiet in operation. Withstands 8,000 Volts. Cannot short circuit.

The only variable condenser, the plates of which actually vary in area.



Prices:

.0003 MF	\$	5
(Equiv. to 17 pl.)		
.0005 MF		
(Equiv. to 23 pl.)	EA.	
.001 MF		
(Equiv. to 43 pl.)		
With 3" Vernier Dial		\$5.00
With 4" Vernier Dial		50c Extra

Ask your dealer or write for our free diagram of Neutrodyne Tri-^{OD} - Super-Heterodyne, and Polydyne.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 Seventh Avenue, New York City

At your dealer's otherwise send purchase price and you will be supplied without further charge.

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.....

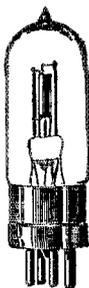
Grade operator's license, if any.....

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.

WE REPAIR THE FOLLOWING RADIO TUBES and Guarantee Them



WD-11	\$3.00	DV-6A	\$3.00
WD-12	3.00	UV-199	3.00
UV-200	2.75	C-299	3.00
UV--201	3.00	UV-201A	3.00
C-300	2.75	C-301A	3.00
C-301	3.00	Marconi	3.00
DV-6	3.00	Moorhead	3.00
DV-1	3.00	6 v. Plain Detector	2.75
DV-2	3.00	6 v. Plain Amplifier	3.00

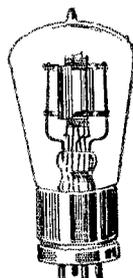
Mail Orders solicited and promptly attended to.
Dealers and Agents write for Special Discount

H. & H. RADIO CO.

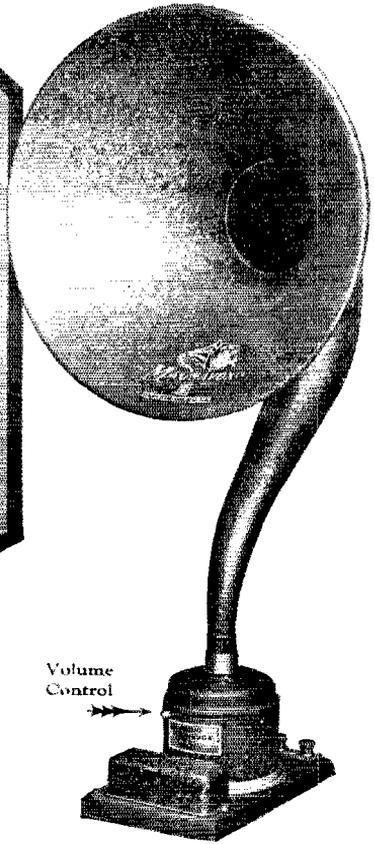
P. O. BOX 22-W

CLINTON HILL STA.,

NEWARK, N. J.



Pioneers in the development of sound reproducing and amplifying equipment



THE new model R3 is distinguished by two important features—a Volume Control, and reduction of current consumption to a point where it need no longer be taken into consideration.

THIS instrument sets a new and higher standard of adaptability, refinement and also economy of operation. By means of the new Volume Control, reproduction can be adjusted at any degree from very loud to very soft.

- R3—(As illustrated) with Volume Control \$35.00
- R2—(New Model) with Volume Control . 50.00
- M1—Requiring no battery for its operation 35.00

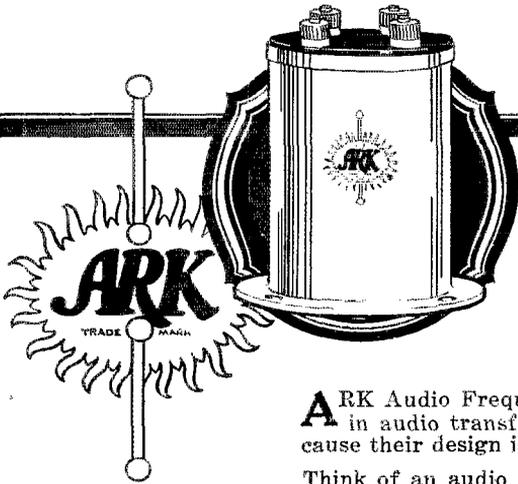
Magnavox Reproducers, Power Amplifiers and Combination Sets may be had of good Dealers everywhere. Write for catalog.

THE MAGNAVOX CO., OAKLAND, CALIF.
New York Office: 350 WEST 31ST STREET

Canadian Distributors: Perkins Electric Limited, Toronto, Montreal, Winnipeg

MAGNAVOX PRODUCTS

There is a Magnavox for every receiving set



a better transformer!

ARK Audio Frequency Transformers mark an epoch in audio transformer design. They are better because their design is better!

Think of an audio transformer so moisture proof that it can be placed under water without damage; so perfect that three steps can be used without distortion! Yet those are only a few of the ARK Audio Transformer's features. If your dealer cannot supply you write us.

\$6
LIST

NATIONAL DISTRIBUTORS
CLARK & TILSON Inc.
1 East 42 St., New York City, N.Y.



LIST
PRICE
\$20

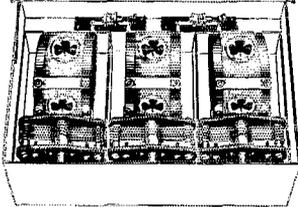


Chart the air with SHAMROCKS

You can build a set with the Shamrock Kit that will give 5000 miles reception on a loud speaker. The kit contains two Shamrock balancing condensers—and three Shamrock air core transformers, mounted and properly balanced on U. S. Tool condensers, made expressly for Shamrock.

Inspect this kit at your dealer's today. Send for detailed information.

SHAMROCK MANUFACTURING CO.
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The New and Perfect Variable Grid Leak
65¢



Although it is cartridge type it is different in principle from any Variable Grid Leak you have ever used before.



COMPLETE WITH MICA CONDENSER AND PERFECT LEAK MOUNTING \$1⁰⁰

At your Dealer—or post paid on receipt of purchase price

A.C. BRADY CO.
Improved Radio Apparatus
108-SEVENTH AVE. NEW YORK CITY

Clear from the skies

You can get greater clarity with a good storage battery than by any other means. If you are in any doubt about this important matter, try some friend's set that is hooked up to an Exide Battery.

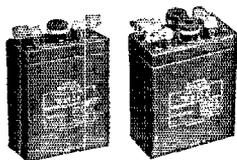
It is a fascination to see how far distant a station you can tune in, but still more fascinating to get it so clearly that you actually enjoy the concert.

Two things to remember

There are two things to remember about Exide Batteries: They give uniform current over a long period of discharge. This means not only clear reception but economy.

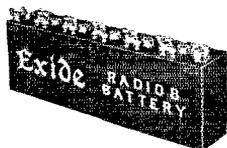
The second thing to remember is that there is an Exide Radio Battery made for every type of tube. In addition to the "B" battery there are Exide "A's" for 2-volt, 4-volt and 6-volt tubes.

From the "midget" five-pound battery for low-voltage tubes to the larger battery for six volts, each Exide is powerful, rugged, silent, and so long-lasting that it makes for true economy.



For low-voltage tubes

Specially designed for WD-11 and UV-199 vacuum tubes, but can be used with any low-voltage tube. The two-volt Exide A Battery consists of a single cell. It will heat the filament of a WD-11 or other quarter-ampere tube for approximately 96 hours. The 4-volt A battery, having two cells, will light the filament of a UV-199 tube for 200 hours.



Exide "B" Battery

Exide

RADIO BATTERIES



For six-volt tubes

Made in four sizes—of 25, 50, 100, and 150 ampere hour capacities. Like all Exides this battery is conservatively rated. It has extra-heavy plates assuring constant potential over a long period of discharge.

And the reason is obvious

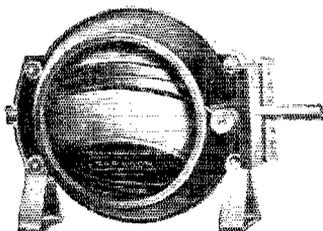
The Exide Radio Battery results from experience in the radio field dating far back of amateur radio. In fact, a majority of all government and commercial radio plants are equipped with Exide Batteries. The giant dirigible Shenandoah and the great ship Leviathan are Exide-equipped.

Go to any radio dealer or Exide Service Station and ask for Exide A and B Batteries. If your dealer cannot supply you with free booklets describing the complete Exide line of radio batteries, write to us.

THE ELECTRIC STORAGE BATTERY COMPANY, PHILADELPHIA

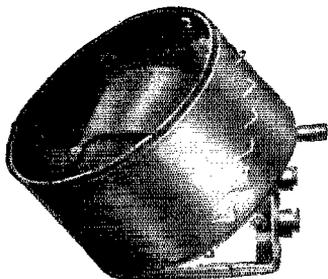
In Canada, Exide Batteries of Canada, Limited, 133-157 Dufferin Street, Toronto

Two Radio Parts That Should be Parts of Your Set



Paragon Variometer No. 60

Reduces dielectric losses to the minimum. Possesses the ideal advantages of coils surrounded by air and at the same time essential mechanical strength. Meets the rigid electrical requirements of Paragon Parts. Gives better results. Price \$5.00.



Paragon Variocoupler No. 65

Strongly made with coils of double silk covered wire wound on moulded black Condensite tubes with highly polished finish. Single turn taps and switch are unnecessary. Makes possible a very fine control. Simple to operate. Price \$3.50.

Write for illustrated catalog

ADAMS-MORGAN COMPANY
4 Alvin Ave., Upper Montclair, N.J.

PARAGON

Reg. U. S. Pat. Off.

RADIO PRODUCTS

MR. BOWDEN WASHINGTON OF THE

Cutting and Washington RADIO CORP'N

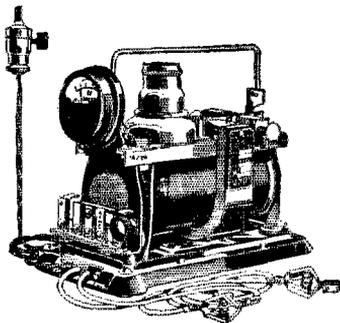
says: "All-American Audio Frequency Transformers were adopted as standard for the Cutting and Washington Receiver after thorough tests in our laboratories demonstrated that they faithfully reproduce broadcasted music and voice with excellent volume and stand up in service better than any other transformers we have tested. We consider All-American Audio Frequency Transformers the best on the market." Many other leading set builders have similarly standardized on the best the market affords. All-Americans! Benefit by their experience. Add All-Americans to your set now. Dealers everywhere.

RAULAND MFG. CO.
2642 Coyne St., Chicago
Pioneers in the Industry



ALL-AMERICAN

AMPLIFYING TRANSFORMERS
Largest Selling Transformers in the World



A TRIPLY GOOD BUY

The type A.B.-EE charger performs three duties economically. Charges radio 2, 4 or 6 volt "A" battery, radio "B" battery up to 120 volts and auto batteries. Average cost per charge about a nickel. Solidly built—will not get out of order. Fool-proof and simple. The first successful charger—introduced over ten years ago. Type A.B. price \$20, West of Rockies \$22; Type 6 for 6 volt "A" or auto batteries, price \$15; West of Rockies \$16. B Battery charging attachment \$2.50 extra.

Write for New Bulletin on station calls, battery upkeep and wiring diagrams of basement installation of batteries. We will send dealer's name.

THE FRANCE MFG. CO.
10431 Berea Road, Cleveland

How to get increased distance with your crystal set



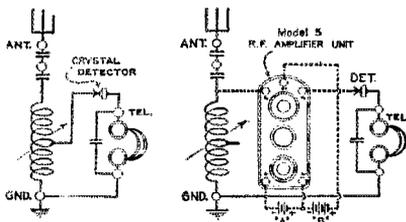
with

BALLANTINE VARIOTRANSFORMER UNITS

YOUR crystal set is the starting point on which to build a good distance receiver. For authorities agree that there is nothing finer than a good crystal for clean-cut detection—not so loud as a tube, perhaps, but much clearer. Simplicity itself is the crystal. And its improved modern forms and mountings make adjustment easy. By all means, keep this element with which you are already familiar.

Use tubes to best advantage

Tubes, of course, are needed for amplification—to build up weak distant signals so that they may operate your crystal detector. But, by putting your money for tube equipment into one or more stages of radio frequency amplification, tuned with BALLANTINE VARIOTRANSFORMER Units, you will get increased distance. And with this method there comes a greater selectivity, accompanied by a reduction of



Present hook-up
tunes broadly

Revised hook-up

interfering noises. In fact, BALLANTINE amplification into a crystal detector may be made as clear as a victrola. Furthermore, the full possibilities of your tubes may be developed without annoying your neighbors.

Easy changes quickly made

The above diagrams show how one popular make of crystal set can be brought up to date quite readily—only a slight rearrangement of wiring to hook in the first BALLANTINE Unit. And it's just as easy with any other crystal hook-up. Additional BALLANTINE Units may be inserted from time to time.

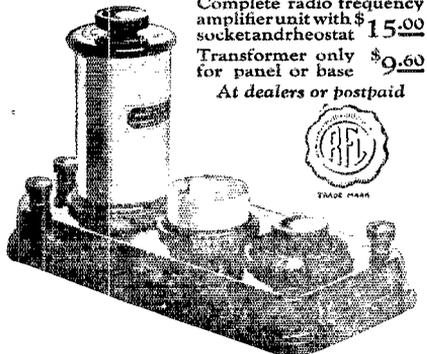
Try this instrument. Then, if there's anything you don't understand, our staff engineers will help you out.

Booklet tells how to improve crystal sets

"Radio Frequency Amplification with the BALLANTINE VARIOTRANSFORMER," is the title of our 25-page booklet, packed with useful data, charts and diagrams. Send for your copy now.

BOONTON RUBBER MFG. CO.
Pioneers in Bakelite Moulding

124 Fanny Road, Boonton, N. J.



Complete radio frequency
amplifier unit with \$15.00
socket and rheostat
Transformer only \$9.60
for panel or base
At dealers or postpaid



SIGNAL RADIO TABLE



"Signal"
Radio Table
Top
20 x 36 in.
Height 30 in.

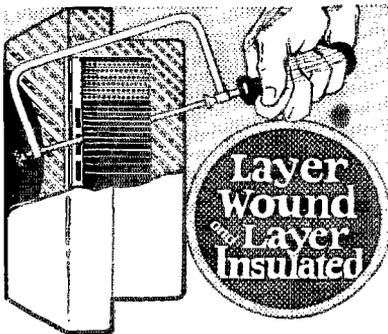
This table is especially designed for radio. The compartment is 12 in. high with two doors opening full length. The table top is 20 in. wide x 36 in. long, and the height is 30 in. The legs are 1½ in. square brass capped with casters. A durable piece of high class furniture, \$22.00.

SIGNAL Electric
Mfg. Co.

Factory and General Offices:
1915 Broadway,
Menominee, Michigan

Boston, Chicago, Cleveland, Minneapolis, Montreal, New York, Pittsburgh,
St. Louis, San Francisco, Toronto, Philadelphia, Los Angeles

You'll find our local address in your Telephone Directory



A cross-section cut through a receiver of the Stromberg-Carlson Radio Head Set reveals the layer wound and layer insulated coils. Stromberg-Carlson coils are wound a layer at a time with a wrapping of tough insulating material between layers, and are used exclusively in

Stromberg-Carlson

Radio Head Sets

This high grade coil construction combined with powerful magnets ensures permanent sensitivity, fine tonal quality, and enables these Head Sets to stand up under the high plate voltages now prevalent. Our 30 years' experience is your warrant of quality and service. Send for booklet 1029 QST, which tells more about these superior Head Sets.



Sold by dealers everywhere
Stromberg-Carlson
Telephone Mfg. Co.
1060 University Ave. Rochester, N. Y.

RADIO TUBE EXCHANGE

We Repair All Standard Makes of Tubes, Including

W.D. 11 or 12
U.V. 199 or C299
U.V. 201A or C. 301A
C. 31 or 12
D.V. 1 or D.V. 2
U.V. 200 or 201
C. 300 or 301

\$2.50



All tubes guaranteed to do the work.

RADIO TUBE EXCHANGE, 206 Broadway, New York
All Mail Orders Given Prompt Attention
Orders Sent Parcel Post C. O. D.

Have you tried it?

Chelten Midget Vernier

You've often wished for a closer capacity adjustment of your variable condenser. Here it is—the Chelten Midget Vernier. The 13 tiny plates and air spaces give sharp tuning. Costs but \$1.50.

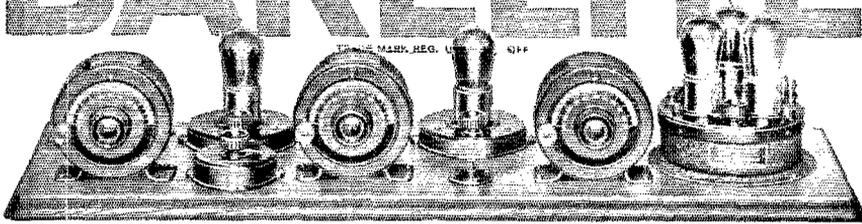


A Precision Instrument

CHELTEN ELECTRIC CO.

4861 Stenton Avenue - Philadelphia

BAKELITE



Atwater-Kent and Bakelite

The enthusiastic commendation accorded Atwater-Kent Radio Broadcast Receivers is due, not alone to the fine workmanship which they exemplify, but to their performance in the hands of inexperienced operators.

The simplified design, made possible through the use of molded Bakelite, is largely responsible for the ease of operation.

Bakelite possesses a combination of properties not found in any other material and which makes it peculiarly suited for this service. Its excellent electric properties provide complete insulation which

remains unimpaired under all atmospheric or climatic conditions.

Its great mechanical strength, permanent beauty of finish and color enhance the value of any Radio Equipment in which it is used.

The permanence of *all* the properties of Bakelite have caused leading Radio Manufacturers to adopt "The Material of a Thousand Uses" as standard insulation for the manufacture of parts and complete units.

Write for a copy of our Radio Booklet C.

BAKELITE
Condensite
REDMANOL

are the registered
Trade Marks for the
Phenol Resin Products
manufactured under
patents owned by
BAKELITE
CORPORATION

Send for our Radio Map

Enclose 10c. and let us send you the Bakelite radio map. It lists the call letters, wave length and location of every broadcasting station in the world. Address Map Department.

BAKELITE CORPORATION

247 Park Avenue, New York, N. Y.
Chicago Office: 636 West 22d Street

THE MATERIAL OF A THOUSAND USES

Amateurs

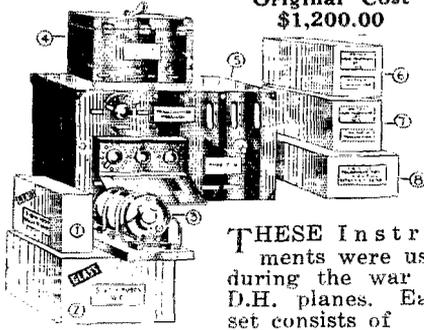
the Opportunity
of a Lifetime:

Western Electric

TRANSMITTING AND RECEIVING SETS

Type CW 1058

Original Cost
\$1,200.00



THESE Instruments were used during the war on D.H. planes. Each set consists of

- 1—3 Western Electric Ballast Lamps.
- 2—8 Western Electric V.T.I. Tubes and 2V.T.2's.
- 3—Westinghouse Generator.
- 4—Western Electric Control Box.
- 5—Western Electric Transmitter and Receiver.
- 6—2 Western Electric Headsets.
- 7—2 Western Electric Microphones.
- 8—Necessary accessories for setting together.

Will Transmit

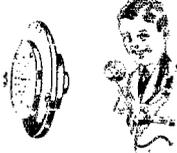
to a radius of 50 miles. In some cases these sets have been known to reach about 200 miles.

Will Receive

on wave lengths from 215-450 meters and has good receiving range. Every set is absolutely new and comes in the original wooden packing cases, as shipped by the Western Electric Company.

198.50

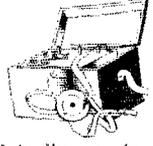
Western Electric
MICROPHONES



Talk thru your own set. Two types—one with breast-plate, shoulder-straps, cord and plug; other, larger size for mounting or suspending.

1.50

WESTERN ELECTRIC
Telephone and
Telegraph Sets



Originally made for the U. S. Govt. Signal Corps. Each comes with phone receiver, variometer, potentiometer, 3 throw switches, telegraph key and condenser.

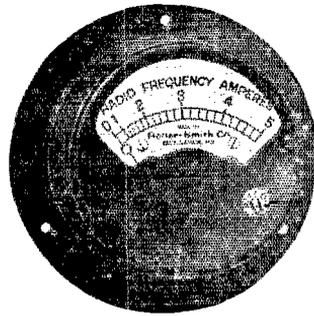
5.00

Shipped prepaid anywhere in U. S.
No Stamps or Checks Money Orders Only.

References: Hamilton Nat'l Bank, N. Y. C.
Pacific Bank, N. Y. C.

ROVA

MAIL ORDER DIVISION
167 WEST 18TH STREET
DEPT A NEW YORK CITY



How Many
Amperes
Are You
Radiating?

A Roller-Smith type TAW Thermal Ammeter will tell you accurately and it will continue doing so. These little 3 1/2" instruments have demonstrated their reliability in the Government service. You can't make a mistake when you use them. Bulletin No. AG-10 is yours for the asking. Send for it. This Bulletin also describes a most complete line of ammeters and voltmeters for all radio work.

ROLLER-SMITH COMPANY
16 PARK PLACE, NEW YORK

Offices in principal cities in U.S. and Canada

Build Your Own

SUPER!

3 BLUE PRINTS

with the
Super-heterodyne

Manual

\$1.50

Biggest Value
in construction aid ever offered!
Victor Greiff's big text book complete and three full-sized blue prints,—tells how to build 3,000-mile, loop Super-Heterodyne. Order today.

RADIO RECEPTOR CO.
Dept. Q 57 Banks St. New York

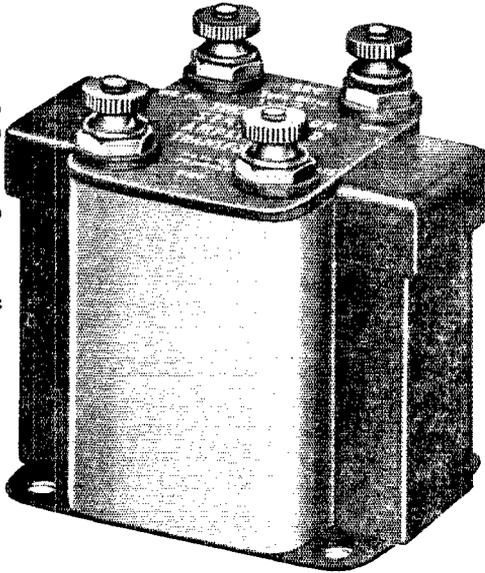
THE PERFECT REPRODUCER

SUPER TRANSFORMER

Audio Frequency

3 1/2-1 Ratio
\$4.00

6-1 Ratio
\$4.50



Did you ever think what a vital part of your phonograph is the little reproducer which rides on the record? The most elaborate phonograph made, with a poor reproducer, would be worthless as a musical instrument.

The reproducer of your radio set is your amplifying transformer. The musical qualities of your set depend largely upon the ability of your transformer to exactly duplicate the incoming signals.

Many manufacturers of amplifying transformers have been devoting their entire efforts in developing great amplification regardless of tone quality.

Thordarson amplifying transformers are designed and built with one primal aim,—perfect reproduction. The Thordarson super transformer is a product of the combined efforts of Thordarson engineers and nationally known tone experts and musicians, who were satisfied with only the best musical reproduction obtainable.

Thordarson amplification puts the finishing touches into your receiver,—that “breath of life” which you have so long sought. It actually brings the broadcast artist into your home.

Leading manufacturers of receiving sets, such as Kennedy, Zenith, Cutting & Washington, Radiodyne, and many others, use Thordarson transformers.

Ask to hear a set using the Super Transformer and you will be convinced.

Even Amplification over the entire musical range

THORDARSON

ELECTRIC MFG. CO.
CHICAGO ILLINOIS

As You Gaze at the Stars—

The gentle calm of a bright starry night fills us with mystery. Little did we dream a while back that today, far and wide in the unknown, thousands of voices, hurried by electrical energy, are rushing at unheard of speed through space to all points of the compass.

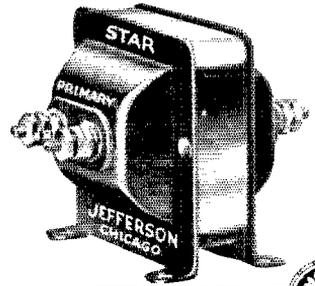
A person here, a group there—in fact, in a million or more homes people are anxiously tuning in on their radios, groping in the air, hoping to catch the sound of a far away station. Scarcely a sound, a slight turn, a faint noise, another adjustment and then clear and clearer comes voices, a quartet is singing; so clear and distinct comes the soft gentle melody that the listeners close their eyes, the singers seem to be in the very room with them.

If you desire clearer reception, greater volume and the elimination of howling and distortion, install Jefferson transformers in your set.

There's a Jefferson Transformer for every circuit.

Write for amplification data and interesting descriptive literature.

Jefferson Electric Mfg. Co.
425 So. Green St. Chicago, Ill.



Coto
"Built First to Last"

"SO MUCH BETTER THAN YOU CLAIMED IT TO BE"

So says one of the users of Coto Compact Moulded Variometer. Letters from all quarters praise this remarkably efficient variometer with the honeycomb wound stator coils. Range is 200 to 600 meters covering the broadcasting wavelengths. Type 8000. \$5.

Read Our Guarantee

Every piece of Coto Radio apparatus is Laboratory Tested before shipment. So we are perfectly safe in authorizing dealers and jobbers to guarantee you absolute satisfaction.

If your Dealer cannot supply you, send us your order and his name and address

COTO-COIL CO. 87 Willard Ave. Providence, R. I.
Los Angeles, 329 Union League Bldg.
Minneapolis, Geo. F. Darling, 705 Plymouth Bldg.
Atlanta, C. P. Atkinson, Atlanta Trust Co. Bldg.
Canada, Perkins Electric Co., Ltd. Montreal, Toronto, Winnipeg

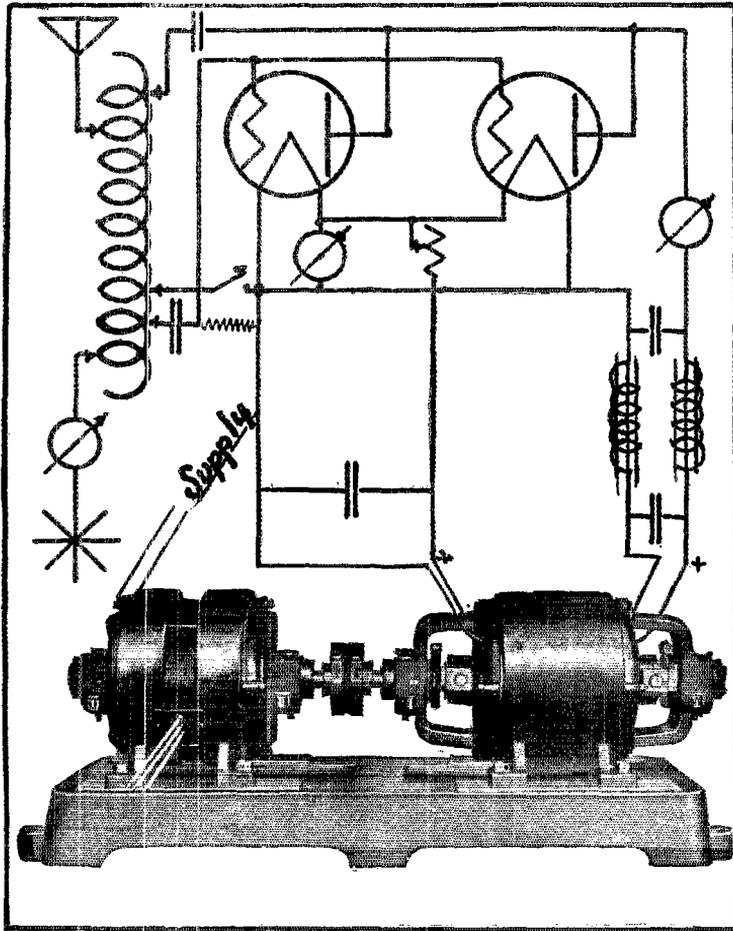
"Kills Reflex Troubles"

"LINCOLN" DETECTOR

Creating tremendous sensation. Enclosed, fixed, adjustable. New. Brings in distant stations loud and clear. You need it. Price only \$2.00. Absolutely guaranteed for one year. Jobbers, Dealers: Wire or write. Mention this ad.

LINCOLN MFG. CO.
Los Angeles, Cal.





ITEM 35

A Few Good Combinations

Item	Description	Recommended for
2 350 V	40 Watt	2-5 watt with separate Fil. supply.
7 500 V	100 Watt	4-5 watt with separate Fil. supply.
8 500 V	150 Watt	5-5 watt 2 mod. 1 mast. osc.-2 osc. sep. Fil. supply,
13 1000 V	300 Watt dbl. comm.	2-50 watt with separate Fil. supply.
15 1000 V	500 Watt dbl. comm.	3-50 watt or 2-50 watt and 4-5 watt as speech amplifier and mast. osc. sep. Fil. supply.
16 1000 V	650 Watt dbl. comm.	4-50 watt with separate Fil. supply,
20 1500 V	600 Watt dbl. comm.	2 to 3-50 watt with separate Fil. supply,
24 2000 V	500 Watt dbl. comm.	1-250 watt with separate Fil. supply,
26 2000 V	1000 Watt dbl. comm.	2-250 watt with separate Fil. supply,
31 500 V	100 Watt -10 V	60 watt Same as item 7 but with Fil. supply.
35 1000 V	300 Watt -12 V	150 watt Same as item 13 but with Fil. supply.
41 2000 V	500 Watt -14 V	200 watt Same as item 24 but with Fil. supply.

Many other sets for various combination of tubes.

Special sets made to order.

Trade "ESCO" Mark

ELECTRIC SPECIALTY CO.

225 South St., Stamford, Conn., U.S.A.

Pioneers in Developing and Perfecting High Voltage Wireless Apparatus

Motors Dynamotors Generators Motor-Generators

Used by more than 150 Universities—Colleges—Research Labs., etc. Many Federal—State—County and Municipal Depts.

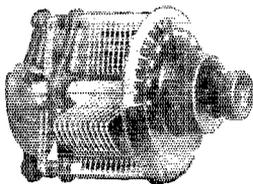
Write for Bulletins 237B and 242A listing over 200 combinations

Send us your problems—we'll help you solve them.

CHELSEA

Volume Without Distortion

Can best be secured by using Chelsea Parts Variable Condensers



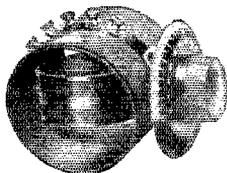
LOW LOSS

Genuine bakelite insulation Pigtail connection to rotor Absolutely guaranteed.

No. 10—23 plate with Vernier, \$4.50

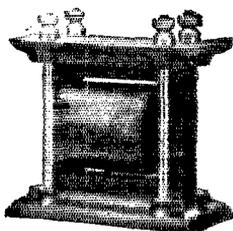
No. 95 Variocoupler

Stator and rotor wound on genuine bakelite tubing. Pigtail connections to rotor and taps on stator brought to binding posts. Will give maximum results in any circuit. Panel mounting.



Price without dial, \$3.50; with dial, \$3.95

Amplifying Transformer



Genuine bakelite insulation. Highest grade silicon steel core. Tested to 500 volts. Easy to assemble in your set. Ratio 3/4 to 1.

Price \$4.50

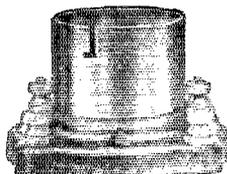
No. 60 Bakelite Socket

The base of this socket is genuine moulded bakelite and supports four readily accessible binding posts. The tube receptacle is highly polished nickel and will take any standard make of detector or amplifier tube.

Price, \$0.75

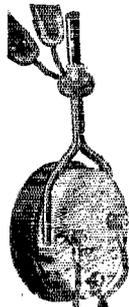
At your dealers or write direct

CHELSEA RADIO COMPANY
175 SPRUCE ST., CHELSEA, MASS.



Guaranteed Head-Sets

"RED-HEADS" are guaranteed radio phones. You run no risk when you buy them. Money back if, after 7 days' trial, you're not satisfied that they're the best receivers on the market at the price. Why not act right now and get a pair? It'll mean getting the maximum from broadcasting from the day you put them into use.



RED-HEAD RADIO RECEIVERS

NOW READY

The new '24 Model F For Fair Complete

\$6.50

The new "Red-Head" Jr. For Pair Complete

\$5.00

"Red-Heads" sent prepaid on receipt of price if you are unable to get them at your dealer's.

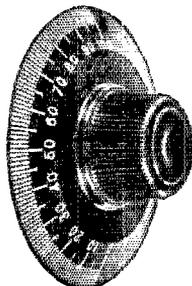
The NEWMAN-STERN COMPANY
Dept. 08 Newman-Stern Bldg. Cleveland

NA-ALD

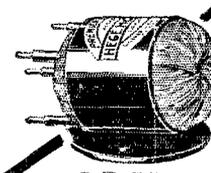
When phonographs were first made they were square boxes without ornamentation. Likewise the first dials, turned out in a laboratory,—had hard straight lines for shape. Beauty is a later development. Na-ald dials have soft, graceful lines which makes them very pleasing to the eye. They lead in both beauty and quality. They have the right grip for delicate, exact tuning.

ALDEN MANUFACTURING CO.

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



3 inch
No. 3003—4
35c, 3 for \$1.00



THE LITTLE WONDER

The smallest, yet most efficient Transformer ever made. Maximum reproduction value, minimum distortion, 100% shielded.

PREMIER "HEGEHOG"

\$3.50

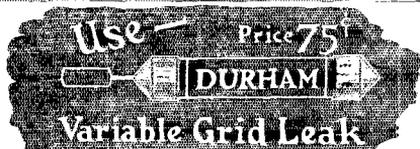
AUDIO TRANSFORMER

Mounts anywhere—save space in assembly. We guarantee it unconditionally. Try them in your next "hook up." Ratio 1 to 3, 1 to 4, 1 to 5, \$3.50; 1 to 10, \$4.50. Ask your dealer. Write for bulletin No. 92

Premier Electric Company

3811 Ravenswood Ave.

Chicago

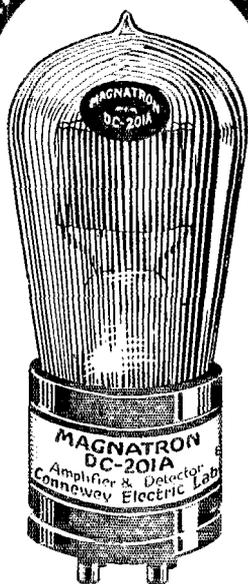


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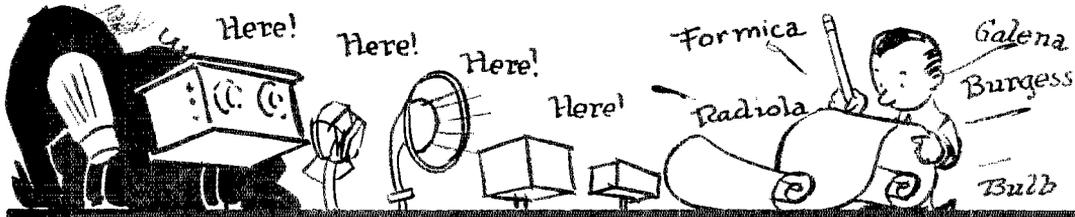
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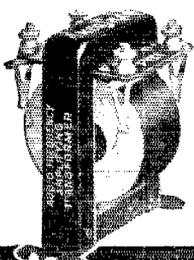
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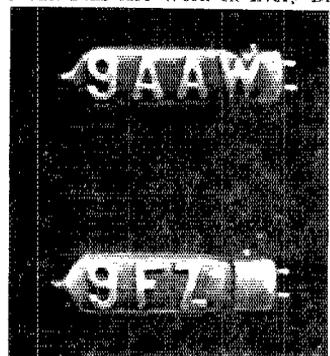
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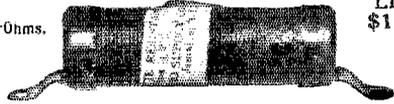
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FOR SALE—Half Kilowatt Spark Transmitter, Packard Transformer, Molded Condenser, Enclosed Benwood Gap, Large O. T. \$20. Clifford Mauer, 109 South Tenth, Reading, Pa.

FOR SALE—Monodyne \$8.50 Crystal Portable \$4.00. Duck Bros. Receiving Coupler, \$4.00. National Head Set 2200. ohm. Phones \$3.00. George Proschler, 567 Amsterdam Ave., New York City.

5BX GOING TO California, have to sell Westinghouse 500 volt 100 watt Motor-generator, guaranteed OK. Cost \$85 month ago, sell for \$50. Watson, 2500 Maple Ave., Dallas, Texas.

FOR SALE—Grege CR-3 and RORD \$100. 20 Watt transmitter at 9CS1 \$125.00 complete. M. L. Monson, Grafton, N. Dak.

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5VM's 1000 VOLT, 400 watt Esco MG, compound, four bearing, double commutator, ring oiled, 60 cycle, 110-220 single phase; machine in perfect condition, used very little, \$125. Want three UV1716s. Emory Stuedle, Okla. University, Norman, Okla.

SELL—One Sacodiel, Two UV1714 transformers. Three fifty each. Carl Elsasser, Boonville, N. Y.

200 DOWN—Calibrate that wavemeter at home, easy. We will tell you how to use the new projection method for 10¢. No calculation or guess. Moore, 902 North Fourth Avenue, Tucson, Arizona.

BARGAIN—Every Ham needs a set of Stevens Spinlite Radio Wrenches. Set of three popular sizes sent postpaid on receipt of money order for 75¢ Dollar value. Radio 9DWS 895 S. 2nd St., Champaign, Illinois.

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FOR SALE—Federal Hand Microphone, \$5.00; 5-watt Plate and Filament transformer, \$10.00; UP-1719 grid leaks @ .60, UP-1016 Power Transformer, \$25.00; UV-216 Kenotron (New) \$6.00. Arthur Walsler, Chesaning, Mich.

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FOR SALE—One Grebe CR13 new, \$67.50. Maurice E. Kimmel, DuQuoin, Ill.

PRACTICALLY new Esco Motor-Generator two bearing type. Hundred ten volt sixty cycle motor, five hundred volt hundred fifty watt direct current generator. Must sell because fifty cycle supply here. Fifty dollars. The Radio Shop, Fifteen Fifth Street, Redlands, California.

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30 HENRY chokes capacity .75 amperes, \$10; R.C.A. UL1008 Inductances, \$6.50; PT537 Rheostat, \$5; New 10 Ampere Mercury Arc Tube, \$14; New Tungar Tube and Socket, \$5; Will sell or trade. 3PZ.

VOLTMETER WANTED—0-10 AC. Homcharger for sale, \$8.50. Will swop charger for meter, write 9BTY.

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100 OR MORE D.C. Gen. Electric Generators—Guaranteed output 375 volts. \$7.50 each, Prepaid, John Matthews, Newton, Iowa.

UNCLAIMED LETTERS

Letters have been returned to this desk after being sent to the following members. Please send in a postcard giving your correct and complete address, INCLUDING THE STREET NUMBER.

Hugo C. Gibson, DeVer C. Warner, Duncan Merriwether, R. S. Rose, George Turner, E. L. Dye, A. A. Haagenon, E. R. Bateman, Stillman Shaw, Jack Paddon, Howard I. Morris (?), J. Edward Page, F. C. Van der Voort, R. W. Decker, In addition a number of letters cannot be answered because the writer signed only a radio call which has recently been re-assigned.

Technical Editor.

WANTED—Omnigraph, Must be cheap. Bernard Taylor, Thornton, Tex.

NEW GREBE APPARATUS for sale or trade for C. W. Apparatus, CR-6—list \$200.00 for \$125.00, CR-9—list \$130.00 for \$80.00, CR-8—list \$80.00 for \$60.00, RORN—list \$60.00 for \$40.00, FINCH Automatic Relay and Recorder—list \$250.00 for \$125.00. Pick yours out and shoot me a check. M. G. Watson, 1521 Elm St., Dallas, Texas.

BARGAINS—Acme 300 watt power transformer \$20; No. 64 Jewell 0-5 radiation ammeter \$10; No. 74 Jewell 0-15 A. C. Voltmeter \$6.50; New Omnigraph No. 2 \$15; Two Stage A. F. Amplifier-in-cabinet \$20; two 5 watters \$12; Hawkins Electrical Guides \$5; any size H.C. Coils 25% off list. Charles Johnson, Pullman, Wash.

BARGAIN—Jewell 0-10 AC Voltmeter, Never used, \$7.00. N. Klein, 1773 Carlyon Rd., Cleveland, Ohio.

FOR SALE—Navy Type Detector Cabinet, \$7.00; Chopper Motor, \$5.00; Paragon 10-R Radio Frequency, \$30.00; Complete 1KW Spark, \$25.00. All practically new. Terms 1/3 down, balance C.O.D. 8AVJ.

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FOR SALE BARGAIN—New 5 Watt Broadcasting Station including motor Generator, Tubes and Microphone. Write for particulars. Webster Electric Company, Racine, Wis.

WANTED—Vibroplex, have Homcharger, new, Remler Variometer, Mitchell Variocoupler, Bunnell Sounder, Royal S. Daggett, Vineyard Haven, Mass.

STATION CARDS—Your call in red. Space for transmitter, receiver, remarks, etc. First hundred, \$1.00, each additional hundred, \$0.65. Also personal stationery with league emblem for members. Low prices, quick service. Burdette H. Buckingham, 195 West Eleventh Ave., Columbus, O.

WANTED—Copies of QST from 1917 to 1921, inclusive. State month and price, Robert Browne, 326 Broadway, N. Y. C. Care of RCA.

FOR SALE—deForest D7A Reflex Receiver—with tubes—One hundred dollars. C. G. Jewett, 417 Franklin, Keokuk, Iowa.

WANTED—Edison Sixteen Volt, 450 A. H. Battery. H. L. Hackley, Box 248, Truckee, California.

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9AE's DX Transmitter For Sale. Heard in every state and New Zealand. Sell cheap. For dope write R. N. Jones, 209 Hyland Ave., Ames, Iowa.

WANTED—Motor-Generator 500 volts 100 watts. Direct current motor. What have you? R. E. Laden-dorff, Burt, Iowa.

SUPER-Heterodyne—Build your own—The best circuit. Four Air Core transformers (no iron), baseboard and panel layouts, and circuit, price \$25.00. Also complete parts, including drilled and engraved panel, solder—everything except cabinet \$85.00. 2LO on a loop. Agents wanted, Philadelphia School of Wireless Tel. 1533 Pine Street, Philadelphia, Pa. Est. 1911.

DUBILIER MICA Condensers, Limited Quantity, Type C.A.3, .004, 8500 volts. Excellent for C.W. and spark. Price \$3.50 prepaid. F. A. Alexander, 62 West 14th St., New York, N. Y.

WILL BUY MG SET OF high voltage if its guaranteed and extra cheap. Describe. Summers coming. Watson, 2500 Maple Ave., Dallas, Texas.

MORE APPLAUSE, Please! On Applause Cards at 65¢ per 100 postpaid. Send money order at once. Money refunded if not satisfactory. Samples on request. The Wireless Acknowledgment Card Co., Dept. 47, 325 Sixth Ave., McKeesport, Pa.

7 No. 201 and 3 No. 200 @ \$2.50 each; 1 No. 202 @ \$6.50; 1 set of Victor wireless records @ \$3.00; 1 Tuska C.W. Inductance \$3.00; 2 No. 1714 transformers @ \$3.00 each; 2 Tuska variometers with knob dial and brackets \$5.50; 2 moulded variometers \$5.00; Variocoupler @ \$1.00; 2 No. 712 transformers @ \$4.00 each; 1 Baldwin headset cord and plug type "C" @ \$3.50; 1 Baldwin loud speaker Westinghouse Vococora type @ \$12.00. R. A. Gilman, Norris, Montana.

ORS A.R.R.L. is certificate proficiency. List our students holding this appointment also records rapid progress, quick success free. Dodge Radio Shortcut, Dept. S.C. Mamaroneck, N. Y.

OMNIGRAPH Wanted—Philip Brown, 2648 S. Sheridan Street, Philadelphia, Penna.

BARGAIN—Grebe CR9 with 3 Western Electric tubes \$95. Western Electric 10-D speaker, \$33. Schuck, 1411 Avenue A., New York City.

SELL—Two circuit tuner and two step amplifier. Formica panels and cabinets. 2 pairs headphones. \$50. Great DX records. Write. 1-CTP.

SACRIFICE— $\frac{1}{2}$ KW 500 cycle alternator \$85; $\frac{1}{2}$ KW alternator \$25; Radio corp 750 watt trans. \$22.50; new UV203's \$20; 4 WE peanut Tubes \$4; Colt .45 Calibre Army automatic \$20; 1500W Generators \$35; other CW apparatus—Edward Page, Baldwinsville, N. Y.—BAQO.

MUST SELL COMPLETE 20 watt CW and fone set immediately. This is a fine outfit and will sell cheap. Write John McGregor, Pontiac, Illinois.

WESTINGHOUSE—T. F. transmitter fone and C.W. with 4 five watt tubes, motor generator and key, brand new never been used. \$150. J. C. Gill, 342 West Main St., Galion, Ohio.

BARGAIN—Single circuit receiver with 2 stages A.F. double circuit jacks in oak cabinet \$40; 2 Faradon UC 490, 1MFD 1750 volt filter condensers \$2 each; Acme $1\frac{1}{2}$ henry choke 500 MA double coil \$6.50; Murdock .001 variable condensers \$3.50; three coil H.C. mounting \$3.50; Chelsea .0005 variable condensers \$3.25. Paul Schumacher, 222 Harrison St., Pullman, Wash.

FOR SALE—Western Electric 7A amplifier, loud speaker outfit with 2A current supply set for running on AC. No batteries required. Complete with tubes,

good condition \$125. I. G. Wilson, 91 Remsen Street, Brooklyn, N. Y.

SELL—In A-1 condition, 5 watt tube, \$5.00; Jewell voltmeter 0-15, \$4.50; Wimco inductance, \$8.00; Cotocoll condenser \$3.00. Irwin Johnson, 831 Rittenhouse St., Washington, D. C.

HERE YA ARE—DX Receiver, one tube, all districts in ten minutes, \$20.00. 2 Willard Storage "B"s, \$6.00. Slightly used. Snap it up. Melbourne Renken, Cole Camp, Mo.

FOR SALE—New Giblin Remler 1250-1500 coils \$2.50 each; 1 double coil mounting \$1.50; all for \$6.00; 3 new 202's \$5.00 each; 2 Radio Corp 5 watt rheostats \$2.00 each; 1 Westwye .001 vernier variable condenser used \$3.25; 1 Horne .001 variable condenser new \$3.00. Thomas Henley, Jr., Paris, Texas.

SELL—"Esco" 6-8V 500V dynamotor, 9DPN, Chicago.

FOR SALE—Amrad three circuit regenerative receiver and detector 2 step with tubes, \$68. N. C. Jones, Billerica, Mass.

SELL-PARAGON RA10. Almost new, \$45. Need the money. William Loeffler, 51 Woodland St., Lawrence, Mass.

INVENTORY SALE of One Tube Sets. Regular Value \$18.75. OUR PRICE \$6.90. Limited Number on hand. No Circulars. Send Cash or Money Order. William Q. Greene, 25 Third Ave., New York City.

FOR SALE—Stahl sync. rectifier, used four months excellent condition. First Forty Dollars. Hise 9CSY.

FOR SALE—1KW United open core transformer, 2 Dubilier Condensers and one Grebe synchronous gap. C. J. Goette, 10938-115th St., Woodhaven, L. I.

BRAND NEW— $\frac{1}{4}$ to $\frac{1}{2}$ KW 500 Cycle Excited Alternators \$18.00, with Transformer, state your voltage for CW \$24.00; $\frac{1}{4}$ KW CN1105 Quenched Transmitter with Alternator \$32.50; Weston Thermos, Flush 0-4 amp \$7.25; 53 ft. Portable Mast \$20.00. Prompt Shipment. George Eaton, 1915 South Twelfth, Philadelphia.

50 WATT WESTERN ELECTRIC Tubes \$28.00; 250 Watt Western Electric in stock; 50 Watt 203-A R. C. A. Tubes, \$25.00; R. C. A. Radiation Meters (0-2.5—0-5.0), \$3.25; Filter Condensers R. C. A. .5 Mfd., \$1.00; Paradon Antenna Series Condensers, \$2.50; Mercury Variable R.C.A. Transmitting Condensers, \$4.00; Crocker-Wheeler $\frac{1}{2}$ KW. 500 Cycle Generator and Exciter Generator with Gas Engine Drive For Sale with or without Gas Engine; $\frac{1}{4}$ KW. 110 D.C. 500 Cycle Motor Generator, \$30.00; A large collection of 500 Cycle and C.W. Transmitting Material For Sale cheap, R.C.A. and other standard makes. Troy Radio Co., 1258 St. John's Place, Brooklyn, N. Y., Decatur 6139-J.

EDISON TYPE A Elements 5¢ per pair. First Grade only. No. 20 Grade "A" pure nickel wire, 1¢ per foot. Perforated Separators, $\frac{1}{2}$ ¢ each. $\frac{3}{4}$ "x6" Flat Bottom Container 3¢. 84 Cell knocked down Rack, ready to assemble \$1.95. Holes are drilled to take $\frac{3}{4}$ "x6" container. Dry Caustic Potash in sticks 80¢ per lb. While they last, brand new French make 6 volt 60 ampere lead storage batteries in transparent Pyraline cells, cannot crack or chip \$5.75 each. Money back if not satisfied. Shipping weight 30 lbs. J. Zied, 530 Caltowhill St., Philadelphia, Pa.

20 WATT TRANSMITTER complete, Acme transformer, 3 meters, 4 tubes, all district DX-\$90. 8BOB.

KENNEDY UNIVERSAL No. 110 with two step amplifier. Practically new. Cost \$370. First \$175 cash takes this bargain. George Momborg, Latonia, Ky.

FOR SALE—Motor Generator Set, Emerson-500 volt -200 watt-new. First Money Order for \$60.00 takes it. Guaranteed. 9CEE.

WANTED—Two new UV-204-A tubes (9CZP)

FOR THAT LOW LOSS short wave tuner. No. 12 Double Cotton covered Copper Wire, \$1.20 per 100 feet prepaid. SML, Cleveland, O.

FOR SALE—10 Watt set for Key or Broadcasting. For particulars write to A. E. Schilling, 108 Elm St., Kalamazoo, Mich. Will send photo on request. Station W.L.A.Q.

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

FOR SALE—"DX" Radio Instrument Co. 6-tube amplifier, 3 r.f., det. 2 a.f., with plug-in transformers 170-450 meters, can be easily utilized in superhet by connecting in other transformers; value \$125, condition like new, \$75. Hard Moorhead amplifier tubes, best for above set, practically unused, \$3 each. SCR-65 sparkcoil transmitter, \$18. SCR-54 portable crystal receiver, \$20. Reliance laboratory model DC milliammeter, 0-10 and 0-100, \$5. Weston 0-100 flush DC milliammeter, \$4. Tuska Type E three-circuit regenerator, \$20. Original 1922 Reinartz tuner photographed QST March 1922, \$15. SE-95A navy long-wave tuner, \$200. Two Cotocoll R.F. transformer-reactors in tandem, \$5. K. B. Warner, care QST.

NOW FOR THE REAL THING—Genuine Edison B Batteries, in Nickel Steel Containers, type W, Twin-Cell Units, used by the Navy, in first class condition, and offered at amateur prices: \$.50 per cell, in dozen lots. Tray supplied for holding 44 cells, and also handsome steel boxes for holding complete batteries. Sample twin-cell, prepaid, \$1.35. This is the chance of a lifetime. A. R. Spartana, 615 N. Washington St., Baltimore, Md.

SELL—R.C.A. Power transformer UP-1916. New, \$24.00 cash. 4SE.

FEW NEW W.E. fifty watters, \$25; Airplane 30-350 volts D.C. dynamotor, \$12. 2BYJ.

FOR SALE—One $1\frac{1}{2}$ K.W. 60 cycle, Single phase General Electric transformer: 1040/2080 to 115/230 Volts. Oil cooled, \$10.00 at Chicago. M. Wesely, 7142 Rhodes Avenue, Chicago, Illinois.

RADIO CORPORATION transmitting apparatus at rock bottom prices. UC-489 1750 volts filter condensers, \$1.00; 6000 volts, 4 amps, .002 condensers, \$4.50; 1831 4000 volts 5 amp variable antenna condensers \$5.50; 1015 7500 volts .0003, .0004, .0005 grid or series condensers \$4.00; UT-1654 large filter reactors \$12.00; 1853 small filter reactors \$8.00; PX-1638 chopper wheels \$4.00; Everything new in original packing. David Talley 2PF, 1435 East 19th St., Brooklyn, N. Y.

SELL—GREBE CR8. Consistent range both coasts, nightly. A real buy. Fifty fish, prepaid. 9CIN.

INDUCTANCES—25 turn pancake inductance for Reinartz Balanced Circuit, \$8.00; 2 and 3 coil inductances \$15.00 and \$20.00 respectively. Inductances a specialty. Write us your wants. 8NX.

FOR SALE—Paragon RA 10. Perfect condition, \$45. Hackensack Radio Club, Box 194, Hackensack, New Jersey.

GREBE CR-13 for sale, new perfect condition, \$62. All letters answered. N. S. Stackpole, 139 Pratt St., Providence, R. I.

SELL—Four new VT-2 five watt power tubes \$5.00 each cash. 4SE.

PURE SHEET Aluminum and Lead $\frac{1}{16}$ " 75¢ Square foot. 9DVK.

NEW RADIO STUFF—Jewell Meters—0-5 TC-Ammeter \$10.50; 0-500 Milliammeter \$6; New "S" Tubes pair \$18.00; Used "S" Tubes pair \$12.00. What have you to trade? Want Omnigraph. James R. Curtis, 1109 Eighth Avenue, Fort Worth, Texas.

SELL—One new DeForest reflex receiver at \$45. Morris Decker, Baldwinsville, N. Y.

UV73 Pliabletron 5 to 1000 watts \$8. Page 52 March issue. SML sells em. Pump Free.

SELL—RC Inductance, \$7.00; UV203 Socket, \$1.00; UC1831 transmitting condenser, \$4.50; Two Acme 150 watt filament heaters, \$10.00 each; Condensers, UC1015, \$3.00; UC1014, \$1.50. Woolfries, 304 Welch Ave., Ames, Iowa.

MAGNAVOX R3—Latest nationally advertised reproducers; concert modulator. List \$35. Introductory \$25. The factory sealed carton is your guarantee. Radio Central, Dept. Q, Abilene, Kansas.

LOWEST PRICES ON STANDARD RECEIVERS, 20% DISCOUNT. THOMAS RADIO SUPPLY CO., MUNCIE, IND.

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PURE SHEET Aluminum and Lead $\frac{1}{8}$ " 75¢ Square foot, 9DVK.

FOR SALE—Acme Two hundred watt Transformer. Ten Dollars; Two Kenotrons—Two sixteen, Three Dollars. H. Zirschky, Burbank, Okla.

TRANSMITTING—Grid leaks, 5W. RCA \$1.10. RCA Filter Reactors UP1626, 5W. size, regular 1250, special price, \$6.00. Philadelphia Wireless Sales Corp., 1533 Pine St., Phila. Pa.

FOREIGN amateurs, KDKA and WGY found in on low waves. Blueprint and complete data for One Dollar. Low loss condensers, eleven plate, three dollars, twenty-three plate three fifty. Send stamp for complete list. Superior Coil Company, Harwichport, Mass.

FOR SALE—2 Grebe RORN \$40.00 each; Grebe CR-3 \$40.00; Grebe RORD \$50.00; Amrad Variometer set with 2 step \$50.00; single circuit with 1 step \$25.00; Acme 75 watt power transformer \$11.00; complete 1/12 KW Spark \$25.00; Thorphone \$35.00; Michigan Variocouplers \$3.00 each; 0-5 Jewell R.F. ammeter, large type, \$9.00; Single circuit 2 step complete with Magnavox, etc., \$60.00; Reinartz tuner \$15.00; Model C Superheterodyne complete with storage "B." Loud Speaker, etc., \$300.00; write for list of new and used parts and apparatus. Electrical Specialty Company, Valparaiso, Indiana 9DVK.

HAMS ATTENTION—Acme C.W. Inductance at Cost. Only \$1.95. 30 turns No. 12 Wire on 5" Slotted tube. Studs on every turn. Hurry. 9-BNC. Robt. Adams, Anthony St., Glen Elyn, Ill.

PURE SHEET Aluminum and Lead $\frac{1}{8}$ " 75¢ Square foot, 9DVK.

PURE DC FOR THE PLATES—New 1500 volt 500 watt General Electric dynamotors operating from 24 volts. \$45. Holtzer-Cabot 500 volt. .07 ampere for 12 volts. \$22. General Electric 350 volt 1.43 ampere for 12 volts with filters \$18. Either of above for belt drive \$3. additional. When driven will also develop current for filaments, battery charging, etc. General Electric fine, cw. icw transmitters originally costing \$350. new—complete with two tubes, dynamotor, spares, etc. \$75. Operates from 12 volts. 500 cycle generators with and without motors. GE 203A \$28. 250 watters \$85. 1000 watts \$150. Henry Kienzie, 501 East 84 Street, New York.

SELL—Radio Corporation 750 watt Transformer, \$25.00; Grebe CR2, \$25.00; Radio Corporation Mercury Condenser, \$4.50; Radio Corporation 0-5 Hot Wire Ammeter, \$5.00. 2WZ.

WILL TRADE FOR KENNEDY Type 110 Universal Type 525 Two Stage Amplifier, must be in perfect condition, \$100.00 cash, three circuit 150-600 meters and single circuit 150-3000 meters regenerative sets each with two stage amplifier, guaranteed perfect condition, cost \$260.00. Joseph Schindler, 116 S. Rebecca Ave., Scranton, Penna.

DON'T BUY MUD for that short wave set. Radio Corp Porcelain Sockets, seventy-five cents; Freeman Porcelain Sockets, forty cents. Superior Coil Company, Harwichport, Mass.

LOOK FELLOWS—500 volt 100 watt Robbins-Meyers motor-generator \$50.00. 20 watt C.W.—fone complete set of meters with 2 tubes, \$100.00. 750 volt 250 watt generator \$25.00. Two stage power amplifier \$20.00. 10 watt C.W.—fone complete less tubes \$75.00. 110 volt 100 watt generator \$10.00. 15 dial omnigraph. Write for further description. H. S. Brooks, 151 W. First St., Fulton, N. Y.

EDGEWISE—Wound Copper Ribbon $\frac{1}{8}$ inch wide 6 inch diameter 15¢ turn, $7\frac{1}{2}$ inch diameter 17¢ turn. Remler Giblin Coils mounted 107-150-200-300-400-500-750 1000 turns half price. Genuine Silicon Transformer steel cut to order 25¢ pound 10 lb. and over, 4 cubic inches to pound. Chemically pure Aluminum $\frac{1}{8}$ inch 80 cents. $\frac{1}{4}$ inch \$1.60 postage extra. Geo. Schulz, Calumet, Mich.

KNOCKED DOWN—50-150 Meter receivers, detector and one stage. Panel drilled ready to assemble and wire. Best of parts. Price \$20. Superior Coil Company, Harwichport, Mass.

NEW TUBES—Westinghouse. WR 21 Amplifiers, 4 volts, 8 Amp., Price with sockets, \$2.50 each; DX. Radio Frequency Transformers and mounts \$4.50 each; DeForest Unit Panel Vernier Condensers .001 and .0015 \$8. each; Fixed Variable Condenser \$4. Acme Choke, \$2.25. McCarthy, 4412 Washington St., Roslindale, Mass.

STAHL SINKS \$45.00 prepaid; G. R. Wavemeters 2% accurate 150-500 Meters \$10.00, 9DVK.

AMATEURS! HAMS! NOTICE THESE PRICES ON "QSL" CARDS. 500 POSTAL SIZE CARDS PRINTED IN BLACK INK WITH LARGE RED CALL LETTERS, \$4.00. A.R.R.L. CUT USED IF WANTED BY MEMBER. TWO COLOR APPLAUSE CARDS FOR BCLS AT THIS PRICE ALSO. NOT MORE THAN TEN LINES OF PRINTING. THIS RATE ON 500 ONLY. CASH WITH ORDER. A.R.R.L. MEMBER CURTIS, 1109M EIGHTH AVENUE, FORT WORTH, TEXAS.

TRANSMITTER BARGAINS—75 Watt Acme Mounted Transformers \$10.00; S Tubes and Sockets new each \$6.00; only few, order early. Van Blaricom, Helena, Mont.

REINARTZ TESTED REINARTZ Receiver with two stage amplifier in case. Has all refinements. Parts alone cost \$85.00. Will take \$50.00. Have logged 3000 miles with it many times. Write for particulars. Van Blaricom, Helena, Mont.

FOR SALE—10 watt set for key or broadcasting. For particulars write A. E. Schilling, 108 Elm St., Kalamazoo, Mich. Will send photo on request.

CALLS HEARD POSTAL CARDS (for DX reports). Send \$1.00 with your name, address and call letters for 100 (\$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—prices upon application. Twenty-four hour service. Samples of our complete line of cards, rubber stamps, etc. on request. Printed by 9AVO, member A.R.R.L. Radio Print Shop, Box 582, Kokomo, Ind.

100 WATT C.W. and fone parts for sale at sacrifice. Write for list. 2COA.

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W.E.216A's at \$6.00, U.V.199's at \$3.75. R. Breunig, 2252 Roscoe St., Chicago.

SELL—UV200 \$3.25. UV201A \$4.50. Acme 200 watt transformer \$14.00. Reinartz tuner—two coils—60-275 and 180-800 meters \$12.00. Detector two stage \$19.00. World 80 amp battery \$8.00. Write today. 9CRK.

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SELL—One fourth horse power Westinghouse continuous duty, 110 volt A.C. motor. New. \$20.00 cash. 4SE.

1-200 WATT mounted Acme plate transformer, \$10.00; 1-75 watt mounted Acme filament transformer, \$8.00; 1-UT-1367 Magnetic modulator, \$12.00; 1-Western Electric desk microphone, \$10.00; 1-UC-1831 variable transmitting condenser, \$3.00; 1-UC-1014-R.C.A. grid condenser, \$1.00; 1-mounted Acme $1\frac{1}{2}$ Henry Choke, \$2.00; 1-Grebe CR-8 new, \$55.00; 1-Grebe Rork 2 step \$30.00; 1-type R-3 Magnavox, \$18.00; 1-DeForest old time 2 filament audiotron never used, \$5.00; 2-UV-201's hardly used, each, \$2.50; 1-Bunnell Bug Key new, \$2.00. 3KO, Paul R. Kern, 1030 N. 10th St., Reading, Pa.

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WILL SELL CREED CR8 and Rork 2 stage amplifier, \$90; R3 Magnavox \$36; three Radio Corp No. 1417 R. F. transformers each \$3.50 honeycomb coils 200 to 1500 turn at half list \$501 tubes \$3.50 each Atwater Kent mounted coupler \$7. Will buy Omnigraph at bargain. Fred E. Dowdell, 912 N. First St., Aberdeen, South Dakota.

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BARGAINS for hams—10 to 50% off on all standard merchandise due to our unusual buying powers. Send us your wants and receive prices by return mail. RCA tubes \$4.34; Burgess and Eveready batteries 25% off; Acme Audio and Radio transformers \$3.49; Cardwell condensers 10%; Brandes superior phones \$4.79; type "C" Baldwins \$7.90; Paragon detector units (list \$4.75) special \$2.45; RCA mercury condensers (list \$8.50) \$5.95; Tungar rectifiers 15%; Bakelite and radion panels, Weston and Jewell meters 15%; General radio 15%; Federal apparatus 20%; Magnavox new type \$26.50. Standard sets at least 15%. Immediate deliveries guaranteed. 10% deposit with order, balance C.O.D. Guarantee Radio Service Co., 3886 Third Ave., New York City.

EDISON ELEMENTS—Drilled 5¢ pair; four fifty watt Sockets \$1.50 each; UP1654 reactor \$10; Three .0002 glass jar condensers \$2 each; 1/2 KW Amrad gap \$8; 3000 meter coupler \$8; Reinartz tuner \$12; three stage AF amplifier \$30; three stage RF amplifier for 199's \$30; ampitone loudspeaker \$3; Westinghouse 22 volt B \$4; DeForest ultraudion cabinet \$10; two UP 415 reactors \$4 each; Double pancake inductance \$8. P. E. Slade, Box 114, Stamford, Conn.

FOR SALE—1 Paragon RB-2, \$90.00; Western Electric Sub-chaser transmitter and Receiver \$140.00; 10 watt transmitter, \$60.00; Magnavox R-2 \$40.00; Magnavox 3 stage amplifier \$40.00; both \$75.00. 8-RD. 15 William St., Meadville, Penna.

HAMS!—Here's a ten watt ACCW set with a mad kick. Complete, mounted on bakelite panel, in mahogany cabinet, a beauty, sell cheap, have a fifty now. Want Synchronous Rectifier. 50C.

FOR SALE—Federal hand transmitter, \$4.00; Western Electric 7-A power amp. complete \$95.00; 2-UV-217 Kenotrons used little \$10.00 each; New Grebe "13" \$75.00; New 5 watt tubes \$5.50 each; R-2 Magnavox, \$30.00; all guaranteed. Arthur Walsler, Chesaning, Mich.

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BARGAINS—For that Storage B battery—Largest size Edison A battery Elements only 4¢ per pair, \$29.50 Edison A-6, 225 amp. hour cells 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.

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

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\$12. EACH takes Ohio or Wagner 110 volt sixty cycle eighteen hundred R.P.M. motors built in 1/4 H.P. frames. Can be used as power motors. Type C, Edison elements per pair 3 1/2". Highest quality 1 1/2" x 6" test tubes \$3.00 gross. Perforated hard rubber separators 1 1/2". No 20 99% pure nickel wire \$1.50 per hundred feet. 25% off on 4 new Acme 1/2 and 1/4

K.W. Plate transformers. Kimley Electric Company, Inc., 2665 Main St., Buffalo, N. Y.

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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.

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.

FOR SALE—Esco motorgenerator 1500 volts 600 watts with field rheostat for panel mounting brand new, never used, \$200. Ten watt C.W. and lone set all complete in cabinet and panel mounted antenna ammeter, 0 to 5 plate milliammeter, 0 to 250 Jewell meters; set can be used with any D. C. source plate supply, \$75. Kennedy receiver 281 @ \$95; Power transformer U. P. 1016 @ \$25; Magnetic modulator 1367 @ \$10; Omnigraph @ \$18; 3 tube sockets for 50 watters @ \$1.75 each; rheostat P.T. 537 @ \$5.00; Grid Chopper PX 1368 @ \$4.50. No trades considered must have cash. Every article guaranteed A No. 1 condition. SBCA.

IF YOUR Neutrodyne won't "Neut" O.K., send 10¢ for details of Kladag Coast To Coast circuit, bill of materials, etc. to change over your Neut into a set that will bring them all in from Mexico City to Tunucu, Cuba, on a loud speaker. Or send \$5.00 for all extra parts, blue print, etc. you need to do this. Stamps accepted. Radio list for stamp. Super Heterodyne specifications, 10¢. Kladag Radio Laboratories, Kent, Ohio.

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

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LITZ WIRE green silk two cents per foot. Postpaid. Superior Coil Co., Harwichport, Mass.

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.

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I AM UNABLE to use the Grebe Transmitter which I won in the recent Transatlantic tests. This transmitter was described in the October issue of Q.S.T. and is being held at the manufacturers pending my shipping instructions. A chance to secure this Deluxe transmitter at a bargain price. IANA, R. B. Bourne, Chathamport, Mass.

1 MOTOR GENERATOR Set for sale. Motor 1/2 h.p. repulsion single phase, 110-220 Volt. A.C. generator 800 Volt 72 Segments on Commutator; 1 1000 Volt Generator, knocked down, will furnish wire for Armature, by 8 CWL, Hertz Battery Co., 1236 E79th Street, Cleveland, O.

5 AMP. TUNGAR \$20.00; UV--203 Sockets \$1.50. Transmitting Grid Leak \$1.00; Murdock moulded condenser sections \$1.50 each, fine for CW. Hengelbrok, 624 Monroe, Newport, Kentucky.

TRADE—50 watters, used about 2 hours, want 3 or 4 5 watters, must be in good condition. What have you? Radio 9AXD.

1KR—Leon E. Hadley, 87 Orchard Street, Leominster, HERE YOU ARE BOYS—Grab it. Finest Silicon transformer steel sheets ten by twenty, cut it yourself. Ten cents per pound. Cash with order. Pay your own freight. Brody, 1965 Horton Ave., S. E., Grand Rapids, Mich.

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RADIO 1XQA, 1AEL, 10A now at Silver Lane, Connecticut, a suburb of Hartford. Operators; S. Kruse, "LQ"; F. C. Beekley, "JS"; and A. L. Budlong, "VL"; all of the A.R.R.L Headquarters staff.

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1ZD es 1CAK—John M. Wells, 40 Main Street, Southbridge, Mass.

1-ZT 1-PA—George E. Nothnagle, 176 Waldemere Ave., Bridgeport, Conn.

2AEY—Raymond E. Groebe, 338 El Mora Ave., Elizabeth, N. J.

2CM—Cornelius C. Vermeule, Jr., 63 Harrison St., East Orange, N. J.

2CG—Charles S. Hallock, 5710-4th Ave., Brooklyn, N. Y.

2FG—Henry C. Baarens, 278 Passaic Ave., Clifton, N. J.

3CX—Wm. R. Stewart, Jr., 3950 Parrish St., Philadelphia, Pa.

3EP—Gideon Peirce, Westmont Ave., Haddonfield, New Jersey.

Canadian 3GG—M. J. Caveney, Lat. 48, Long. 81 near TIMMINS, Northern Ontario, Canada.

4PT—A. J. Barclay, Box 1662, Tampa, Florida.

4ZD—Paul G. Watson, 830 East Park Ave., Savannah, Ga.

5KV—M. E. Eaton, Box 384, Henrietta, Texas.

"AMATEURS—Please make correction in your call books. 5OM—WALTER M. GARRARD, 1430-No. 12th Court, Birmingham, Ala.—TNX"

5UP—G. C. Coleman, 805 S. 66th St., Birmingham, Ala.

6DO—Norman A. Woodford, 440 Tenth Street, Richmond, Calif.

6ZBJ—"Y" Radio Club, 110 W. Carrillo Street, Santa Barbara, Calif.

8VBV—Edw. C. Brichta, 3393 Williams Ave., Detroit, Michigan.

8CHM—Allen Campbell, Wauseon, Ohio.

8DAN—Ann Arbor High School, Ann Arbor, Michigan.

8DMA—Vernon S. Foote, 1442 Milton St., Grand Rapids, Mich.

8DMT—A. H. Van Norden, 132 Sanford St., Glens Falls, N. Y.

8DOQ—Chas. A. Weaver, Penna. Ave., So. Huntingdon, Penna.

9CVL—Milton L. Johnson, 938 So. 4th St., Atchison, Kansas.

9DNP—Harry Herlin, RFD No. 1, Rockford, Illinois.

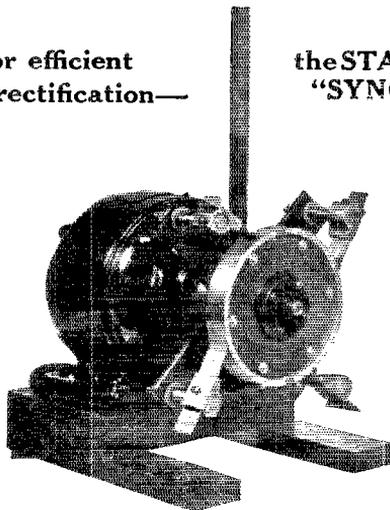
9EGZ—R. W. Freitag, Preble, Indiana.

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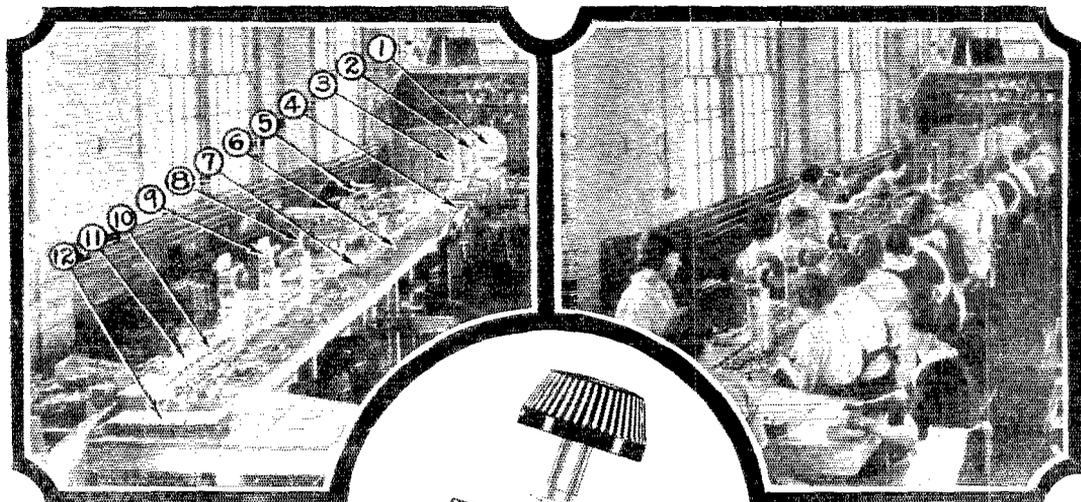
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—FOR YOUR CONVENIENCE—

QST'S INDEX OF ADVERTISERS IN THIS ISSUE

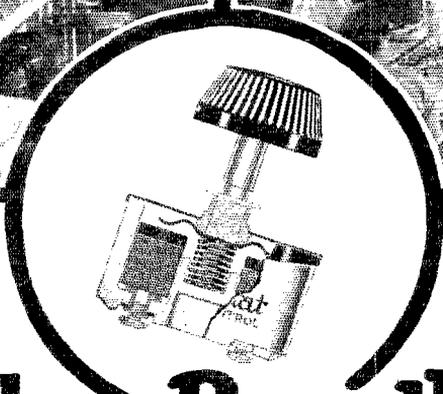
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ALWAYS MENTION Q S T WHEN WRITING TO ADVERTISERS



View of one production line in Bradleystat assembling department. The conveyor assembly process was developed to keep up with the increasing demand for Bradleystats and Bradleyleaks. See explanation below.

View of one production line, showing operation assembling Bradleystats and packing them in cartons for shipment. All parts are fabricated in other departments. The electric furnaces are in a separate building.



How the Bradleystat is made

FOR over twenty years the Allen-Bradley Co. has made graphite disc rheostats for battery chargers and motor starters. The experience gained during these twenty years is embodied in the most perfect filament rheostat used in radio, the Bradleystat.

Today, the Universal Bradleystat, with its two columns of graphite discs under adjustable pressure, provides unequalled control for radio tubes. Its control is absolutely noiseless, stepless and of exceedingly wide range.

Bradleystats are assembled by the most modern methods and tested rigidly before they are shipped.

The illustration above depicts the assembly process that guarantees a uniform product for the radio fan.

- | | |
|------------------------------|-----------------------------|
| 1—Cleaning porcelains | 7—Installing cover plates |
| 2—Riveting terminals | 8—Inserting adjusting knobs |
| 3—Threading terminals | 9—Six testing machines |
| 4—Inserting terminal screws | 10—Conveying Bradleystats |
| 5—Disc-filling machine | 11—Inspecting Bradleystats |
| 6—Inserting pressure springs | 12—Packing Bradleystats |

Bradleyleaks follow the same process, except for the use of different discs and the installation of condensers.

Install Bradleystats in your radio set, if you want the finest filament control obtainable. Try one, and experience new delights in radio reception.

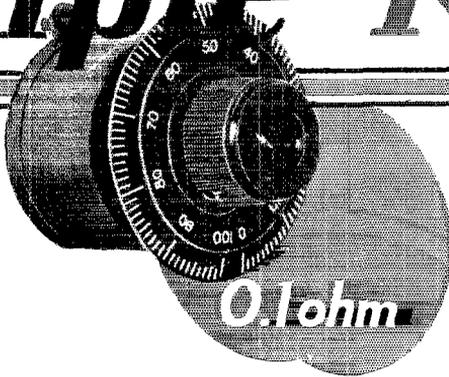
Allen-Bradley Co.
Electric Controlling Apparatus
277 Greenfield Avenue
MILWAUKEE, Wisconsin



For Sale at All Dealers
BRADLEYSTAT \$1.85
BRADLEYLEAK 1.85
CONDENSER (.00025 m.f.)35

THE ALLEN-BRADLEY CO. HAS BUILT GRAPHITE DISC RHEOSTATS FOR OVER TWENTY YEARS

Triple Range



Low Loss

The True Measure of Efficiency

0.1 ohm is the resistance of the
CONNECTICUT
D-10

Triple Range Variable Condenser

at a capacity of 330 micro-microfarads on a wave length of 215 meters.

This is a statement that means something.

Those who know that the losses of a condenser are in direct proportion to its resistance—

Those who have learned that measurements taken at radio frequency are much more valuable than those taken at audio frequency—

Those who can see the importance of judging the efficiency of a condenser for amateur and broadcast work on results obtained at a frequency in the immediate vicinity of that at which it is to be used—

Will see in the above the real reason why this condenser should be used by all who wish to obtain the greatest degree of signal strength and sensitivity from their receiving equipment.

Three Condensers in One

These three ranges of capacity enable it to take the place of the ordinary eleven, twenty-three and forty-three plate instruments.

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.

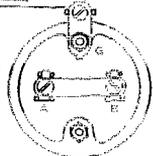
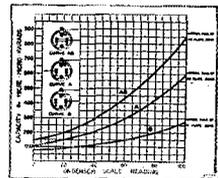
The range indicated by Curve AB—from .00015 to .00085—approximately that of a forty-three plate condenser is secured by bussing A and B and wiring into the circuit from G and B.

**FEATURES: Vernier Scale—Complete Shielding—Compact size
And all the convenience that goes with One-hole Mounting**

PRICE \$4.50

Complete with dial, index stud, spacing washers and buss bar.

Send for Bulletin A-104 describing this unique instrument, with information and diagrams illustrating its special applications.



AMRAD

"S" TUBE RECTIFIER -- What Takes Place In The Tube

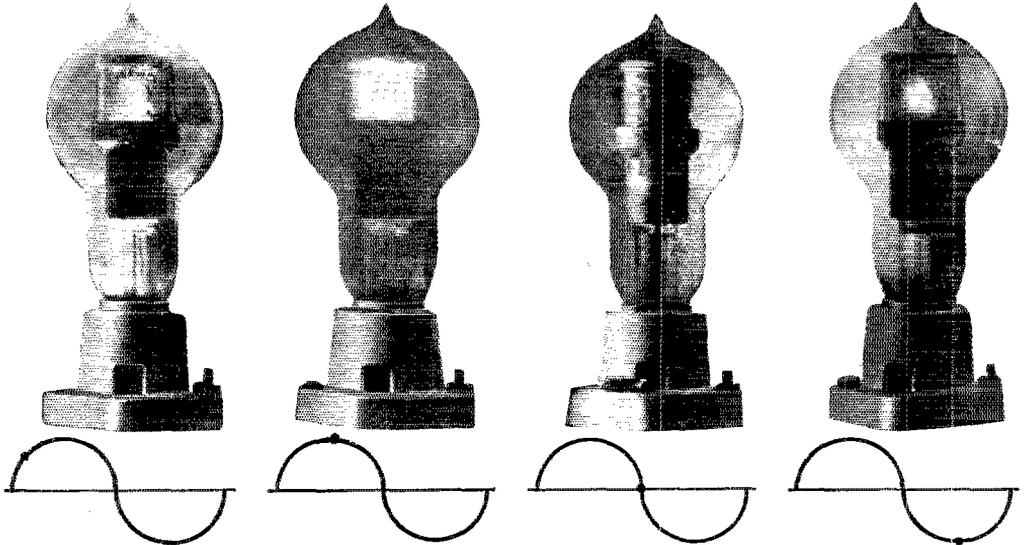


FIG. 1.
TUBE JUST BEGINNING
TO CONDUCT
FORWARD DIRECTION

FIG. 2.
TUBE IN FULL
CONDUCTION
FORWARD DIRECTION

FIG. 3.
TUBE AT 0 POTENTIAL
NO CONDUCTION
EITHER DIRECTION

FIG. 4.
TUBE AT REVERSE
POTENTIAL SHOWING
LEAKAGE CURRENT

The above Laboratory photos show what actually takes place inside the rectifying "S" Tube. The small spot on the sine curve below each view shows the point on the AC wave at which the photo was taken.

The glow in Fig 4, although apparently quite bright, is due to the negligibly small reverse current—which is less than 3 milli-amperes irrespective of the voltage and value of the forward current.

The "S" Tube used was the standard AMRAD No. 4000, excepting only that a specially constructed cathode of gauze was utilized to permit photographs being taken. A small amount of neon was added to the helium within the tube to give a brilliant red glow. A panchromatic film, sensitive to red light, was used to record the discharge image, and a specially designed shutter running at synchronous speed with the AC supply, served to catch the discharge at the desired points of the cycle.

IDEAL FOR AMATEURS

"S" Tubes find ready application in radio transmitting circuits, in charging Storage "B" Batteries, and wherever DC is desired under conditions requiring dependable performance. The "S" Tube has no filament to burn out.

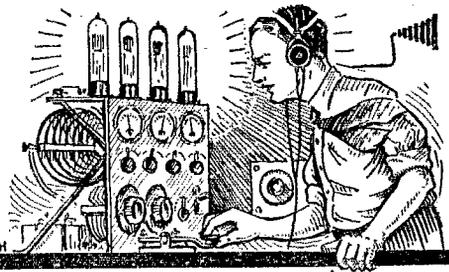
Write for descriptive Bulletin J-2

AMERICAN RADIO AND RESEARCH CORPORATION
205 College Ave., Medford Hillside, Mass.
AMRAD Dealers in Principal Cities and Towns

The Traffic Department

F. H. Schnell, Traffic Manager
1045 Main St., Hartford, Conn.

QST



Cancellations and Corrections in and Additions to Traffic Department Directory Printed in October, 1923, January and March, 1924 Issues

Cancellations

WESTERN PENNA.—Dist. No. 9: C.M. PITTSBURGH—F. B. Westervelt, 5306 Westminster Ave.
SO. INDIANA—Dist. No. 3: O.R.S.—9ALP. Dist. No. 5: C.M. RICHMOND—M. E. Druly, 317-20th St. O.R.S.—9PD.
OHIO—Dist. No. 3: C.M. CLEVELAND—D. Dominzi, 3097 W. Blvd. Dist. No. 4: O.R.S.—8EB.
KENTUCKY—Dist. No. 1: C.M. LOUISVILLE—Eddie Smith, 688 E. 39th St.
WISCONSIN—Dist. No. 3: C.M. SHEBOYGAN—H. J. Steffen, 1611 N. 8th St. Dist. No. 4: C.M. LA CROSSE—Ed Benton, 117 N. 6th St.
SO. DAKOTA—Dist. No. 1: C.M. SIOUX FALLS—F. B. Christopherson, 731 W. 18th St. Dist. No. 2: C.M. ABERDEEN—A. H. Rosvold.
MINNESOTA—Dist. No. 2: D.S.—H. R. Skifter, Northfield. Dist. No. 3: O.R.S.—9BKJ, 9DAC.
MISSOURI—Dist. No. 2: D.S.—B. Laizure, 8020 Mercier St., Kansas City.
IOWA—R.M.—J. P. Gillett, Rippey, Iowa.
NO. TEXAS—Dist. No. 2: D.S.—W. B. Forrest, Jr., 502 Royal St., Waxahachie.
SO TEXAS—Dist. No. 6: O.R.S.—5XAD.

Corrections and Change of Addresses

NO. NEW JERSEY—A.D.M.—A. G. Webster, should be A. G. Wester.
A.D.M. WEST. PENNA: A.D.M. P. E. Wiggin address changed to 714 Johnston St., Wilkinsburg, Pa.
WISCONSIN—A.D.M.—C. N. Crapo, address changed to 443 Newton Avenue.

Additions

WEST. PENNA.—Dist. No. 9: C.M. PITTSBURGH (East and South Sides) B. Arthurs, Jr., 3046 Center Ave., Pittsburgh. C.M. PITTSBURGH (West and North Sides) C. C. Young, 1505 Federal St., N. S., Pittsburgh.
WISCONSIN—Dist. No. 3: C.M. SHEBOYGAN—W. W. Wick, 200 Huron Ave.
OHIO—Dist. No. 3: C.M. Cleveland—J. E. Phillips, 9711 Lamont Ave.
ILLINOIS—Dist. No. 7: C.M. CHICAGO—W. F. Marquardt, 2624 Potwyne Pl. C.M. EVANSTON—E. W. Kimbark, 926 Michigan Ave. C. M. FOREST PARK—F. Mumm, 7219 Jackson Blvd.
MINNESOTA—Dist. No. 1: C.M. VIRGINIA—Albin Lofback, Box 957. O.R.S.—9DOE, 9BAV, 9CMS, 9ADE, 9ZC, 9DXT, 9CDV, 9EGF. Dist. No. 2: D.S.—N. A. Canfield, Luverne, Minn. O.R.S.—9DWN, 9CPO, 9COF, 9DYR, 9DCH, 9CVV. Dist. No. 3: O.R.S.—9BIS, 9CXP, 9DEV.
NO. DAKOTA—Dist. No. 1: O.R.S.—9DLI, 9DNX, 9AMP, 9EBT, 9CKA, 9UH.
SO. DAKOTA—Dist. No. 1: C.M. SIOUX FALLS—H. B. Manning, 114 S. Euclid Ave. O.R.S. 9AYD. Dist. No. 2: C.M. HURON—Merle Buck, 677 Lawn Ridge. C.M. ABERDEEN—T. F. Anderson, 404 S. 8th St. O.R.S.—9DUU, 9CGA, 9CJS.
TENNESSEE—Dist. No. 3: C.M. MARYVILLE—J. T. Underwood, Maryville.
MISSOURI—A.D.M.—L. B. Laizure, 8020 Mercier St., Kansas City, Mo.
MONTANA—Dist. No. 1: C.M. HELENA—G. C. Stocking, 413 1/2 N. Beattie St.
WASHINGTON—Dist. No. 4: D.S.—Chris Maginn, Jr., P. O. Box 407, Cosmopolis.
VIRGINIA—Dist. No. 1: O.R.S.—3BNE. Dist. No. 9: O.R.S.—8CA, 8CKL.
WEST VIRGINIA—Dist. No. 1: WEST VIRGINIA

—8DES, 8WZ, 8AUE. Dist. No. 4: 8BBM. Dist. No. 5: C.M. HUNTINGTON—E. L. Murrill.
NORTHERN TEXAS: A.D.M.—W. B. Forrest, Jr., 502 Royal St., Waxahachie, Texas.
ALASKA: A.D.M.—G. Sturley, 206 E. 17th St., Vancouver, Wash.

ATLANTIC DIVISION C. H. Stewart, Mgr.

EASTERN NEW YORK—Brooklyn—2CPQ, 117; 2BO, 87; 2AAY, 78; 2BRB, 75; 2CHY, 59; 2GDP, 52; 2BZO, 39; 2ABN, 36; 2CLA, 38; 2DL, 30; 2ABR, 22; 2EM, 12; 2FF, 4; 2BEG, 63; 2CTW, 8.

2AAY on two fifties and 2BRB on one, work the west coast regularly. 2CLA is heard there every time he steps on the key but has not connected up with them yet. 2CPQ has been on the air more than any other Brooklyn station and shows it in his report. 2ABN has a swell note now and his DX is improving. 2CHY is doing fine work with his low power.

Bronx—2CRQ, 225; 2CNO, 118; 2CYX, 97; 2CJJ, 32; 2BBX, 31; 2FZ, 13; 2CWR, 19; 2ABH, 12; 2SM, 19; 2CVX, 10.

2CRQ gets the honors this month. 2BBX is getting all over on two 5-watters. 2FZ is back on the air. 2CYX has four ops, one of which as a YL. 2CJJ is doing good work on his fifty.

Manhattan—2BEE, 105; 2CPK, 78; 2CSL, 59; 2CZR, 52; 2KR, 35; 2XNA, 29; 2DL, 25; 2CHK, 26; 2AQL, 13; 2BNL, 6; 2CTE, 6; 2LX, 18.

2BEE, 2CPK and 2CSL are going regularly and handling the most traffic. 2CHK is doing fine on his 20 watter. 2XNA is QSO the west coast nightly. 2DI is going F.B. 2CPK is promising much better reports as soon as they get going strong.

Richmond—2BQU, 23; 2ADJ, 11; 2CAJ, 8; 2ACZ, 193; 2CEV, 115; 2CEP, 4.

Mr. Boyd Phelps, formerly of the editorial dept. of QST is living in Staten Island. 2NZ and 2CQZ are back. 2ND has retired for a while and there is one less spark in the second dist. 2TS is leaving our ranks for the commercial game.

Queens—We are sorry that Queens has fallen so far behind but Cunningham is after the bunch. 2CTN, 10; 2AVE, 2; 2BSL, 5.

Dist. No. 1: 2CXB was just appointed D.S. He is getting the gang lined up and will have more extensive reports in the future. 2BUM is moving to Lynbrook where he will start up. 2KB will open up in Rockville Centre soon. NOTICE—All hams outside of Brooklyn and Queens on Long Island, please send their traffic reports to 2CXB, 18 Brower Ave., Rockville Centre.

Dist. No. 2: 2BQB is stepping out great. 2UA is going to install a high power C.W. set in Hartsdale. 2CVJ is doing well. 2CBI and 2BPR are still on with spark. 2CBI also has C.W. 2ATF is on once in a while with his 500 cycle I.C.W.

Dist. No. 4: 8CKN reports no activity.

Dist. No. 5: 2CGH, 57; 2GK, 21; 2CGJ, 20; 8AVJ, 49; 8APU, 4. 8AVJ and 2CGH have reached the coast. 2CGH is using a 5-watter. 2GK has a 500 watt Master Oscillator going. QST to all stations in Albany, Schenectady, Schoharie, and Montgomery counties—please report to 2GK.

Dist. No. 6: 8AOT reports no traffic. 8AVR is getting ready to open up on a 10-watter. New Rochelle—2CFE reports no activity except occasional appearances of 2ABM. Yonkers—E. B. Wilson, 2ADD, 209 Van Courtlandt Park Ave., is the new C.M. 2CUZ, 60; 2APY, 15; 2AQH, 10; 2CLL, 5; 2ADH, 3; 2ADD, 3; 2AAC, 1. Troy—2ANM reports not much doing. 2ANM, 26; 2CFZ, 7. Kingston—2CNI report ND. Newburgh—2CXG, 24; 2CNP, 8. Albany—2AWF, C.M. reports not much stirring. 2AWF, 14; 2PV, 10; 2BSB, 4; 2AWF, and 2PV have been QSO in England.

WESTERN NEW YORK—RAWP has resigned as A.D.M. This will mean new life for those men who have been struggling along. Three message reports came through. 8DDV, 5; 8COK, 47; 8ADG, 11; although we know many stations are operating regularly each month. This is a pitiful showing—all due to inactivity on the part of one man.

NEW JERSEY—3CBX is only using a 5-watter but has no trouble in raising the first and eighth districts OK. 3CBS is a new comer, but sure has a nice fist. 3CS-3ZI is back on the air again and is reaching out. 3BLZ is being operated by 3CS himself during spare moments. 3BWY is giving 3EH a run on real DX work. He has received three cards from British hams and has worked the west coast three times, and all on a 10-watter. 3BEL was out of commission for a time but now has 9 5-watt tubes. Traffic: 2WR, 44; 2ANA, 64; 2AXF, 12; 2BEO, 45; 2CBP, 18; 2BQA, 10; 2BFC, 1; 2BWM, 20; 2QS, 11; 2CYQ, 15; 2ZB, 22; 2CYW, 16; 2CTS, 7; 2AYN, 18; 2CVV, 12; 2CRW, 25; 2CQZ, 6; 2CFB, 21; 2BQC, 8; 2BXY, 21; 2AGO, 132; 3BLZ, 16; 3CS, 34; 2CYV, 21; 2BMS, 48; 2CXL, 175; 2BGL, 37; 2BBN, 25; 2AJF, 27; 2ATE, 40; 2AGB, 125; 2BKJ, 2; 2CJX, 341; 2CRC, 45; 2CRD, 15; 2ADU, 17; 2AEW, 11; 2CRO, 20; 2AZL, 19; 2CYV, 127; 2AHY, 17; 3BEL, 26; 3BWJ, 42; 2CGK, 8; 3EH, 10; 3BAY, 60.

MARYLAND—Two Baltimore stations handed in reports. 3PH has been reported from the west coast. 3WF, 3LG and 3TE have been reported in England. 3AJD still reaches the west coast. 3ZD (3APT) has gone on a southern business trip, but maintains schedules with 8IJ, 4AB, and Can. 3NF. The following Baltimore stations are also active in DX: 3MF, 3DQ, 3TE, 3BMO, 3AEK, 3CJU, 3CJW, 3UZ, 3BCK, 3CHB, 3FK, 3GL, and 3LL. 3TE is now 3XAQ on 110 meters. 3APV has worked west coast and been heard in England on a 5-watter. Traffic: 3ZD-3APT, 32; 3HG, 4; 3APV, 48.

DISTRICT OF COLUMBIA—Most of the Washington stations were put out of commission in a recent snow storm. Only two or three stations remained intact and they did their best to keep Washington open for traffic. 3BSB immediately erected a temporary antenna and kept things moving as well as possible. It takes a little "ambush" to do things like that.

3SU is apparently, out of the game for good. 3TY promises to be one of our most reliable. A 50-watter is being installed to replace the 10 formerly used. 3LR is back on the job with 50 to 100 watts and is heard consistently. 3HS can always be depended upon to be somewhere close at hand when needed. 3AB is singing to the tune of "in again, out again, off again, Finnegan," antenna down again; won't be back again until spring. 3IW had half his mast come down in the storm but put up the antenna on the other half and is getting out in spite of the handicap. Traffic: 3AB, 110.

EASTERN PENNA.—Dist. No. 1: 3HH is working sixes faster than he can log 'em. (Keep up the good work, OM.) 3GC heard in New Zealand, FB. 3AKR is on Tuesday and Thursday mornings 3 to 5 A.M.

Dist. No. 2: 3CTZ wants to know how he can move a Mountain. He claims nothing comes in from that direction. 3TS is heard in most all states. 3BNU is using the new 203A tubes. (How many, OM?)

Dist. No. 4: 3AUV continues to reach out and is doing wonderful DX work. 3MB has worked the Pacific coast and England and was heard in Holland. 3BJ worked every district in one night, including Canada and England. 3BDI and 3CBL are working everything in sight.

Dist. No. 5: 3CCU is on every morning and works all U.S. districts. 3BVA is quarantined and the transmitter is working full blast. 3BBV is erecting a 65 foot pole and was off most of the month. 3CCX works west coast frequently.

Dist. No. 6: 8BQ's cage came down and got tangled up with the roof. A new one is to be erected.

PHILADELPHIA—This city is totally dead as far as traffic reports are concerned. New traffic officers will be appointed unless better cooperation is forthcoming. 3FS is the only faithful reporter and he failed to receive the reports from stations in his district.

Traffic: 3CG, 28; 3AEN, 41; 3HH, 163; 3ZM, 17; 3BNU, 54; 3BAQ, 2; 3CJN, 41; 3MQ, 1; 3TS, 7; 3YO, 15; 3BLP, 234; 3ZO, 318; 3AUV, 29; Reading, 117; 3CCU, 149; 3BRF, 53; 3CCX, 16; 3BBV, 2; 8BQ, 19.

WESTERN PENNA.—3DY has been away for the month. 3AOX has been doing good work on low power. 8AKI reports every message delivered during the month. 8BW operated but little—QRW school. 8QD lost an antenna and is using short waves now. 8VN, using capacity coupled antenna is reaching out

much better, working sixes and sevens. 8ASB is no more—new QRA Chicago. 8GDC works sixes regularly and Wisconsin, Massachusetts, and District of Columbia in daylight. 8CIX is on the job as usual. 8VE is being changed and will be back on the air soon. 8CKO was the leader in traffic handling. 8AGO did some good fone work when he was heard at 7SW in daylight. 8CVX lost part of a mast but is back on the job as good as ever. 8AIG has power QRM, but managed to work a couple of sixes thru it. 8BHJ seems to be out of the running—all of his tubes went west. 8CEJ boasts a 12 hour message service—more stations could follow this example with profit. 8DHW with a lone 5'er took part in a relay from 1CXQ to 6BV and returned the answer in 45 minutes. 8BED has nothing new to say. 8AYW expects to change his QRA and hope to get out better. 8PX is riggin' up a super for reception. He lost a mast in the recent storm, but is working again OK. 8ADS is building a 100 watter. 8BYI gets out FB with his 50 watter—worked 5AMH in dalite. All stations in Vandergrift seem to be dead according to 8HY. 8KQ is a new station helping out 8BRB. 8DKI with his 5'er sure gets DX but not much traffic. 8DKI, 8BIL, and 8CON probably will consolidate and have one real station before long. According to word from 8BJV, all stations in District No. 14 were hit hard by the recent storm.

Traffic: 8ADS, 22; 8CKO, 255; 8BYI, 56; 8AGO, 59; 8DKI, 14; 8CVX, 35; 8AIG, 30; 8BHJ, 26; 8CEJ, 25; 8DHW, 24; 8AOX, 170; 8AKI, 13; 8BW, 21; 8QD, 9; 8VE, 111; 8VN, 5; 8GDC, 10; 8CIX, 30; 8ARB, 2; DAH, 12; 8ARX, 11; 8CTF, 5.

CENTRAL DIVISION R. H. G. Mathews, Mgr.

Altho the message totals are not to be compared with those of last year the number of stations in active operation is greater than ever before and the organization is functioning in fine shape.

Indiana is coming to the front with plans for a convention which will be the first ever held in that state.

Berman, of 9CA, is running another district convention at Dwight, Ill. and D.S. Wilson at Kalamazoo, Mich. has announced the same thing for his district.

There are murmurs of an Ohio convention. From things in general it would appear that this was a fall instead of a spring month.

KENTUCKY—Dist. No. 1: 9OX has combined his station with 9WU and both ops are on the air regularly. A 100 ft. tower is being erected. 9ARU leads the whole state in amount of traffic handled. He is working the west coast without difficulty using three 5 watt tubes. Ex-9DK is back with us again as 9DYC with two 5-watters. 9DTT is doing good consistent work and has worked as far as 7MC. 9DJN, 9ELL and 9BAZ are doing good consistent work. 9CON is on the air with one 5-watter but handles as much traffic as most 100 watt stations.

Dist. No. 2: 9APS works the sixth and seventh districts most every night. 9DIA has just opened up with two 5-watters and is getting out fine. 9BOO is going to put in a new installation from power lines to aerial. 9UZ, using only 1 5-watter has received two reports of being heard in England. 9VZ and 9AWF are on occasionally. 9BCE is working great DX with a 20-watter. 9EP is handling quite a bit of traffic. 9LH is remodeling his set. 9ASE is not on the air much—too busy at school. 9EI can be heard most any night after 10:30.

Traffic: 9ARU, 83; 9ELL, 53; 9WU, 41; 9APS, 41; 9DTT, 35; 9EPZ, 26; 9BAZ, 25; 9EL, 22; 9DIA, 8.

NORTHERN INDIANA—Dist. No. 1: 9APD is putting in 50 watts. 9CUS has been going fine. 9DJZ says messages are dear around there. 9CLN is building almost a broadcasting outfit.

Dist. No. 2: 9DYT takes the honor this month with 114 messages. He is using 2 5-watters and has worked the west coast ten times in fifteen days. He is using the low waves for traffic west and is 9RV. 9MM reports that messages are hard to get. 9BON is working into So. Dakota in daylight. 9DHI is still using a quarter k.w. spark and has a regular schedule with 9AOR. He moves all traffic within 48 hours. 9YB has not been doing much. Too much school work. 9DWA is doing the bulk of relay work in this section.

SOUTHERN INDIANA—Dist. No. 3: 9ARR is very inactive. 9BRK seems to be making up for the inactivity of some of the other stations, however. 9EAD has the Indianapolis Radio Club broadcasting station in full operation and is broadcasting on regular schedule now. 9TA was heard in England. 9TG is going to put in two 50's. 9VC has been doing fine work during the last three months. It finally

got him down, however, and he went back to his old job of steering a Pennsylvania locomotive. 9AXH has improved his fist and no station is too fast for him. 9AUD now has the largest tube graveyard in the city. 9BQW either has lost his interest in the women or the car as he blossomed out and is still going strong. 9EP moved to Indianapolis. 9B1W twists the crank on a moving picture machine until eleven and then hunts DX with his 10-watter the rest of the night.

Traffic: 9DYT, 114; 9CUS, 73; 9MM, 34; 9BON, 29; 9AFY, 21; 9AZX, 17; 9DRS, 13; 9APD, 11; 9YB, 4; 9DJL, 4; 9CHV, 1; 9BRK, 183; 9ARP, 84; 9ALP, 41; 9BVZ, 41; 9BCC, 40; 9EAD, 37; 9BGW, 8; 9CYQ, 8.

MICHIGAN—Dist. No. 1: 8BXA deserves much credit for his work as C.M. of Ann Arbor. 8ZH has resigned as A.D.P.M. It was either the Relay game or the publicity game, the key wins, can't leave the Traffic Dept. guess it is a germ, D.S., and Wouff Hong correspondence furnishes plenty of work.

Dist. No. 2: 8CED finds it impossible to keep a tube, if he can't burn 'em out he drops them on the sidewalk. Tuff luck.

Dist. No. 3: 8CZD is working a 50-watter with good results. 8CZZ has lost his hold on DX records. 8CPY-8DKC handled lots of real msgs. 8BGQ and 8CPY had a wrestle with the R.I. but came out on the top with their new licenses. 8CGM has been in bed following an operation. 8ZAG resigned as C.M. of Grand Rapids because of too little time for the office. 8BGQ is the new C.M. of Grand Rapids. Plans were laid for a convention of all the hams in District No. 3 of Michigan to be held all day Saturday, May 17th. Big feed and everything. Send in reservations early.

Dist. No. 4: 9CE, 9DRR and 9CWI report, FB!
Traffic: 8CPY, 231; 8DCY, 111; 8DDT, 103; 8BWR, 76; 8CWX, 68; 8BNC, 60; 8CRV, 55; 8DCW, 44; 8CQG, 39; 8BQ, 38; 8AZG, 35; 8CDY, 34; 8AII, 38; 8CE, 32; 8BXA, 30; 8DIL, 28; 8NX, 27; 8BBI, 26; 8FC, 25; 8ZK, 25; 9DRR, 24; 8ZF, 23; 8CPD, 23; 8ZH, 21; 8CFQ, 19; 8ZZ, 16; 8CZ, 15; 8DGC, 13; 8ZT-8ATX, 10; 8JJ, 5; 8BFW, 4; 9CWI, 3; 8AMS, 3; 8AEJ, 2.

ILLINOIS—Dist. No. 1: 9CKF and 9DAY with 15-watters work every district. 9BUH is reported from New Zealand. 9DAP reports a transcontinental relay in one night. 9BJI figured in 3 of the same kind, none of which took over thirty minutes. 9LF now has a tube set and is knocking things cold. 9CGU is still QSO both coasts. 9BJI and 9DAP both report working several 6s and 7s. 9CTV is on with four 5's. S tubes puts 5 amps in the aerial. He worked both coasts the first week.

Dist. No. 5: 9AYX wants to know why there are no individual reports in QST. (Help to make 'em, OM, and you'll get 'em there.) 9PE reports being busy and little time for radio.

Dist. No. 7: 9EE uses one 50-watter and is getting out in fine shape. 9AIO, ex-9DSO, put up a new antenna and is getting out better than ever using 50 watts. 9ARF with his 5 (?) watter handled 12 on I.C.W. and expects to put in 300 watt MG next month. 9AA has been playing in an orchestra and has not had much time for radio. 9OU just started in the game and is on with a 5-watter. 9AZJ had two of those \$8.00 feelings last month so has not been on the air much. 9CAH is getting out in fine shape with his 50, having been reported in Australia. 9EHY is getting out in fine shape on a 10-watter. 9AOY has 2 ops now, JA being busy with his many jobs. 9CEK just got through remodelling his station. 9RC was only on the last week of the month having been busy hooking up the old 500 cycle MG from 9ZN with 250 watt tube. 9DKK is coming back on the air next month with the only 50 he has left. 9CLX has his 50-watter working. 9CVS blew two 50-watters. 9EDJ will soon be on with a 10-watter. 9BRE has a new aerial and is using two fifties. 9CKC and 9BEE have combined their stations. 9AMZ has dismantled the old spark. 9EDH has a new power line now and is on again with spark. 9COW and 9EEG have a schedule for handling school news between Proviso and Evanston. 9JO and 9AJJ have combined forces.

Traffic: 9CZL, 346; 9DAY, 165; 9CFK, 151; 9AUE, 100; 9BWO, 96; 9AWU, 89; 9AOY, 74; 9BUH, 60; 9AYX, 57; 9BDF, 55; 9DAP, 53; 9BE, 52; 9CA, 50; 9DWX, 48; 9AHQ, 46; 9ADW, 46; 9LE, 45; 9EIB, 43; 9DXL, 38; 9COL, 37; 9AAU, 37; 9AIC, 32; 9RC, 30; 9EEG, 30; 9AIO, 28; 9ASD, 26; 9BZ, 25; 9DGA, 24; 9BJI, 24; 9CTT, 23; 9BRE, 24; 9CXH, 24; 9BXH, 18; 9ED, 18; 9OU, 15; 9BQW, 14; 9CGV, 13; 9ARF, 12; 9BWP, 12; 9AP, 12; 9CFD, 11; 9AMZ, 11; 9BCR, 10; 9AXT, 9; 9EHY, 9; 9PE, 9; 9BXD, 8; 9DQN, 8;

9CVS, 8; 9CLJ, 6; 9AZJ, 6; 9CAH, 6; 9GLX, 6; 9DXP, 6; 9ARM, 5; 9CZ, 17; 9CEK, 5; 9BTA, 4; 9VK, 4; 9DHQ, 3; 9AER, 2; 9BZQ, 2.

OHIO—Dist. No. 1: 8CCI is working every night after midnight and has a schedule with 6BUR, 8AVN still working Ohio on his spark, making lots of QRM for everybody.

Dist. No. 3: 8BHN sigs heard in England (50 watts). 8BKM purchased his tenth 5-watter and is on again. 8KG burned out his generator and reports unusual trouble with BCLs. 8BWB cops the cat's whiskers this month, working 750 miles with one watt input, he has been getting good results with full power on his 50 watter, also. 8BVR is rebuilding. 8RJ and 8CUX are still burning out the west coast receivers with their heavy sigs. 8ARD is working out F.B. 8AJE is heard working occasionally and is doing good. 8BFY is still using spark. 8BK is back after a year's absence. 8ADA has another 50-watter and has worked the west coast on 150 meters. 8JY is using a 100-watter until his 500 watt tube is fixed. 8BF and 8CUQ (consolidated into 8BF). 8CYU is back on the air with a 50-watter. 8CUR is pounding brass at 8BVR during the time when there is no school QRM. 8BBY, the spark fiend, put in C.W. His DX has increased considerably. 8BVT is doing great DX on his 50-watter and also has a very fine note. 8LQ on spark is 8ZI on C.W.

Dist. No. 4: 8ALW is going to put in a 100-watter. 8CWR, new C.M. of Dayton, is right on the job. 8DC is back on the air again. 8CBX gets on occasionally and does good work. 8CVM has dropped to a lower wave and is getting out better.

Dist. No. 5: 8PI reports working sixes and sevens but not much traffic to QSR. 8BBH is on the air again wanting schedules with 1st, 2nd, 3rd, and 9th district stations who will come to his rescue. 8BYN was star station with total of 494 messages and reported off Cape Horn S. American and working west coast station often.

Traffic: 8BYN, 494; 8CQP, 135; 8CCI, 102; 8CNL, 102; 8BNH, 74; 8PL, 56; 8ZC, 54; 8AIW, 48; 8CZT, 43; 8RN, 38; 8BKM, 36; 8AGP, 35; 8DKM, 30; 8BCF, 28; 8BBH, 22; 8CWR, 21; 8AA, 20; 8BZT, 18; 8CVH, 18; 8GD, 12; 8WY, 14; 8KG, 12; 8AWX, 6; 8MD, 6; 8BGV, 3; 8BNU, 2; 8AIB, 1; 8AVN, 52.

WISCONSIN—Conditions are improving through the entire state. This is due mostly to the unceasing efforts of the D.S.s who are all plugging to bring their district up to the top-notch of efficiency. 9BLF is the star brass-pounder for the state.

Dist. No. 1: 9HW re-opened this month and worked all districts. 9CVI, not going so strong this month on account of assisting at 9HW. 9ELV still shooting holes in the ether with his long 50.

Dist. No. 2: 9CCF, Madison, star station for this district, Madison is fast coming up to its proper place in League affairs. Under the guidance of its new C.M. things are certainly humming. The C.M. operates 9DKS. 9BIB has worked all districts on a 10-watter. Down in Beloit, 9CPE and 9EGW are the champ brass pounders. 9CET recently burnt out his generator and now has to use a 220 v motor 9AZA is back on the air with a 200 watter.

Dist. No. 3: 9AQQ is a new station at Marinette. 9CZY is on the air again signing 9CLG. 9CXY and 9AX are new stations at Sheboygan. 9DKO is reaching out fine and the same with 9CJI who has new sticks and added voltage. 9DLY is working them all using 1000 v on 5-watters. 9ADP and 9ASB are going strong at Appleton. 9DYD gives promise of being a good station—100-watter at Ripon. 9AGT is doing good. 9BQG is heard in all districts. 9BYJ, 9BVA and 9CIU hand in a good total from Amherst. 9DCT hits both coasts with a 10-watter.

Dist. No. 4: 9BLF leads in traffic. He sacrificed a good 5-watter to do it and advertised in order to secure messages. 9AZN changed his antenna from 4 wire flat top to 8 inch cage with much better results. 9AKY is doing fine work with one 50 on 60 cycles. 9CFX is new O.R.S. at Baraboo. 9ALI and 9ELL came across but are not on regularly. 9DST and 9BSO are getting out on a 5-watter. 9BXE has been doing exceptionally good work on 114 meters working Atlantic coast in daylight—self rectifier circuit.

Dist. No. 5: 9BTH has been experimenting with phone. 9DPR is on regularly and is handling traffic in great shape.

9CYG has been working the east coast and the Gulf coast, also way-points with only a pair of 5 watters. 9GD has been off the air for a couple of weeks account of rebuilding the transmitter.

Traffic: Dist. No. 1—450. Dist. No. 2—618. Dist. No. 3—541. Dist. No. 5—743.

DAKOTA DIVISION
N. H. Jensen, Mgr.

Get this Gang! A Dakota Division station copped the 1923 Hoover Cup, which was awarded to 9ZT by the Department of Commerce for having the best amateur station in the United States. Hats off to D. C. (Direct Current) Wallace, Assistant Division Manager of Minneapolis. Wouldn't it be great if the Dakota could land it again next year.

The D.M. is making an effort to still improve our division organization. We have a good one now, but there is always room for improvement. Several additional city managers have been appointed. Any D.S. who fails to do his work properly will be replaced.

Daylight traffic handling is becoming very popular. MINNESOTA—Dist. No. 1: 9EGU was on the job consistently as is shown by his traffic figure. All of the stations have shown a decided improvement over last month as is shown by the traffic report. Friend Gjelhaug, 9ZC, finally came thru with a report, and while not so very strong, nevertheless it shows signs of life up north after a hard winter. John says he had to send and receive his messages by dog team because they persisted in freezing onto his lead-in and could not get them to the aerial, and then to the outside world. 9EAU had some hard luck when someone left a large valve open that feeds the Chisholm High School swimming tank and flooded the radio room with more than two feet of water. Things are gradually drying out at the station. Albin Lofback has been appointed C.M. of Virginia. 9DOE continues to do good work.

Dist. No. 2: The Redwood Falls gang have made their appearance with four stations: 9SF, 9BF0, 9BFU and 9BVS. 9AXS is down on the low waves and is working the Pacific Coast with a 5 watt battery C.W. Fairmont and Waseca hams report trouble with B.C.L.s. 9CDEH says "The B.C.L.s are trying to start action through one of the local lawyers to stop our sending between 6:00 P.M. and 2:00 A.M. We haven't come across yet as we do not see where we come in on it. They say they will go to the Supreme Court if we don't sign and make ourselves liable to a fine of \$100.00 if we should send within these hours." Fairmont is in a similar predicament, and 9DSW says "B.C.L.s here have retained a lawyer and are going to see what they can do." We also have and are going to fight. Believe we can get them on using sets built here which are infringements on certain patents. "Watch our smoke." 9DCH appears to be very busy. 9BAB worked all districts in a single night with a 15 watt. 9DSW is getting ready to graduate so must QRX for a time. 9DDP is working everybody on the low waves. 9CPO has blown two fivers and a filament transformer, but with replacements and a new 100-foot mast, expects to be QSO soon. 9DYR is on as regularly as ever and doing their best to work DX and keep an even level of traffic. Their signals have been reported twice from New Zealand. 9DAX using one 5 watt tube with 500 volts R.A.C., radiating 1.3 amps, was reported by French 8CS.

Dist. No. 3: 9BTL works on 150 meters, but is attending the University and hasn't much time for radio work. 9ZG has 550 volts battery D.C., but wave is too sharp to raise anyone, so is abandoning master-oscillator for straight loose coupled circuit. 9AUS and 9DGW have been assigned new calls. The former is 9GZ and the latter 9FH. 9BPN is still handling the biggest share of St. Paul traffic and is thinking of more power, as also is 9BDQ. Most stations in St. Paul are lowering their wavelength and working out much better. 9BLY has been doing some very good work and it is understood that his signals have been heard across both oceans. 9BQJ blew a 50-watt and now works into the Sixth District on a pair of 201A's.

Traffic: 9GZ, 11; 9BQY, 20; 9DPX, 62; 9ZG, 21; 9AGB, 67; 9APE, 25; 9BMX, 33; 9AXX, 27; 9DZF, 64; 9DEV, 90; 9BPN, 234; 9CRW, 51; 9AWV, 172; 9BQJ, 162; 9CJSJ, 103; 9BLY, 10; 9BIS, 40; 9BTL, 35; 9CXP, 114; 9ZT, 64; 9BFL, 209; 9BEP, 20; 9CPM, 140; 9BQQ, 90; 9CSJ, 140; 9AEV, 1; 9EGU, 416; DOE, 345; 9CDV, 222; 9BAV, 168; 9BMR, 156; 9CO, 110; 9EGF, 64; 9EFP, 58; 9EAU, 32; 9DXT, 26; 9ZC, 12; 9DYR, 68; 9CAJ, 22; 9ANJ, 23; 9DCH, 55; 9COF, 14; 9EGG, 6; 9CPO, 30; 9DSW, 29; 9DJW, 25; 9BNF, 27; 9DDP, 25; 9AXS, 51; 9SF, 2; 9MB, 36.

NORTH DAKOTA—Dist. No. 1: It has been found that the daylight route in this district is the best traffic mover. A large share of the messages reported were handled in daylight. We regret to report the dismantling of 9DLI, a station that has done its part to keep this district on the map. The owner is going to leave the state. 9AEJ is

doing excellent daylight work and is handling all traffic in this manner. 9CSI is getting best results from daylight work and reports good DX. The return of 9DKB to Fargo from Minot gives us another good station. His outfit is already on the air at the new location and we hope he will be able to keep his record for work with WNP. The fone hath greater charms for 9AUU, but he is working them far and near with equal success. There is but one C.W. man left in Aneta, 9AMP, but he is holding his own as the report shows. 9DNX has been in the game only a few months, but he is a comer.

Dist. No. 2: The removal of 9DKB back to Fargo leaves this district without a superintendent. 9ACK has been fairly active, but has had the misfortune of burning out his last good fifty watt and now talks of a 250-watt. He is practically the only outlet for western traffic. 9DM, a new station in Jamestown, is just starting to bust loose. Traffic: 9AEJ, 50; 9AMP, 112; 9CSI, 83; 9DNX, 66; 9EBT, 55; 9DM, 8; 9ACK, 58.

SOUTH DAKOTA—Dist. No. 1: The traffic total of 300 messages does not seem much as compared to the same time last year, but a much greater percent of messages are being delivered and the rubber stamp kind which were so prevalent at this time last year are practically all gone. 9DKQ has been appointed C.M. of Sioux Falls and his station is reaching out fine with his new D.C. transmitter. Other stations in Sioux Falls doing good work are 9BCG, 9AYD and 9BNH. 9BG reports traffic rather light because they blew their last 50-watt. 9CKT is still on the job even though he is bothered with school QRM. 9BOF is doing very consistent work and has been reported in London, England. 9CKA reports receiving a warning from the KKK not to transmit from 6:30 to 11:30 P.M. Hi.

Dist. No. 2: This month 9AHT-9TM handled the most traffic. They have been doing very good work. 9DWN works both coasts and is trying some of the 3:00 A.M. stuff. Has worked 800 miles on loop fone. 9AGL's latest DX is 5AKP in Texas worked with fone 1½ hours after sunrise, using a ten watt loop fone. 9CJS has been doing good work the past month. The first report was received this month from 9DEC. He has a ten watt using Colpitts circuit. Radiates 2.4 TCA in antenna 26 feet long and 35 feet high, and reports very good DX, having been heard on both coasts. 9BRI has heard British 2YT. 9CGA has been appointed C.M. of Huron and 9DUI C.M. of Aberdeen. The latter city now has two active stations in 9DUI and 9BOR. 9NFM reports working west coast station on an amplifier tube. 9AVZ thinks he will cut some of the YL's and get on the job again. Traffic: 9AYD, 5; 9BCG, 26; 9BNH, 25; 9DKQ, 41; 9BG, 60; 9BOF, 108; 9CKT, 35; 9AHT-9TM, 158; 9DWN, 75; 9AGL, 62; 9CJS, 50; 9DEC, 9.

DELTA DIVISION
W. W. Rodgers, Mgr.

The honors for handling the highest number of messages go to 5AMH. 5KR is a very close second. (Good work, fellows—D.M.) Traffic in the Division holds up very good in spite of the almost total disappearance of the cursed rubber-stamp stuff and credit is extended to the stations who have cooperated with us in erasing this blot from the record of our traffic.

Since the inauguration of our new system for handling the station reports, the A.D.M.s and D.S.s with a few exceptions, have reached the conclusion that we do not need them in our scheme of things, and they are not supposed to work any more. Get this—we expect a report from every one of you every month, regardless of what you have to say. The stations cannot tell me what you are doing—that is your job and I expect you to fulfill these requirements. This is a gentle warning, but I crave action! Now for the kernel of the nut—the reports.

ARKANSAS—5AAC reports 53 messages. 5BI uses a "J" tube with a low plate voltage and phone. 5EA is having C.W. trouble on the new set. 5RO past 20 last month. 5ANW uses a 5-watt with DX to New York. 5DQ complains that less than 10% of the stations answer him when he calls on 150 meters with 5 amperes. (OM, their tuners won't go that low—D.M.)

MISSISSIPPI—5AIR, C.W. always, spark, never, has been rebuilding. 5AIR will be QSO when he gets another 50-watt. 5AGS has worked Cuban 2BY recently. 5AKP has been off considerably. 5AGV wouldn't report the rubber stamps he handled.

5AGV threatens to step on the gas next month. 5KR has 98 to his credit, and says things are dead down his way! (Wonder how many he would move if times were alive—D.M.)

LOUISIANA—A good spirit of cooperation on the part of the C.M. of Shreveport, saved 5KC from being the only station to report. Bateman reported directly to division headquarters. 5ZS is away on a lake trip north of Shreveport and plans to experiment all summer with a boat transmitter. 5ANC is a new license, the proud owner being Mr. Bradford Hearn, the guy who is putting over the Fifth District Convention with others. 5WV has done nothing at his station, but is assisting 5ANC with his station. 5BB is down for good. 5KC persists in working all districts in one night.

TENNESSEE—5ALV uses a 15-watter. 5ZB is trying hard to get his license back and we hope he will succeed. 5SY will rebuild soon. ND, now, 5PV is working with super-regeneration now with some success; his transmitter is of course being neglected while this deep stuff is being carried out. 5PF had a 50 flash over. R.C.A. won't make it good, so he says he is through till next winter. 5ANT has been made into a Reibertz station and has been experimenting considerably. 5AMF has been appointed Official Broadcasting station and is sending out good live news every Saturday and Sunday nights. Copy this dope and you won't be so impatient for QST to come out. Maryville: Mr. J. T. Underwood has been appointed C. M. here.

Get this everybody, **FIFTH DISTRICT'S FIRST CONVENTION WILL BE HELD IN SHREVEPORT IN OCTOBER OF THIS YEAR. LET'S GO!!!**

Traffic: 5AAC, 53; 5BI, 2; 5DQ, 31; 5ANW, 22; 5RO, 20; 5KC, 70; 5AIR, 20; 5AGS, 22; 5AKP, 19; 5AGV, 15; 5KR, 98; 5ALV, 62; 5AMF, 92; 5KA, 12; 5ANT, 36; 5AME, 109.

EAST GULF DIVISION

H. L. Reid, Mgr.

ALABAMA—Traffic has taken a decided slump this month due to the fact that all the operators seem to be getting their sets down as low as possible.

Dist. No. 1: 5AMH easily leads the list with 109 mgs. The out-of-town station is 5KQ, which has not been very busy because of the activities of the station owners along other lines and also because of B.C.L. complaints.

Dist. No. 2: Is almost out of the running—only one station reporting.

Dist. No. 3: 5CQ takes the lead with 63. 5UT, with out- $\frac{1}{2}$ T2 has worked 146 $\frac{2}{3}$ miles per dollar.

Dist. No. 4: 5XA is busy and 5GP and is on practically every night. 5VC and 5QP have been the star stations in this section this month. 5QP assisted 5VC in attempting to establish radio communication with Birmingham during the heaviest snow that Gadsden has seen in years. 5HM reports QRM from school so all in radio.

FLORIDA—Dist. No. 1: 4FS conducts a code class for the B.C.L.s and 12 are learning rapidly and are building transmitters. 4PK is one of our best stations. 4FS, 4SB, 4HZ, work a three cornered relay every noon, between Jax, St. Augustine and Gainesville. 4ER leads the district with 144 mgs. 4EZ has built a 65 foot tower and his 10-watter is copied regularly in Oregon. 4XE is conducting extensive experiments with antennas. His transmitter gets out great on 60 meters and his receiver gets down there also. He has worked Holland and France and has been reported by five British stations. 4BA has put up a 70 ft. mast and works Pacific Coast. 4IT is a new 10-watter. 4LS gets out well with his 10-watter. 4KW steps out great. 4KK is beginning to reach out with his fiveer. A station has been installed on the U.S. Dredge Mallory and other Dredges throughout the state are being equipped. Jax amateurs are QSO with the Mallory and are QSRing between the Dredge and the U.S. Engineers' office in Jax. 4SB handles the tourist traffic in fine style. He is still keeping a schedule with Porto Rico, his 15-watter is heard consistently on the west coast, and he works New York easily on fone. 4HZ has moved his station to Gainesville for the season and he and 4OH both reach out consistently. 4MS has replaced his $\frac{1}{2}$ K.W. spark with 1 K.W.

Dist. No. 2: 3OI of Sarasota again walks away with the highest honors. We are sorry we can't have Mr. Beale the year around but pride ourselves in the fact that he knows the right place to spend the winter. 4II still keeps daily schedules with Jax. He lowered his wave again and comes in much better. 4BL has finally put in C.W. but still relies mostly on spark. 4JZ comes in frequently and is QSO Cuba. 4IZ lowered his wave and got 16 reports from the west coast the first week. He is now rebuilding his

transmitter. 4LR built a Neutrodyne for a B.C.L. and bought a 50-watter with the proceeds and is now trying to burn the B.C.L. out with it. 4PU pounds out when he is on but commercial work takes most of his time.

Dist. No. 3: 4IH is the only active station in this district.

Dist. No. 4: 4QY is one of the best in the state. His 10-watter is copied regularly on the west coast. 4PY is rebuilding for the Pan-American Tests. 4HX has returned to 2BYC. 4DP is QSO Jax in daylight. 4BH gets out well. 4CH, spark, still consistently QSO with Jax and makes some of the C.W.'s look sick.

SOUTH CAROLINA—Everyone feels the loss of 4JK as A.D.M. and we are sorry he has left the game. 4SH has been heard in Holland and 4LA in Italy. 4PV is still at college. 4DH will open up in the lower part of the state. 4HW was unable to be on this month. 4RR works the west coast regularly.

PORTO RICO—4JE and 4OI are the only stations in Porto Rico, working the mainland. 4BJ and 4KY are doing a little local traffic work. There are no amateur stations outside of San Juan at present ready to do any inland relaying and delivery of mgs. from the U.S. has to be done by mail. Porto Rican amateurs are eager for the arrival of the Pan-American Tests.

GEORGIA—C. B. Transou has resigned as A.D.M. and has been succeeded by J. M. Keith, 4RH, of Atlanta, Ga. 4DB is as steady and as reliable a station as we have. The Atlanta stations are doing nice work most of this being done by 4XC, and 4BQ-4EH. 4KU is out temporarily due to some changes that are being worked out. 4EB is operating an experimental station under the call of 4XU, the same being true of 4ZA which is now 4XS. 4KU is also signing 4XW on 180 meters.

Dist. No. 2: 4DT and 4JD at LaGrange, have not been on this month. 4JD has just succeeded in getting his 5-watter to radiate. 4ZD has purchased 4GL and is handling traffic both north and south. We are sorry to hear that 4EL and 4GL are quitting the game. Georgia is losing a most prominent amateur and pioneer in 4GL and we understand he is moving to Chicago. 4BY is on the air on 110 meters as 4XR and has been handling traffic with European stations. 4DV is now on with a 15-watter. Some of us have already worked WZY who has now opened up as 4TF with a 50-watter D.C.C.W. There is a good station in the southern part of the state which is 4PL using a 15-watter and who will be on week-ends. 4BW has done some fine work this month. 4LG has done some splendid daylight work with a 5-watter. 4FZ is doing good work on a 15-watter having worked Texas and Missouri on fone and has a daylight fone schedule with 4SSB. 4AY is going to open up with a 20-watter soon.

CUBA—Cuba has been taken into the East Gulf Division and is being supervised of R. A. Torom at Havana. Watch this division grow.
Traffic: 3OI, 22; 4ER, 144; 4EZ, 66; 4IU, 27; 4BA, 27; 4OH, 25; 4SD, 30; 4II, 20; 4OY, 18; 4JZ, 20; 4LR, 4; 4DP, 2; 4BL, 2; 4FS, 1E; 4LS, 20; 4PK, 20; 4SH, 30; 4RR, 85; 4IO, 63; 4XC, 110; 4EQ, 95; 4RH, 12; 4KU, 5; 4CS, 5; 4ZA, 7; 4HS, 42; 4AZ, 8; 4SN, 10; 4EH, 12; 4GZ, 17; 5AMH, 109; 5ADS, 35; 5FB, 1; 5FU, 29; 5MI, 40; 5VV, 46; 5KQ, 20; 4DF, 23; 4BW, 4; 4FZ, 89; 4ZD, 25; 4IO, 22; 4HS, 17; 4BL, 11; 4CH, 17.

MIDWEST DIVISION

P. H. Quinby, Mgr.

Wish to express my humble appreciation of the fact that the fellows of the Midwest Division hold sufficient esteem for me to make me the manager of their Division, to replace a man who has made a record for himself unparalleled in the history of the Division, and a place for himself in the hearts of all his fellow amateurs. The Division comes to me in splendid shape. The fellows all have the genuine spirit of the A.R.R.L., and of the Ole' Midwest thoroughly inoculated into their systems. The organization in several states is working efficiently as is evidenced by the fact that I have at hand a traffic report from every A.D.M. in the Division. This is not the sort of thing that springs up over night. It is the result of long and earnest effort on the part of your late D.M., and am sure we all hate to lose him. And now, fellows, let's all RISE and give George Turner THREE ROUSING CHEERS!!

Now remember this, fellows, the D.M. is your servant, not your master. It is his duty to fulfill your needs, and get for you what you want, in making a

bigger and better League. If he is a little slow at first, give him time. The work is new and overwhelming. Allow him to get squared away and he'll give you his very best.

All he asks at present is cooperation. But that means a multitude of things. Cooperation on the air, in handling traffic in such a way as to do credit to yourself, in permitting others to handle their traffic with a minimum of interference from you, in entering whole-heartedly into the various schedules planned by the League, and in obeying the law with a generous margin to go on. Cooperation in the department; in making out your reports properly; in getting them in the mails ON TIME; in making your officers sing in praises rather than forcing them to jog your memory; in answering correspondence promptly, and with a show of interest in the subject at hand; and in keeping the department thoroughly informed as to conditions and activities in your respective districts.

IOWA—9BCX leads the state, but is pressed hard by 9CHC and 9BGH. 9CS is the only active spark station left in the state. The route manager, 9BGH, has been doing excellent work, but alas, he resigns. 9CSB notes an absence of rubber stamp messages. 9BCX has been reported in London, England, using 10 watts (?) with battery plate supply. 9HK is off the air for a while. 9AXD was off the air last month, and 9BRS has sold his entire set and quit radio. 9FK has started up again. The C.M. of Des Moines says gang does not report. Come on, gang, let us know about the good work you are doing. Let's all get down and dig now, for a new O.R.S. certificate!

Traffic: 9CHN, 90; 9BCX, 180; 9DJA, 40; 9CSB, 55; 9FK, 55; 9DSL, 51; 9HK, 5; 9AXD, 10; 9CS, 71; 9CTD, 70; 9CHC, 169; 9BSH, 166; 9ATN, 34.

KANSAS—9BVN leads the state. Next in line is 9CEA. The gang came through in fine shape. We want to congratulate those stations reporting who are not O.R.S. You are certainly making the gang hump and we are lining you up for the new O.R.S. appointments. The D.S. (9CCV) has moved, so send your reports to him at 222 E. 6th St., Concordia, Kansas. He is now busy getting his station on the air again. 9AHG has a 600 volt Edison storage battery which is the envy of the gang. 9AOG is QRT now, but we wager it will not be for long—A.D.M. 9CCS raises an awful howl about the small number of messages moving. Too much DX for a large amount of traffic. 9AVG was getting out fine on a 10-watter until his transformer had a "stroke." 9AYP couldn't persuade a fiver to eat 1500 healthy volts, so has decided on a 50 for next Fall. 9EFU has come to the same conclusion, and in the meanwhile is hurting his ears copying French 8AB. 9DEA and 9EJC are making the little tubes hit the trail and 9CFI, 9A1M and 9CCS are bringing home the bacon from all quarters. The gang at Hutchinson does not report. Come along, fellows, let us know what you are doing, be it little or big. Let's not allow district No. 1. to carry off all the msgs next month, either.

Traffic: 9CFI, 102; 9HN, 16; 9CEA, 148; 91W, 12; 9BVV, 168; 9DHB, 52; 9CKM, 35; 9CVT, 10; 9BJB, 8; 9BLB, 6; 9CCV, 25.

MISSOURI—The new A.D.M. for Missouri is L. B. Laizure, 8020 Mercier St., Kansas City, Mo. The D.S. for West Missouri District to replace Laizure has not been appointed yet, so all stations in this district will report to the A.D.M. until the new D.S. is appointed. No other changes in the personnel of this state are contemplated at present.

1577 messages handled during the month. 470 messages reported from St. Louis, although no report was sent in by the D.S. of district No. 1. (9DZY) (Where is it, OM?—D.M.) 1087 messages reported from Dist. No. 2, of which 597 come from Kansas City. Of the above total 1296 were on C.W. and 261 on spark. 9ST tops the list with 163. Next in line is 9ADC with 128. Both of these stations are C.W.

The St. Louis C.M. comes through with an excellent report. 9DMJ is not on much as he is pounding brass at 9MC. 9AAU worked Cuban ZBY right through 2KW QRM at the south end of the line. Other consistent stations reporting are 9EKY, 9BLG, 9CVO and 9ACL. Schoening's code class which was started last month is going great. Members can now take traffic from 15 to 18 words a minute. (FB, OM.)

The Kansas City transmitters have formed a separate division of the Radio Club of Greater Kansas City and are meeting at the Manual Training High School. The club held its annual banquet on the 13th and had some guests of note from Chicago. 9BKO built a low-loss tuner and copies French 8AB right off the bat. 9AYL reports working all districts in one hour, 55 minutes. 9ACX has been doing some good work on C.W. 9CRM, 9RR, 9BZH, 9DAE and

9CXM are all doing good work on spark. They make life miserable for the nighthawks in their respective vicinities. 9BZH went to sea on the 15th and promised to keep an ear out for the Midwest gang. 9CYM, 9CHJ, 9ADC and 9DZO are doing excellent work on C.W. Many of the fellows are working on early morning schedules. After the "worms" (?) 9AJD reports working GIP at 6:30 A.M. on a 10-watter, and 9DIX is doing reliable work on the same power.

Traffic: 9ABR, 4; 9ACX, 38; 9AHZ, 48; 9AVN, 12; 9AYL, 34; 9BDZ, 39; 9BKO, 30; 9BSI, 48; 9CDO, 9; 9COI, 20; 9CXO, 4; 9IB, 12; 9DJB, 2; 9ELZ, 22; 9FM, 26; 9RR, 42; 9SS, 23; 9ST, 163; 9DWW, 6; 9BOZ, 10; 9BLG, 80; 9DMJ, 55; 9AAU, 98; 9DXN, 50; 9PW, 10; 9EKY, 77; 9CCW, 23; 9CVO, 32; 9DR, 20; 9BHI, 20.

NEBRASKA—The A.D.M. has resigned and a new one will be announced in the near future. In the meanwhile report to your D.S. or C.M. as usual. 9ANY takes the prizes for the month. He also reports working Cuban 2WW on 1 5-watt tube. Other reliable stations are 9ATE, 9BNU, 9AFA, 9DJP, 9CCS, 9CMK, 9ATC and 9EHW. 9DXY is seldom on during the week, but always all night Saturday and usually late Sunday. The new circuit is reported FB everywhere. 9CJT and 9HG are starting up again. 9AQK has been one of our best stations, but is being dismantled. He is moving to Kansas. 9EGA has joined the ranks of the experimenters and is doing good work along this line. The R.L. recently visited Omaha and checked up a number of wavelengths. KDEF has been working the amateurs all over the country in the early morning hours on I.C.W. The Central High School station (9XAR) will soon be regularly on the air and QRV for traffic. 9EGA completed his new low-loss tuner, and has heard British 2OD, 2GD, 2KF, French 8AE, and Dutch PA9.

Traffic: 9ATE, 13; 9ANY, 102; 9BNU, 73; 9AFA, 16; 9DJP, 7.

NEW ENGLAND DIVISION I. Vermilya, Mgr.

MASSACHUSETTS—This state still continues to be a leader in key activities. The state is larger of course, but is more active per station.

1SK and 1CPI seem to be the leaders in eastern Massachusetts as far as message totals go. 1CJR has been busy remodelling his station. Many amateurs lost their antennas during the two severe storms of the past month. 1LK has done some fine work on 154 meters. 1AAC has worked British 5KO and 2KF, besides fifty 9's and 5's, all on one lone 5-watter. He has also been assigned the call 1ZO. 1CIT is working 5's consistently on 155 and has also worked 6AVV. 1BNT is doing some very fine work. 1CPI has probably handled the biggest amount of messages for this month. 84 messages were delivered in person so as to make sure they got there. He also gave some valuable help in the last storm when the lines were down. 1BBM lost his antenna but he strung up a single wire antenna and proceeded to work the 8th district. He stood by during the storm for SOS signals via the amateur route. 1CMP has worked 12 European stations and 22 sixth district stations. He has been in communication with all districts three nights in succession. Now, there's some record to shoot at. 9CEU in Hawaii and 4AA in Australia have been heard at 1CMP. 1SE has installed a Telefunken 50-watter.

WESTERN MASSACHUSETTS—First of all, we wish to congratulate Mr. McLean and his co-workers for the wonderful job they did with the First District Convention. It was the best arranged program that we have attended in all the conventions. The Worcester crowd also deserves great credit for the Wouff Hong initiation which they put on. Also the Independent Order of Yellow Dog which Bates and his crowd put on so well. Miss Daniels certainly did a great job in keeping everything in order and it was easy to see that she was the popular lady there. About seven OMs danced each dance with her, and we'll tell the world she can dance!

1CPN has copied English, French and Dutch stations quite regularly. 1BKQ has a new call, 1ZP. 1BCR got a 250 watter and promptly worked 2KF and 2OD, British. 1AAL, a new station is working over 100 miles consistently. 1AJK is a star of a different magnitude. He handled 12 messages as far as 15 miles using a W.D.11 tube and 6 volts on the plate.

Traffic: 1CPN, 301; 1YK, 125; 1BSZ, 119; 1BCR, 114; 1VU, 111; 1BOM, 104; 1XZ, 97; 1ABG, 76; 1IL, 62; 1ASU, 57; 1AGT, 55; 1AWW, 54; 1DB, 42; 1JV, 40; 1ASK, 30; 1LC, 27; 1AAL, 26; 1EO, 25; 1AFA, 24; 1CBH, 22; 1BKQ, 20; 1GY, 19; 1BPP,

15; 1ABL, 14; 1AJK, 12; 1AQM, 10; 1BSJ, 8; 1BVR, 5; 1MI, 5; 1ZP, 3; 1AJA, 32; 1PP, 30; 1AAC, 128; 1AGS, 34; 1SK, 160; 1CMP, 123; 1COC, 7; 1BBM, 26; 1LK, 23; 1AQY, 71; 1CJR, 87; 1AAT, 42; 1CIT, 55; 1CBJ, 27; 1OV, 24; 1AF-XJ, 135; 1CPL, 192; 1BNT, 40; 1BDU, 20; 1SE, 57; 1INT, 31; 1AHL, 19; 1ARL, 48; 1RR, 71; 1LM, 69; 1BCN, 7; 1AQI, 81.

CONNECTICUT—Dist. No. 1: 1IV is hearing European stations regularly. 1AJJ worked N-PA9 and logged a bunch of foreign calls. 1AVW has worked all districts but 6 and 7 on 150 meters using a 5-watter. 1BGC reports too much QRN at his station.

Dist. No. 3: No activities in Hartford this month. The D.S. and C.M. are having considerable trouble getting the gang to send in their reports. 1AVJ worked two sixes one morning using a 20-watter. We call that FB for this part of the country. 1AH works 'em all with only a 5-watter. 1XAM is still on 100 meters but has been testing with NKF noons on 20 meters. 1AYR is QSO "across" and makes an awful racket with a 100-watter. 1BHG sent in a good report for a starter. 1ARP has rebuilt his set and it works, but where's the rectifier? 1MY has installed four "S" tubes to rectify a 100-watter and they sure work FB.

Dist. No. 8: 1AJT is doing good work in his territory. 1FD has his traffic report in on time every month. If you want to work with him, you must get up early! 1BIJ has changed over to 1QP's circuit and reports fine results. 1AWI is going to move up on a mountain so as he will get away from QRM.

Traffic: 1BIJ, 7; 1AJT, 276; 1ARP, 111; 1UJ, 28; 1FD, 43; 1CDE, 102; 1AKD, 10; 1BIY, 29; 1MY, 144; 1AMI, 41; 1UO, 105; 1AH, 121; 1BHG, 69; 1BJB, 6; 1CTI, 7; 1AVJ, 75; 1CKP, 39; 1AYT, 73; 1AWY, 12; 1AYR, 31; 1IV, 18; 1BGC, 14; 1ZL, 40; 1AJP, 25; 1AXN, 108; 1ZT, 76; 1BM, 3; 1XW, 33.

RHODE ISLAND—Dist. No. 1: The recent storm hit us all a crack that it will take a month to get over. The masts at the following stations came down: 1IL, 1OW, 1AWE, and 1ABC. 1BIE, an old timer in the game, is with us again and early in the morning one can hear him pounding away for dear life. 1OW won't be with us until he puts the stick back up. 1AWE was hard hit by the storm and is sending on an antenna 15 feet high and reports the incredible DX of working 1SW. 1ABC lost his mast but it doesn't seem to bother him much as he has lost interest in the game. We suspect some flapper has tuned in on his wave and captured him. 1CAB has 1,000,000 $\frac{1}{2}$ CQs to his credit. Few of us have heard him send anything else. The $\frac{1}{2}$ CQ was caused by the plate of his tube melting under the small voltage of 4000. 1GV seems to be all wrapped up in his B.C.L. store and is not doing much. 1ARK, the most powerful sheik in Providence, has learned the lesson of the A.D.M. and persists in conquering feminine hearts. 1AID is on the air consistently and handles traffic with the best of them. 1II got everything perking nice and down came the mast. Just now he is using his receiving aerial for transmitting. No counterpoise is used but two aerials instead.

Dist. No. 2: Westerly seems to have a fever of DX as all three stations, 1AAP, 1ANX and 1BVB have been heard on the other coast. 1BVB was heard in England. Things are about the same as last month outside of that. 1BVB's masts stayed up during the storm for a wonder, as in the past, every breeze took one of them down.

Dist. No. 3: Activities this month have been confined to two stations: 1BQD and 1BHK. 1AML has just got started.

Traffic: 1OW, 20; 1BIE, 8; 1AWE, 69; 1ABC, 5; 1CAB, 20; 1GV, 25; 1ARK, 10; 1II, 222; 1AID, 10; 1CSW, 16; 1ANX, 97; 1AAP, 47; 1BVB, 120; 1BQD, 176.

NEW HAMPSHIRE—Good message delivery schedules have been arranged in New Hampshire, whereby traffic for N.H. will be QSR'd by 1GL, Massachusetts traffic by 1AQL and 1LM. Maine by 1ALI, 1BDB, 1CTP and 1GL. The red letter men in this state for the month are: 1YH, 1AVL, 1AER, and 1AZT. Traffic: 1ATJ, 62; 1YB, 163; 1AVL, 165; 1AER, 135; 1BNK, 2; 1CSS, 65; 1CKK, 41; 1EAR, 25; 1BT, 68; 1AZT, 104; 1BJF, 59.

VERMONT—1YD is on the air and working fine. 1CGM operates whenever he is home and succeeds in pushing some traffic through.

We are sorry to hear of the resignation of C. E. Jennings, D. S. for northern Vermont, and wish to say that we certainly appreciate the good work done by Mr. Jennings.

MAINE—1ACO has a Reinartz which can't be beat for hams. 1ALI has copied several Britishers and other foreign stations. 1ALK has built a low-loss

tuner. 1APF lost his antenna in a recent wind but put up a single wire. Ses all three ops on now. 1APM and 1KX handled a press report of the Baldwin town meeting. 1APT is junking the prettiest spark set we ever saw, and is going to install a 20-watter. 1AUC is still doing good DX on low power. Reached England on a 10 and 20-watter. 1AUR has a low-loss tuner and has logged all kinds of sixes and sevens on it, besides several European. 1AYM has been getting a bit of distance out of a spark coil. His short-wave tuner together with the little bottles, he has been experimenting with ought to make him an excellent station in the near future. 1BDB is working regular schedules. 1BDH lost one 5'er but is doing DX with the other. 1BDI-1XAH, kept foreign schedules regularly and worked the following during the past month: British 2KF, 2SZ, 2OD, 2NM, 5NM, 5KO, 5LF, 2SH, 2KW, 2WJ. French: 8AB, 8CT, 8BF and 8BM. Dutch: PA9 and PC11. 1BD is on more regularly now. 1BJS is one of our old reliable stations, which has sent in a good report every month for over a year. 1BQL is going strong. 1BRQ had tough luck when one of the masts took a fancy dive. 1BTT is on from 3 A.M. to 6 A.M. regularly. 1CDO is working late evenings and early mornings. 1CIB who has handled traffic for years on spark, now has a 5-watter. Ses he's getting out now. 1CRU has been heard in England several times. 1EF keeps regular schedules now. 1FM is on every night on 181 meters. Just annexed an OW. 1FR is using a WE VT-2 with spark coil on the plate. 1GA is going again with good DX and traffic. 1IB is using loose coupled circuit on his 50 and was doing wonderfully well. 1KX just had a present of a flivver. No more time for radio?? 1VF has just come on this month with a 5-watter, A.C.C.W., but has already handled a good bunch of traffic.

This seems to be a low-loss tuner state. Most all of the gang have constructed one, including 1ACO, 1ALI, 1ALK, 1AUR, 1AYM, 1BDI, 1BIG, 1CRU, 1CTP, 1EF, 1IT.

Traffic: 1ACO, 42; 1ALI, 60; 1ALK, 22; 1APF, 62; 1APM, 102; 1APT, 10; 1ASR, 18; 1AUC, 27; 1AUR, 40; 1AYM, 2; 1BDB, 14; 1BDH, 111; 1BDI, 278; 1BHR, 73; 1BDI, 24; 1BJS, 23; 1BNL, 56; 1BQL, 87; 1BTT, 54; 1BUB, 81; 1CDO, 20; 1CIB, 35; 1CKQ, 12; 1CL, 41; 1CNP, 3; 1CRU, 25; 1CTP, 24; 1EF, 104; 1FM, 89; 1FR, 14; 1GA, 23; 1IB, 3; 1IT, 22; 1KX, 122; 1VF, 29.

NORTHWESTERN DIVISION Glenn E. West, Mgr.

Message handling is rapidly getting back to old time form. Message totals are going up rather than down. Messages are being relayed more promptly and are being delivered before they are a month old.

The best traffic work this month was done by: 7GP, 7FQ, 7SH, 7GO, 7QD, and 7NO. 7CO is the most consistent station in the division and for the last three months has handled nearly twice as many messages as any other station.

WASHINGTON—Conditions prevailing over the state remained practically unchanged, although traffic reports have suffered considerably.

Dist. No. 1: 7RC handling lots of msgs has been heard in New York pounding brass at sea. 7ALI reaches out fairly well. 7AHQ is on occasionally but has strong school QRM. 7JS is still off due to the fact that his 12 5-watters went ????. He expects to open up with 500 watts this coming fall. Wowie!

Dist. No. 2: Seattle fellows have been turning out some fine DX work. 7AEL works eight on a 10-watter. 7DU worked the east coast but blew his 50. 7ADP still blows his tubes. 7AHI bought a "Hoopie" and spends his time demonstrating the riding qualities to the YLs. (Watch ur step, AII) 7ADP helps him out occasionally. 7IHS es 7GO not on much due to the awful QRM from an automatic danger signal that makes radio impossible. 7ADQ will be back soon with new radiation system. 7UU is upholding the honor and prestige of Ballard Hi as a member of the track team. Nope, he is not a sprinter—shot putting is his line. 7AFE is QRW at the U. 7TY es 7IB, ditto. 7EA is a newcomer. He used to be 6BGE of Ogden, Utah. He has a 50. 7FD, on 180 meters works all districts, but is anticipating loss of a 50 soon and is saving his necks. 7GO is doing the same with 2 203As in view. 7IY is going to listen for Australian, New Zealand and Philippine hams this spring. 7AIB is busy finding a couple of high poles so as to push out his sigs. 7MT and 7ED are handling their share. 7FN pushed out a nice total on his 5-watter. 7AB has been off due to tube trouble. Hooked up a 5'er and worked an 8.

Dist. No. 3: The traffic handled was chiefly done by 7WS. 7NG is off on account of deceased tubes. 7AAO has been going part of the time. 7AIF and 7DG will

split partnership as 7AF still plans on going to sea. 7DC will be back with a 5 or 10 watter.

Dist. No. 4: All stations are getting the fone craze. Those having fones are 7ADR, 7NN, 7DI, 7ADF, 7LH, 7NO, 7AHA, with 7SH coming soon. 7LH has not been on much on account of QRXing for the B.C.L.s contests. He heard a French station in January and just got a card confirming his reception. 7SF and 7WY are not on because of getting a new Stutz Car and the results (YL's) take up all their time. 7CU is still laid up with a damaged antenna. 7ADF is holding his own and is making preparations to QSY down. 7DI is working DX much more successfully than before. 7SH is the one that picks the messages out of the air and continues to be heard in N.Z. on a 10-watter. 7AHA hopes to QRO to a 10-watter as soon as he raises sum more jingle. 7BM is on with an amplifier tube with 110 volts AC but will increase power next fall. 7ADR is heard around U.S. and N.Z. 7RA has school QRM and is going to sell out. 7SJ just started up again. 7NO is on every night and has been heard by WNP. 7HC isn't on much for reconstruction that's going on.

Dist. No. 5: 7GP is the only one reporting and he wins the hard rubber key contacts. (Whatsamatter with the rest of you birds?)

Dist. No. 6: Every one is trying the shorter waves and their use is a knockout for DX. On 75 watts input 7BJ works the Atlantic coast on 150 meters. He notices that QSO is ever so much better. 7VN has done fine work having worked 3rd district stations on a 10-watter.

Dist. No. 8: 7WE and 7ZI are doing fine handling of traffic. 7RN is also doing fine work. 7NE with spark has the largest total. He has a 15-watter under construction by 7TQ and will discard his spark. This will make Washington 100% C.W. Oh, Boy!

Dist. No. 9: 7GE-7ZX is not on much as for being QRW with a new car. 7RY is doing fair work and pushed through some traffic.

Dist. No. 10: 7FQ is knocking them all dead on his 10-watter, having worked 338 stations in 9 U.S. and 4 Canadian Districts in 2 months. Almost needs special mail carrier as the result of being on every evening from 11 until about 6 A.M. He is what you call a "case hardened owl." 7AF takes the honors of having the best moving DX. He bought a new house so is off the air for a short time. 7ER left the city and don't know when he will be back on the air. 7SZ is the only one to turn in a report on traffic.

MONTANA—Dist. No. 1: Things in Great Falls are looking good. 7WP is getting ready to blossom out with a couple of 502 and a geny set. A new station in Lewiston, 7KZ, is on the air with a couple of the young bottles and is getting out fine. 7AGF is still plugging along QSO everywhere but in Montana. He is usually below 170 meters and finds that his sigs get out better there. Helena has at last come out of its state of coma and we now have a C.M., G. C. Stocking of 413 1/2 N. Beattie St., 7ZL, who will handle Helena from now on.

Dist. No. 2: 7ACI is the most consistent station in this district, even if he did have two youngsters pass away during the month. 7TD is going FB when he can get along with power transformers. The last quit him about three weeks ago, but he is on again. 7GK is still trying to make a five watter shimmy with the aerial and cp that he has up. 7IT complains of spring DX and other fevers but manages to work 3s and 2s with 50 watts input to plates. He is on 128 to 170 meters using 7XAF for short waves. 7NT is plugging away with his usual consistency and is spending some of his time making sort wave tuners. 7DD is on again after having some transformer trouble. This kind of trouble seems to be epidemic in Butte. 7MP, at Bozeman, has been sick and not on with the usual regularity. 7ZF is now ready to go after rebuilding and warns us all to hold to the cans when he hits his sigs. 7ZL has not been on very much due to construction of a new transmitter. 7EL uses a 5-watter 4D coil outfit and sure does the biz.

Dist. No. 3: A light—7KZ in Lewiston, but until more stations appear in this district he will be under jurisdiction of Amdahl at Great Falls.

Dist. No. 4: 7CO, may his tribe increase, continues to apply the grease. He reports hearing WNP a couple of times but too QRZ to be worked. He is handling many messages and has the most trouble getting west. WHO CAN SCHEDULE HIM? 7AJD is on every evening and reports that the set is working to please him. 7ZU ought to be canned. He sends in no card and the only report is indirect. This is a fearful example for the D.M. to set for others holders of O.R.S. appointments, especially as he hasn't a single other thing to do. (Duck your head HEC. Hi.)

The A.D.M. is mighty proud of this report and the way the state is responding to A.R.R.L. work. There is nothing like cooperation, fellows, and it does make things easier for all of us. Let's keep the good work going.

OREGON—During the past month things have picked up with more real business going on over the air. The short waves have come into their own, and many stations are heard on 100 meters who were never heard before. One good thing is that nearly all hams in the state have short wave low-loss receivers.

Dist. No. 1: In Eugene, 7GQ, 7SY and 7IW are the only stations on the air now, except 7JU who is just getting his 5-watter tuned up. 7AHZ and 7KT have to alternate nights as they only have one hi-voltage transformer between them. 7FH uses a 50-watter, but is having plate voltage troubles.

Dist. No. 2: 7QU and 7QT are handling all of the traffic. 7QT is using a 20-watter and is being heard in Samoa. 7QU is putting out about 250 watts with his three 202s and is working all districts. 7HA reports lots of DX worked but that msgrs are very scarce. 7AFT has opened up taking the place of 7AFF.

Dist. No. 3: 7AKH has handled the bulk of the traffic with 7ALD a close second. 7ABU is using a spark coil C.W. transmitter, waiting for the power company to install his power line. 7AIZ is on again with his 10-watter as is 7SN who reports much QRM from school work. 7KS says that the past month has been very slow as far as traffic is concerned.

Dist. No. 4: 7TO reports the gang in Portland very slow to cooperate with him.

Dist. No. 7: 7FR and 7ACM are running the same station using a 15-watter. 7QD is reaching all districts with his bottles at white heat. 7JY will soon sign a nine call in Chicago. We will miss his QRM, but also expect to be in just as good communication with him as before. 7NZ is hunting for a new location so he can again work DX. 7EM is alive working out good. 7GU can be heard any afternoon, but is not able to pound brass at night on account of his work.

Dist. No. 9: 7JE and 7ABY are the only stations on in the district. Both are very busy at school so don't get to sit up very late at night.

IDAHO—Dist. No. 1: The D.S. has failed to report the last two months. What 'smatter, OM, still under quarantine?

Dist. No. 2: Five new O.R.S. certificates were issued last month. 7OB leads the message total with 50 messages. 7IO comes next on the list. Both 7OB and 7IO are doing excellent work. 7IO has increased his power to a 20-watter and has worked most all the hams in Georgia. 7OB will be off the air for a very short time while he is building a new short wave tuner and increases his power. 7FT just got going real good when he wrote us that he was quitting. He has left for Seattle where he will operate on the "briny deep." 7OT is still making Boise heard over the map. 7LO is a new station in Boise that will take 7PT's place. 7PX reports school work has him jumping, so he doesn't get much time at the key. 7GW and 7GX are starting out in great shape. 7IU can take anything for east or west with little trouble. He's the new station in Blackfoot. 7ACF has his pair of fivers going and is working hard for an O.R.S. certificate. 7LNL has again hooked up the old set and was reported very QSA from many eastern stations the first few minutes of operation. Shoot the traffic, fellows, Idaho's ready.

Traffic: 7CO, 342; 7FQ, 327 (two months); 7GP, 259; 7SH, 146; 7NO, 100; 7ZU, 93; 7AJD, 85; 7WS, 75; 7NE, 86; 7LH, 87; 7GE, 63; 7BJ, 60; 7ZL, 36; 7QD, 97; 7TQ, 77; 7AKK, 56; 7ARD, 49; 7AKH, 45; 7AV, 37; 7IW, 34; 7WE, 55; 7FN, 44; 7ZL, 41; 7ED, 37; 7ABB, 35; 7RY, 33; 7RC, 31; 7RN, 29; 7QT, 30; 7FR, 27; 7AKC, 26; 7TT, 19; 7ZW, 19; 7OB, 50; 7IO, 31; 7LN, 28; 7PT, 14; 7GW, 13; 7GX, 6; 7NT, 30; 7TD, 8; 7ACI, 46; 7EL, 53; 7IT, 29; 7AGF, 15; 7WP, 32; 7KZ, 10; 7AEL, 25; 7IH, 24; 7ADZ, 23; 7AIB, 22; 7ADP, 20; 7OY, 19; 7SF, 15; 7CA, 14; 7VM, 13; 7ALI, 12; 7MT, 10; 7ADF, 10; 7AHQ, 10; 7FD, 9; 7SZ, 8; 7DI, 8; 7EA, 7; 7AHA, 6; 7HC, 4; 7GO, 3; 7AFE, 2; 7BM, 1; 7AIP, 18; 7GQ, 16; 7CW, 10; 7KS, 6.

PACIFIC DIVISION J. V. Wise, Mgr.

CALIFORNIA—Dist. No. 1: Activity in San Diego has been picking up lately. There are a number of good stations on the air. 6CDV seems to have decided between C.W. and spark and now his 10 watt bottle set is reaching out much better than the spark ever did. 6AUD, 6KC, 6CFJ and 6BKC still use the old rock crushers. 6BFB, 6CGC,

GBAS, 6CHX and a few others in San Diego are all doing nice work on small power C.W. NPL are mush and harmonics is still very troublesome here. 6BKX had the tough luck to shoot his 50-watter after being on only four nights this month. He has done some fine DX in the past and traffic was going better than ever. 6BNY will soon have his new 50-watter going. 6AVR is using a 60-watter on 195 meters. He gets cards from all districts and has worked 2nd and 3rd district stations. (FB, OM)

Dist. 1-A—Catalina Island. 6XAD's report is slimmer than that of last month, and it marks the end of sustained radio until September. QRN is becoming bad. 6XAD will be glad to hold special tests with any station desiring them, providing he is given several days notice. 6XAD's work with WNP has been nil. His signals at such times have been so QRZ and QSS that it was a waste of time to even attempt communication. The best daylight work in the past month was with 9REZ, at Wichita, Kansas. Communication was maintained with him until 6:13 A.M. P.S.T. on the 12th of February. The motto at 6XAD-6ZV is: "For every card that comes in one goes out." (Hundreds of stations we know would do well to follow that motto.—T.M.)

Dist. No. 2: The amount of traffic in and out of Los Angeles struck a slump compared with the amount previously handled. The gang seems to have a hard time hanging on for the whole winter. Quite a few stations have given up already, although there is plenty QRM in the city from others. 6CHV seems to be the most consistent station and handles plenty of traffic. 6MH comes on frequently and busts through all over. 6BWE comes on the air oftener since graduation from school. 6CMU increased his power to a 50-watter and is getting out better. 6BQK get out fine when on. 6AFG has moved and decreased his luck of getting out. Seems like 6BQC, 6BQY, and 6BVF have left us forever (Women). Hi. 6BVG will soon have enough power to put on his 250-watter and sure ought to increase his DX. 6I.J got his 500-cycle to work and seems to be working everything but Mars. 6ALG finally raised another stick and has his rock-crusher and C.W. both working again. 6BWD burnt out his generator and hasn't been heard on for a long time. 6NB is raising almost everybody and his radiation is around 4 amps. 6BRO is still using 5 watts straight A.C. and sure is plenty broad around the city. 6BVZ has increased his DX greatly and has 48 states to get and all countries. 6ALH hasn't been on as much as usual. 6BR is doing good DX. 6BWL promises to have his heap working again soon. 6CBB has raised his power to a 100 watts and is getting out everywhere. 6ALF has a parallel to his heap which is golf. 6CDO has started to step out since putting in a rectifier. 6ADG comes on once in a while and steps out and works local. 6BPZ has quit and it seems as if we were going to lose him. 6AQD and 6BRA are still hanging on. 6CHU has quit but it might be possible to hear him again. 6CMR is on again and is going as strong as ever. Two operators are working at 6CL and they will keep the air hot. 6PL-6MG has slacked off for a while and expects to be on strong in May and try to QSO New Zealand. 6CMM is doing good DX when on. 6KE still says he will knock everybody's tube in L. A. when he gets his 500-watter working. 6AIC is in Mexico operating KFZ. He QRH is abt. 149. 6TF ex-RFT is going strong. 6CU hasn't been heard for a century, but he will get the bug again. 6ALQ is still using spark and QRM'ing everybody. 6FT finds time at intervals to let the gang know he is still on. 6BJW and 6BKO are going good. 6EA and 6EB will be going again in a short time. 6BJC is getting out fine when on.

Dist. No. 3: 6ACV is a 10-watter getting out F.B. 6CMD blew a 5-watter but is still going strong. GAAN also had a 5 go west. Old 6DT will be on soon with a 10-watter. 6QB has thrown five wattars away now a 50. 6ADZ will be on soon with a 5. 6AVV is working 1's every night, 50 to 250 watts. 6CDG blew one of his fifties. 6AME is stepping out with battery. 6BPZ uses a 5-watter.

It seems as if Central California is composed mostly of 5-watters, but they step out.

Traffic: 6AVR, 27; 6CIA, 11; 6BNU, 20; 6BKX, 45; 6ZH, 55; 6CMU, 105; 6BLQ, 100; 6NB, 25; 6ALH, 2; 6PL, 327; 6MG, 57; 6BWE, 5; 6ALQ, 2; 6CBB, 35; 6BRF, 190; 6BKO, 1; 6CL, 1; 6JX, 9; 6CNL, 7; 6AAP, 223; 6BVZ, 7; 6BVG, 15.

ROANOKE DIVISION W. T. Gravelly, Mgr.

Recent sleet, rain, and snow storms over the entire state of Virginia did considerable damage to telegraph wires in eastern and northern sections of the state. We were called upon by railroads to assist in finding their trains but those stations that were not damaged by the storm seem to have not taken interest in the emergency. If those stations in the vicinity of Charlottesville could have taken advantage of this opportunity to render assistance, and been on the air, they would have performed a service that would have been creditable to the Roanoke Division. 3CA worked his station for an hour and a half in an attempt to raise some station east or north to render assistance but was unable to raise anyone at all. It is hoped that those stations in Virginia that are capable of rendering such service as this will soon get with the gang and use their efforts in this direction.

We regret to state that 8BDA was closed by the radio inspector for a period of six months. The spark transmitter seems to have been the chief offender and we hope this will be a lesson to other spark stations. The spark was drawing 4 amps in the primary circuit, the wave was 216 meters, decrement was off and some other trouble. The C.W. seems to have been all right but the license for the station called for one address and the station was located at another which made bad matters worse. It is to be hoped that the gang will use better judgment in the future and live up to the laws and regulations. The inspectors are exceptionally reasonable with the whole gang and they will more than meet you half way if you show an inclination to do your part and we will have no more of this. A good transmitter putting 4 amps into the aerial was recently operated as a test and a three circuit receiver listened to B.C. stuff with a separation of only THIRTY FEET between the two stations, so why the spark? (Yes—so say we, "why the spark"—T.M.)

WEST VIRGINIA—WEST little traffic is moving through this section but the gang is on the job and QRV for traffic. 8SP is holding tests with French 8CS. 8BBM is doing good work for a new one. 8CFX is off the air at present, but will be back soon as permanently located. 8ATC takes the "iron cream puff" with his message report. 8CQH and 8DKB have 50-watters. 8AMD has a bad habit of blowing tubes. The gang at Charleston has been working west coast right along. 8ATP and 8CXM have been heard in England. Most of the stations in this district are using the short waves now. (How short, OM, better watch that short wave stuff and not get below the assigned waves—DM)

VIRGINIA—3DU is back on the air with a 20-watter and knocking them in all directions. The message reports show that there are more stations working now. Some of the stations suffered in the recent storm. A new station is opened in Portsmouth, call 3ASS. 3AEU, also has a B.C. station, WBBW, using 100 watts. 3ATB still receiving cards from the west coast, has worked Denver with 100-watter, on 176 meters. 3BCH has a very accurate wave-meter. (FB, OM) 3AOT has again moved back into the attic. 3RMN takes the "berries" this month with one 5-watter worked 4JE Porto Rico giving him six messages for Cuba. He also worked Canadian 9BL in Nova Scotia on short waves. A recent storm destroyed the aerial but the station is back on the air and is reported by British 5KO. 3DT, using Master Oscillator, recently made a night of it and worked 6GD, and was reported by a few sevens—then they blew the filament transformer. 3CKL worked 9BVV, 5AJB, 5QW, 2ARB, 1ND and 9DKQ one morning between 5 and 7. 9DKQ is being worked in daylight from this station.

NORTH CAROLINA—4SU is a new station with a 20-watter, QSO Porto Rico Traffic for quick QSE south should go through 4FT and 4SU.
Traffic: 8ATC, 111; 3BMN, 95; 4SU, 85; 8AUE, 74; 3MK, 55; 8CQH, 48; 3CKL, 47; 8WZ, 45; 3UU, 42; 3BET, 41; 8SP, 34; 8DKB, 28; 8DES, 19; 3TY, 16; 8AMD, 16; 8ZW, 16; 3BNE, 14; 3ATB, 12; 8BBM, 12; 3CA, 3; 3AOT, 5.

NORTH CAROLINA—Dist. No. 1: Interest seems to be considerably below par. The active radio club has not been up to old time form in Winston-Salem.

Dist. No. 2: Asheville continues to be the star section. 4MI is leading them this month. If we had some few more like him, 4SK and 4KC, we would have some real traffic handlers.
Traffic: 4SX, 17; 4KC, 18; 4GW, 3; 4MI, 85; 4CM, 5; 4JM, 8; 4OU, 7; 4NX, 8; 4PE, 2.

ROCKY MOUNTAIN DIVISION N. R. Hood, Mgr.

6PE 198 msgs.

C.W.

Salt Lake City, Utah.

UTAH—Utah again leads with the individual honor. Traffic has held up regardless of the slump in this district. 6RM is also 6ZBS. 6ZT, 6AJA and 6CUB have been on regularly, having moved traffic in good shape. The following stations in Utah have been appointed O.R.S. under the new rules; the new certificates calling for monthly reports as part of the procedure in procuring a certificate: 6ZT, 6CUB, 6BUH, 6ZM, 6RM, 6BLH, 6APL, 6BKE, and 6CJB. Traffic: 6ZT, 47; 6BLH, 129; 6AJA, 6; 6RM-6ZBS, 10; 6CUB, 40; 6PE, 198.

COLORADO—9CAA leads the Denver gang, followed by 9CJY, and 9AMB. Traffic has fallen off throughout the Denver district but the messages are of more value and importance. 9APF and 9BJK are out of the city and the stations closed for a time. 9QL, 9BUN, 9BXQ all have been worked regularly. 9EEA is undergoing some changes but has managed to keep on the air.

Dist. No. 1: 9AZG and 9DTE are the only stations reporting this month. They have managed to keep the north part of the state open and both are putting traffic through well.

The southern part of the state has been kept open by five stations which offer a QSO for anything going their way: 9EAE, 9CLD, 9DFH, 9CHT and 9CDE. The report from this district is 100%.

The following stations in Colorado have been appointed O.R.S. under the new rules: 9EAE, 9BTO, 9AVU, 9BXQ, 9BUN, 9DTE, 9CJY, 9AZG, 9CAA, 9BVO, 9CDE, 9EEA, 9CHT, 9CLD, and 9DFH. Traffic: 9AMB, 138; 9BUN, 85; 9BXQ, 15; 9CAA, 185; 9EEA, 45; 9QL, 50; 9CJY, 162; 9AZG, 139; 9DTE, 137; 9DFH, 37; 9CLD, 42; 9EAE, 51; 9CHT, 14; 9CDE, 19.

WYOMING—7HW, 7DZ-7LU, have put through most of the traffic for this state. 7VZ-7MO has finished a brand new 100 wattter that should be on the air in a few weeks. 7ZO-7ADH has not been on the air during March. The following stations have been appointed O.R.S. under the new rules: 7HW, 7ZD and 7ZW. Traffic: 7HW, 18; 7ZD, 5.

WEST GULF DIVISION F. M. Corlett, Mgr.

Below is what happened with those hams who mailed in a report direct to division headquarters on or before the 22nd of March. The only thing that keeps you out of this report is failure to mail your report, or my inability to read your card, and believe I read 'em all this time. Will repeat what has been said many times—every A.R.R.L. member who has a transmitter is supposed to mail a report to headquarters, 2515 Catherine St., Dallas not later than the 22nd of the month, covering his activities for the month ending on the 20th. A post card will do, and is easy to handle. What you write on a card has more chance of getting into the report, for things are moving fast around these diggin's about the 22nd, and the long letters are apt to get short reading.

The stations who report are the ones who get O.R.S. and other appointments, for the big question in things of this kind is "CAN YOU BE DEPENDED UPON?" For the first time in four months, 5LR lost first place to 5QY, and 5QY says all his messages were handled in twenty days, due to a "50-wattter" passing out, and rebuilding his antenna! 5LR takes second place and says he burned three fifties and was not on the air much. He is now using 2 20-wattters instead of 150. Hi. 5FC takes third place.

NORTHERN TEXAS—W. B. Forrest, Jr., Waxahachie, 5AJT, is the new A.D.M. 5AJJ expects to be on with 250 watts before you read this. 5LR has enough DX experience and is down to a 20-wattter. 5HY got a flivver tangled up in the guy wires, so NM until the mess is cleaned up. 5AKN was elected President of the Dallas Radio Club. 5CT can't decide what kind of transmitter he wants. 5BD is raising his antenna. 5AHT has an extra-first-grade license coming up. 5QI burned a generator but will show 'em how next month. Why no more reports from "Cow Town?" If any one is dead, pse QSL, so can send flowers. 5NW blew a fifty, but worked all districts and Canada on a 5'er. 5NY also reports all districts and Canada on a five. 5AHC is off the air until he gets some new bottles. 5LI has an early morning schedule and works 1,000-miles daylight on a 10-wattter. 5JH with one five worked

Minnesota. 5AKX will be on soon and wants your business. 5ALI is rebuilding and 5UD of Terrell says Nil, QRM school and YL.

Dist. No. 2: 5AJT is QSO both coasts and Canada any night with one 20-watt bottle on 150 meters, and wants schedules with any one. 5JF is QRX on account of rebuilding, but will be on with new QRA soon. 5ADH has been sick and has only a 5-wattter left and has some new ones coming up. 5AET is QRW with school. 5FA is changing QRA. 5ADV-5TO reports 50 watts gone wrong. 5QY won first place in the division and only on 20 days. He put up an antenna, rebuilt his set, and burned a 50. Sure had a busy month. 5ABW is on until 1:00 A.M. 5PH, with temporary antenna 64 feet up on what will be a 96 foot pole, works both coasts on 150 meters. 5FC did not receive his report card so wired his report. That's the stuff, fellows!

Dist. No. 3: 5ZADA dismantled and has gone to school. 5UY will be off the air for about six months as he has gone to Wichita Falls to rake up some kale.

Dist. No. 4: 5XAJ has been busy converting some local friends to the A.R.R.L. way. (FB OM—D.M.) Dist. No. 5: 5ZH rebuilt his outfit. 5DC rebuilt and is using an S tube for power. 5OQ reports his city 100% A.R.R.L. MG went west in January, and has just started again.

Traffic: 5AJJ, 58; 5AIC, 57; 5CT, 11; 5JL, 62; 5LR, 294; 5HY, 44; 5AKN, 45; 5ABW, 42; 5QY, 489; 5JH, 25; 5PH, 33; 5ADV-5TO, 16; 5XAJ, 33; 5UO, 76; 5AET, 7; 5ZH, 4; 5SD, 69; 5CV, 119; 5ADH, 64; 5AGH, 50; 5AJT, 153; 5AMG, 14; 5NW, 117; 5BD, 27; 5DC, 4; 5DW, 31; 5NY, 27; 5AFH, 12; 5ALJ, 6; 5AHC, 36; 5FC, 237; 5LI, 27; 5AHT, 24.

SOUTHERN TEXAS—5XAU, College Station Radio Club, sends in a card with a list of ops that looks like a west gulf directory. No wonder some reports are missing! He is on from 11 P.M. to 6 A.M. from here out. Works 140-220 meters and wants to get in touch with all the larger cities. 5XV hopes to be on again some time. 5OC has rebuilt and is getting ready for Pan-American Relay.

Dist. No. 7: 5ALR is QSO all points. QRM school exams. 5YK-5XAV remodeled his transmitter and family had measles.

Dist. No. 8: 5MN has been rebuilding and is ready to go now. 5FS is QSO west and wants some biz. 5BO moved? Despite the fact he has to work the "dog watch."

Dist. No. 9: 5ADB is QSO Washington, British Columbia, Pennsylvania, South Carolina. Traffic: 5NK, 44; 5MN, 4; 5VO, 24; 5MT, 24; 5YK-5XAV, 14; 5ALR, 30; 5ADB, 73; 5OC, 25; 5PS, 11; 5BO, 7.

OKLAHOMA—Dist. No. 1: 5ZAV reports traffic "scarcer than hen's teeth." Blew a 50, but has a couple left and has made some good series condensers. 5AJB worked all districts in one night.

Dist. No. 2: 5XBF is getting ready to consolidate with another ham, so will have more operators. 5AAW has a 10-wattter instead of a 15-wattter. Please omit flowers!

Dist. No. 4: 5VM reports static bad on 200, but not so worse on 150! 5AHD blew three 5-wattters but going to use fifties to reduce the expense. 5IB works 1000 miles regularly, and wants some traffic. 5AGR says OW and broadcasting take up all his time. Traffic: 5ANE, 15; 5AHD, 23; 5AAW, 57; 5AGZ, 35; 5VM, 110; 5IB, 12; 5XBF, 6; 5ZAV, 103.

NEW MEXICO—5ADO moved 121 through bad QRN. 5XD is working on very short waves. 5LG only home three days, but managed to move 6. Traffic: 5XD, 57; 5LG, 6; 5ADO, 121.

MEXICO—BX says revolution not bothering so much now. Rarin' to go, QSO points south. He handled 21 msgs on 160 meters. Traffic: BX, 21.

CANADIAN SECTION

The past month has proven a very fine one from a development point of view in Canada. Several noteworthy events have taken place which are worth recording.

In the East the Maritime Division is leading the whole of Canada by having practically every one of its D.X. stations on the air on the newly developed short wave lengths below 150 meters. These stations

are doing wonderful work under the very efficient management of Major W. C. Borrett. To make the competition keener in this Division, the Mayor of Halifax, Mr. Murphy, has donated a cup to be won annually by the amateur most distinguishing himself in this division. The cup this year has been won by 1BQ, who has done marvelous work by working English stations practically every night for the past three months or more. This station is practically as reliable as clock work over a distance of two or three thousand miles highway. Other stations in this division who have done excellent work are 1DQ, 1DD, 1AR, 1EF, 1EI, 9AK and 9BL.

In the Quebec Division practically all the DX men are also down on the short waves and it is a pleasure to listen nightly now to these wave lengths and hear the bunch of Canadian stations working on 125 to 150 meters. This wave length has made nightly communication between Montreal and Toronto, the simplest kind of work whereas the old wave lengths gave us unlimited trouble in doing this.

In Ontario more men are getting down every day, but there are still a large number who are crowding the 225 wave length. New comers heard doing excellent work in Ontario are, 3AEC, 3WG, 3HH, and 3WV in Collingwood. 3OJ, one of the initial short wave experts was successful in working Montreal at 5 P.M. March the 22nd using one 201 A Amplifier tube and 90 volts of B battery. 3NI worked California using practically no current at all.

The West is also showing up well in getting down, though they are a little slow as yet. 4CR and 4CO in Winnipeg are both good and 4CB, 4HH, 4DQ and others are getting down to business.

The C.G.M. arranged a test for Sunday morning the 15th of March in which all division managers endeavoured to get on the air at the same time on the same wave length and work each other. The Eastern part of the country was entirely successful in so doing as 1DD, 2CG, 3XN, 9AL and 3NI were on the air and in communication with each other at the same time. In the West however, we were not so fortunate for various reasons and so a further test in which D.M.'s and A.D.M.'s are to participate, has been arranged for the night of March 29th-30th in which we hope to have complete trans-Continental communication.

The latest Government regulations as regards amateur transmitters have caused considerable anguish among the brass pounding fraternity in so far as the boys are all required to have operator's certificates of proficiency prior to renewal of licenses on April 1st. This is expected to eliminate a considerable number of licensees who have licenses but no stations as well as those who are interested solely in radio-telephone and who have never taken up the code sufficiently to learn it up to an efficiency of ten words per minute. The license fee for amateur transmitters has also been raised from \$1.00 to \$2.50, this

also with the same idea in view of eliminating the dead-wood.

The C.G.M. hopes next month to be able to give the gang an item of considerable importance to them and one which should cause considerable enthusiasm. In the meantime keep up your short wave work and don't slack down for the summer.

MARITIME DIVISION W. C. Borrett, Mgr.

The Royal Order of Transatlantic Brass Pounders is the new order up here. Qualifications are that you communicate with an European amateur whereby you forthwith become a member and receive a most handsome and terrible looking document. 1AR just became a member when he worked British 25H and two French stations. The other members are: Canadians 1BQ, 1DQ, 9BL, and 1DD. 1BV is going thru the trials and tribulations to become a member since his signals have been heard by PCTT. 1BQ is a bit ahead of the gang—he logged Italian ACD. 1BV seems to hold the honors for low power DX when he worked Canadian 3AEC using an input of about 1 watt. 1EF has a weird antenna but he certainly keeps the traffic moving. 1EB is pushing his loner to the very limit and reaches out quite well. 1DT works when he can get away from his studies. 9BL is using two UV 201A tubes and stirs up quite a racket. 1DJ uses a single 5'er and punches thru OK. 1AQ started off with a fone, better get on the key, OM.

The big thing is the Trans-Canadian route to the west coast. Hams up here work the 2's and 3's quite regularly and we shall show our cousins across the border that we can work across Canada in spite of the difficulties. It is requested that the Canadian 2's and 3's fall in line and work on schedule with us.

The memberships in the Maritime Division is 60 and we want to reach the century mark before fall—we're quite proud of ourselves because we have just broken forth within the past year and we are coming right along. Before long we will be QSO Newfoundland—we have some members up there and we'll do the trick—watch us!

Up New Brunswick way, 1AF is working Canadian 3's and has a schedule with Canadian 2BN. 1EI operates every night after midnight. 1DN has worked several of the Nova Scotia gang during the month. 1BZ made his return to the air by working 1DD as a starter. 1AW will soon break out with 4 5-watters—don't get mixed up with 1AW at Hartford. 'twud be good stuff to hear each working the other—why no try it?

Traffic: 1AR, 15; 1BQ, 30; 1BV, 20; 1DQ, 3; 1DD, 10; 9BL, 21, 21; 1EF, 38; 1EI, 2; 1AF, 8; 1BZ, 1.

ONTARIO DIVISION C. H. Langford, Mgr.

This month has been one of the best for some time.

Reports show that school work is taking most of the spare time at this time of the year. 3PZ is getting out in fine style, he worked three sixes in two hours one night. 3DB says that his outfit is a 10-watter, not 100 as per last QST. (S'all right, OM.)

London is still in Ontario, with 3TB, 3ADN and 3XN-9CF, doing the best they can for the cause. They are all around 125 meters. 3YH, with a 10-watter, is reported in California, and works Canadian fours and gets 2 amps on this 124 m stuff. 3ADU and 3DS-9BC are on the air at times. 3BQ on 125 meters works 'em all except Canadian fifth district. 3GB and 3IR will be on shortly, both are moving. 3TM is doing good work in traffic. 3XI, using 10-watter, 118 m. with 1.9a. radiation, works the sixth district. (FB) 3YV is also doing good work on 125 meters. 3KO on a 10-watter is heard at times. 3DH is returning with a 10-watter. 3WS is ill again with that common malady, tube blowntis. 3NI worked 4XC on .36 watts and also was heard by 6BVG at the same time. (FB, OM, that's where "B" battery chaps can do just as good as the higher-powered fellows on the lower wave-lengths.)

Traffic: 3WG, 66; 9AL, 42; 9BJ, 23; 3BM, 10; 3OJ, 4; 3YV, 35; 3LM, 6; 3GN, 5; 3NI, 30; 3YH, 8; 3DB, 15; 3PZ, 52; 3LY, 22; 3CO, 18; 3FC, 10; 3KQ, 4; 3XI, 62; 3TM, 27; 3KO, 38; 3MN-9AR, 48; 3BQ, 32; 3BG, 67; 3IF, 46; 3KP, 28.

QUEBEC DIVISION
J. V. Argyle, Mgr.

Conditions are not booming, but everything is about normal. Traffic comes along on the short waves a lot better. The latest recruit to the ranks of 125 meters is 2BE, who worked British 20D. 2AZ is a low waver who also gets along fine with the traffic. A curious technical point noticed is that the 125 meter wave gums up the neighborhood a whole lot worse than the 225. This was quite unexpected and it is decidedly disappointing. Most of us imagined we'd be able to send all day and all night on 125, but the telephones began to ring and the B.C.L., has a bigger grouch than ever. This holds true for D.C. supply as well as R.A.C. and has nothing to do with heavier load on filter condensers. However, the gang, using Low loss tuners is able to work through each other as smoothly as our fondest hopes could wish for. 2BN worked England nine times this moon. 2BG gets across occasionally. 2CG is quite jealous of the gang's luck and blames it on his rotten aerial. The O.R.S. with the new certificates have carried out its provisions to the letter. 2BE has the honor of being the first operator in the division to work Winnipeg and we are very pleased that others are QSO 1AF. New Brunswick for the first time. Miller, the P.M. is making good at the new job and there has been some spirited controversy in the papers here—the gang is good to the B.C.L.s and they know it.

Traffic: 2BE, 48; 2BN, 35; 2CG, 14.

WINNIPEG DIVISION
J. E. Brickett, Mgr.

4FV has been appointed radio inspector for Regina. 4AJ might assign his YL operator to the station on nights when he is out so his traffic would be greater. HI 4JL is a new C.W. station. 4IX has constructed every part of his low-power fone and compared to a commercial article it runs rings around them all for good stuff. 4AA is knockin' 'em dead! 4GH blew his 5 watter and is going to use a 50. 9BX-4CB, due to illness has not been on the air as regularly as heretofore. 4FA and 4AY will be going by the time this is in print. 4FC is the new C.M. at Prince Albert—stirring 'em up for more activity. 4EC is breaking forth with a 15 watter using storage battery plate supply. 4HH's 50 watter bit the dust after having worked everything in sight. 4ER tried to put 1500 volts on the plate and 8 on the filament of a 5 watter—result 'westward ho' for the tube, gess he is more reasonable with the present one. 4EO opened up with a 5'er and 4BB will open up with a 5'er before this reaches you. 4AO has a peculiar one or else it's a case of a brand new 'brand'—says his set won't oscillate in the day time but is OK at night. Maybe she is a nighthawk. OM! On the other hand, maybe the tubes were made at night or went to night school and don't know how to act in daylight. Can anybody solve the mystery as to why 4 5-watters refuse to operate in daylight?

Manitoba enjoyed a most successful month—more stations handled more traffic than ever before and most of the gang seem to think that the month of March will put the month of February to shame for real business. 4DY will be more or less a sort of worry to the BCL's in Portage la Prairie when he gets his 20-watter going. All set but the sticks! 4BI is operating at Brandon. 4FZ keeps things going thru Fort Garry. 4AG dropped over to look at the "Peg" 100-watters in action. 4BK-4CO and 4EA are moving traffic in the usual good way through the "Peg"! 4BK blew a 5'er but is well supplied with spares. 4EA with his 15 watter does as good work as some with 50-watters—best DX was 1400 miles twice in one night. 4CN could do some fine work on his 50, but he doesn't seem to. 4AD signed up with the pure D.C. clique. 4AW is still fussing around with his rectifier. 4CR on 125 meters is the berries.

The new O.R.S. certificates have worked wonders with the gang up this way an dthings are moving better than ever—we shall continue to make things hum.

Traffic: 4ER, 50; 4CB, 20; 4AO, 15; 4HH, 98; 4AD, 8; 4CO, 70; 4CN, 24; 4BK, 20; 4AW, 6; 4FZ, 127; 4AG, 12; 4EA, 67; 4CH, 3.

VANCOUVER DIVISION
A. J. Ober, Mgr.

Traffic is moving in great shape—messages that mean something. Every station is trying out the short waves, and all seem satisfied with signal strength and DX.

Stations that will take part in the Trans-Canada
(Concluded on page XVI)



The
Tech. Ed.
to the
Brass
Pounder

THE Production Editor and the Traffic Manager have managed to jungle things so as to leave a few inches of space in this department for a message from the Tech. Ed. to th brass pounders. It's a great chance to talk to you for a moment, and to explain a few things.

The response to the little request for cards to WWV has been great! Keep it up right along and we may get an extension of this service down to waves below 150 meters.

The response on information about dead spots has been very, very slow; everyone seems to be letting George do it.

The Experimenter's Section promises to snow us under much worse than we had expected. Good! Now we will not have to hire private detectives to find the modest fellow that always knows the most about amateur radio. Watch for our announcement next month and for the detailed letters to the men that have signed up.

Now let's talk about things that are not so pleasant.

The commonest letters here are the ones that demand that I "answer immediately". Can't be done. Where would I get the necessary ten days to work up articles for next QST? Be patient and remember that we answer you carefully—even if not today.

Then there's the letter that asks "Why don't you print something about-----?" Yes, but where? For everything that goes into QST something else must be thrown out!

The there's one other thing. Mason and I are going to die young if we don't stop losing sleep on account of having to patch up the bum addresses on the letters you fellows write us. Maybe you put the addresses on the envelope instead of the letters—but Larry takes the envelopes off so that does us no good.

Please put the address on the letter, and please don't pretend that your radio call is your address. It takes a lot of time to dig thru the call books and they are never right. For instance we recently found out that 3MF had 4 addresses—and all of them were wrong.

Just one thing more, why do we get so few articles on operating and traffic? Don't make the T.M. write all of them.

Well—here's the end of the space-----
C.U.L.

—“LQ”

Calls Heard



When preparing a list for QST, it is essential to observe the following rules:

1. List the calls neatly on a separate sheet of paper with a line of space between lines; do not embody them in a letter.

2. Arrange the calls as they will appear in QST: across the page, numerically by districts, alphabetically in each district, Canadian and foreign calls listed separately, state whether spark or C.W., and give period of time covered by the list.

3. Forms close on the fifth of the month preceding the date of issue of QST. Make your lists cover the period from the first of one month to the first of the next if possible, but don't let your list come in late.

4. List only calls over 500 miles distant.

HEARD DURING MARCH unless otherwise specified

F. D. Bell, 4AA, Palmerston, South New Zealand
(Jan. 3rd to Feb. 4th)

1xz, 1yb, 2ts, 3je, 5ahr, 5auu, 5bc, 5ev, 5ek, 5gj, 5ht, 5ig, 5mn, 5qy, 5yw, 5zav, 6aoc, 6akz, 6awt, 6arb, 6age, 6aao, 6abk, 6arf, 6auy, 6acm, 6alv, 6bfj, 6bql, 6bpf, 6bij, 6bkk, 6bqb, 6bur, 6bbw, 6ckp, 6ckr, 6cbb, 6cic, 6ebe, 6cmi, 6cfe, 6fy, 6gt, 6iv, 6ol, 6pl, 6xp, 7co, 7ih, 7jp, 7jw, 7lr, 7qj, 7tt, 7wp, 7ws, 8acg, 8aih, 8fu, 8kan, 8apf, 8aap, 8aus, 8aau, 8ape, 8aac, 8aac, 8bof, 8bri, 8bwc, 8bly, 8bis, 8bli, 8bhi, 8cdj, 8uc, 8cc, 8ckm, 8ccm, 8ccv, 8ccv, 8cca, 8dgv, 8elv, 8eky, 8ekf, 8eq, 8edb, 8mc, 8rc, 8vm, 8zt.

Canada: 8go, 8pb.

Hawaii: 8ado, 8asr, 8ceu.

kdef has been heard on C.W. vy QSA.

Frederick L. Hogg, G2SH

37 Bishop's Rd., Highgate, London, England
(Feb. 19 to Mar. 19)

(1xak), (1xah), 1cmp, 1xw, 1xj, 1bcf, 1cak, 1bwj, 1xar, 1xae, 1ajp, 1jv, 2agb, 2brb, 3oe, 3yo, 3mb, 3cc, (4bz), 4xe, 4bi, 4xc, 8cmn, 8fm, 8xs.

Can.: (1bq), (1dd), (1dd), (2bg), (9bl).

Wkx daily 11 pm est.

N. G. Baguley, G5GL
Newark & Dist. Wireless Society,

The Park, Newark, England

(Feb. 1st to Mar. 10th)

1alj, 1apy, 1auk, 1cpn, 1xah, 1xam, 1xaq, 1xar, 1xwj, 1xw, 1xap, 2agb, 3ot, 6bci.

Can.: 1ar, 1bq.

Will the above stations kindly QSL by card and will acknowledge.

T. W. Higgs, G5KO

45 Howard Road, Westbury Park, Bristol, England
(Feb. 18th to Mar. 13)

C.W.: (1aac), 1abf, 1agh, 1aja, 1azl, 1ber, 1boq, 1sw, 1xj, 1xw, (1xah), 7xam, (1xar), 2awf, 2ayv, 3bnu, 4xe, 4xr, 4zr, 9em.

Phone: kdka, wgy.

M. L. Perusquia, 1B

P. O. Box 540, Mexico City, Mex.

(20 days Feb. & Mar.)

1agu, 1bak, 1bkq, 1fd, 1kc, 1xam QSA, 1xw QSA, 2amb, 2bqs, 2brb QSA, 3adb, 3ath, 3ot, 3xq QRA?, 4bz, 4ek, 4er, 4hs, 4ik, 4io, 4mb, 4my, 4oa, 4qy, 4rh, 4xc, 4xe, 4xr, 5aac, 5aaq, 5aaw, 5abf, 5ac, 5ad, 5adi, 5adv, 5aes, 5agl, 5aib, 5aic, 5aip, 5aiu, 5aju, 5akf, 5alm, 5alr, 5alv, 5amh, 5aqd QRA?, 5asj QRA?, 5bai QRA?, 5bz, 5ck, 5cs, 5dj, 5dr, 5eh?, 5ek, 5ft, 5gt, 5he, 5id, 5jl, 5kf, 5lr, 5mi, 5ml, 5nk, 5nn, 5no, 5nw, 5ny, 5ov, 5ot, 5ov, 5ps, 5ps, 5qd, 5qx, 5y, 5rb, 5rg, 5rs, 5ru, 5tj, 5to, 5ua, 5uk, 5ul, 5ur, 5vc, 5xab, 5xau, 5xat QRA?, 5za, 5zai, 6bel, 6bic, 6cbx,

5xad, 6xv?, 6xu, 7io, 5amb, 5amd, 5amn, 5aol, 5bcp QSA, 5bjv, 5cbw, 5ct, 5fm, 5pl, 5xpb QRA?, 5aau, 5aim, 5ais, 5amb, 5ape, 5apf, 5asn, 5atn, 5awg, 5bab, 5bax, 5bhi, 5bpy, 5bsp, 5bu, 5ccm, 5ccs, 5cdf, 5dpx, 5dro, 5dyr, 5eaf, 5eg, 5ij, 5iz, 5nu, 5qr, 5utp?, 5xax, 5xbe QRA?, 5xw.

Phone: 9xw short wave, 25 ft. fm phones on det & 1 stp A.F.

Cuban: 2BQ vy QSA.

Mexican: bx.

kdef calling 4hs.

F. B. Borton, 2BY, Galiano 29, Havana, Cuba
(During March)

1bjm, 1bw, 1eik, 1ii, 2bco, 2blu, 2bw, 2by, 2cei, 3bd, 3bm, 3dk, 3ph, 3pi, 3pz, 3za, 4ai, 4az, 4ba, 4co, 4dl, 4er, 4ei, 4hs, 4ik, 4iu, 4pb, 4pk, 4xc, 5ac, 5agl, 5agn, 5ags, 5aji, 5alf, 5alm, 5alv, 5amh, 5amz, 5co, 5cm, 5ek, 5fc, 5ft, 5gi, 5he, 5ka, 5kr, 5mi, 5na, 5nn, 5ov, 5qf, 5wq, 5rg, 5ro, 5rv, 5sg, 5ua, 5uk, 5vc, 5vv, 5xa, 5xc, 5xk, 5yd, 5zav, 6bbc, 6cgv, 6qo, 8aod, 8bhn, 8bos, 8bpn, 8cqh, 8cua, 8dd, 8ddj, 8do, 8fu, 8ue, 9aau, 9ahh, 9ahj, 9ai, 9aim, 9arp, 9aza, 9bdc, 9bhi, 9bhx, 9bkf, 9btg, 9buh, 9c, 9ckp, 9cu, 9evo, 9dbf, 9dhr, 9dlw, 9dr, 9dy, 9dyy, 9dwb, 9ell, 9eky, 9ih, 9mc.

Cuban: 8dw.

Ex-3AE to Sea

All CW heard on Magnavox with regenerative detector and 2 steps audio.

Feb. 9th 700 miles West of Atsoria, Ore. 4cl, 9dyr.

Feb. 11th 1100 W. 8aa, 8apt.

Feb. 12th 1250 W. 1xae fone.

Feb. 13th 1400 W. 4ft, 8aa, 8akc, 8arv, 8cx, 9afw, 9el.

Feb. 14th 1650 W. 6aao, 6aop, 6aqf, 6bdd, 6ebe, 6co, 6pl, 7fq, 7ta, 9ajv, 9bby.

Feb. 15th 1900 W. 5abf, 5ahr, 5ak, 5tj, 5yw, 6akz, 6awq, 6bm, 6bms, 6bra, 6cgv, 6lv, 6pl, 7af, 7ajh, 7ob, 7tt, 8aa, 8cay, 9ar, 9ami, 9aza, 9bly, 9bre, 9bth, 9ega, 9ezd, 9adw, 9dce, 9er, 9pn, Can. 4cb, 5eh.

Feb. 16th 2150 W. 6aos, 6brf, 6cgv, 6mh, 6vo, 6vk, 6zba, 7afo, 7om, 9azg, 9czm.

Feb. 17th 2340 W. 6age, 6cbd, 6ckr, 6ki, 6ol, 7ael, 7bj, 7ta.

Feb. 18th 2510 W. 5amu, 6aao, 6age, 6alr, 6cbd, 6cjh, 6pu, 7ael, 7qd, 7th, 7sh, 8ase, 9ami, 9ar, 9bly, 9cga, 9dli, 9gd, Can. 4fn.

Feb. 19th 2710 W. 5ht, 5tj, 6aao, 7acb, 7qd, 9dxn.

Feb. 21st 3050 W. 6bjj, 6bvg.

Feb. 22nd 3250 W. 5tj, 5za, 6arf, 6cay, 6cgv, 6cke, 6ckr, 6dd, 6gt, 7pf, 7qd.

Feb. 23rd 3430 W. Australian 2cm calling CQ Hawaii, U.S. 5ak, 5aks, 5auu, 5tj, 5zav, 6aao, 6abc, 6acm, 6aka, 6akw, 6any, 6ao, 6aol, 6aw, 6bfb, 6bdi, 6brf, 6ebe, 6cib, 6cke, 6cms, 6cmu, 6dd, 6en, 6gt, 6ip, 6ka, 6nb, 6od, 6rn, 6vk, 7abb, 7ael, 7em, 7ih, 7ks, 7ma, 7ry, 7ta, Can. 9bp.

Feb. 24th 3540 W. 5tj, 5za, 6aao, 6acx, 6acz, 6bvg, 6cjb, 6ckr, 6cmu, 6ip, 6kj, 6pu, 6zh, 7abb, 7aim, 7co, 7fq, 7ly, 7ta, 9ala.

Feb. 25th 3770 W. 6aao, 6agt, 6dd, 6ip, 7gq, 7ks, 7qd, Can. 6cl.

Feb. 26th 4010 W. 6cjb, Can. 9bp.

Feb. 27th 4200 W. 6bvg, 6cjh, 7em, Can. 5ch.

Feb. 28th 4417 W. 6abw, 6avj, 9dp.

Feb. 29th 4642 W. 6aao, 6lv.

Times are P.S.T. and often run into next date. Pse QSL to 3ae.

Canadian 3DF, Ingersoll, Ont.

(March 1st to March 13th)

4af, 4ai, 4ba, 4dv, 4er, 4ft, 4fz, 4gh, 4hr, 4je, 4jr, 4lj, 4mb, 4mg, 4mi, 4my, 4na, 4oa, 4og, 4oi, 4rf, 4rh, 4rr, 4ru, 4zg, 5aac, 5nas, 5naz, 5agd, 5agl, 5agn, 5aif, 5air, 5au, 5auj, 5ajz, 5ajt, 5av, 5amh, 5ami, 5amu, 5cz, 5dm, 5dq, 5ek, 5ez, 5ft, 5gj, 5gr, 5hl, 5ib, 5jh, 5jl, 5ku, 5kw, 5li, 5nw, 5ph, 5uh, 5ul, 5qr, 5qz, 5rg, 5rh, 5ro, 5sk, 5tj, 5uk, 5vm, 5xar, 5xd, 5za, 6aao, 6abk, 6acm, 6ajh, 6ak, 6akz, 6ape, 6arf, 6arp, 6avr, 6bb, 6bm, 6bhc, 6bcl, 6bdt, 6beg, 6bhr, 6bic, 6bjj, 6bjt, 6bnt, 6bnu, 6bnp, 6bi, 6buo, 6bur, 6buy, 6caw, 6cdi, 6cgr, 6cgv, 6cjh, 6cuj, 6ckd, 6ckp, 6ckr, 6cmr, 6emu, 6enc, 6eng, 6equ, 6dd, 6eb, 6fp, 6hc (vy QSA), 6jh, 6lv, 6ng, 6rn, 6tm, 6tu,

6chz. 6cih. 6civ. 6cka. 6ckp. 6ckr. 6cmr. (6cmu).
6cnc. 6cng. 6cnk. 6ea. 6ga. (6gt). (6ip). 6li. 6lu.
(6lv). (6nb). 6nx. 6od. 6pl. 6qj. (6rn). 6tn. 6ts. 6tu.
(6uc). 6ue. 6uw. (6vc). 6vd. 6vf. 6vm. 6zah. 6zar.
7abb. 7aci. (7ael). 7afn. 7agz. 7ahv. 7bj. 7cd. 7co.
7ej. (7fd). (7fq). 7gu. 7hw. 7it. 7iw. 7ks. (7lu).
7mn. 7oh. (7qd). 7th. 7sc. 7sf. (7th). 7to. 7ta. 7we.
7wp. 7ws. (7ya). 7zo.

Can.: 4cl. (4co). (4ea). 4ef. (4er). (4fv). 5cn.
Without aerial: (6aao). (6ahp). (7fq).

4RR. Wofford Campus, Spartanburg, S. C.
6afq. 6age. 6arf. 6aru. 6bcl. 6bpm. 6pl. 6tu. 6vw.
6xad. 6xt. 6zat. 6zbu. 7anb. (7bj). 7co. 7fq. 7ih.
(7kz). 7od. 7qc. 7wp.

Can.: 1ef. 1ei. 1bv. 1dq. 3aac. 3ms. 3oh. 3ph.
3ty. 3zt. 4cl. 4co. 4fz. 3db. (3fc).

5AJJ. 3704 Oklawm Ave., Dallas, Texas
lawe. (lbsz). lcit. (ler). (lcmp). lcmx. lfs. lfk.
lyb. lxu. (2bgi). (2bqk). 2vc. 2wr. 2xna (qra?)
2za. 3chh. 3dt. 3dr. 3hg. 3v. 3zc. 3cu. 3co. (4ab).
4af. 4cs. 4db. 4ec. 4er. 4g. 4jt. 4jr. 4ol. (4pk). 4sb.
4tj. 5's too numerous. 6aao. 6abk. 6adh. (6age). 6bic.
6bk. 6bij. 6bwd. 6ege. 6cmr. 6ecr. (6ux). 6vd. 6zcd
(qra?). 6zt. (6zbu. (7afn). (7akk). (7alk). (7em).
(7ks. 7mc. (7vn). 7zu. 8aii. (8bde). 8bji. (8cap).
8cci. (8ccd). 8scr. 8cci. (8cxi). 8cmu. (8dhs). 8fu.
8oh. (8vn). (8yn). 8vt. 8tt. 8xan. (8zc). (8zw. nines
too numerous.

Mexico: bx.

Cuban: (2ww).

Hawaii: 6ecu.

Porto Rico: 4oi. 4je.

Can.: (3bg). 3kg. 3ud. 4co. 4fz. (5ef).

5XAU. A. & M. Radio Club, College Station, Tex.
(laac). lag. lagh. (lare). (laur). (lawv). (lazu).
1bbp. 1ber. 1bt. 1boa. 1btt. 1bv. lcit. lein. lcix.
lcmx. (lepi). ldk. ldq. ler. (lfh). (lfs). lil. lka.
lml. (lmy). (loj). (lom). lpa. (lsw). (lvc). lxah.
lzp. 2aay. 2atz. (2bec). 2be. 2cg. 2hj. 2ku. (2blp).
2bn. 2bse. 2cti. 2csi. 2cvw. 2cx. 2ig. 2te. 2rr. 2vr.
2vw. 2xab. 2xaf. (2xna). (3ab). 3adl. (3auv). 3bgi.
3bnu. 3chs. 3ds. 3hs. 3lg. 3mo. (3oy). 3vj. 3vo. 3wb.
3yv. 4af. 4ba. 4bn. 4bz. 4cd. 4cg. 4co. 4db. (4dv).
4fg. 4fs. 4fz. 4gz. 4il. 4lj. 4ll. (4mb). 4me. 4my.
4pb. (4qy). 4rr. 4xc. (4xw). 6aao. 6acl. 6ae. 6aja.
6ae. 6af. 6aja. 6ajf. 6akw. 6al. (6alk). 6ar. 6aro.
(6aru). 6aup. 6aur. 6awe. (6bbw). 6bh. 6bij. 6bji.
6bs. 6blg. 6blr. 6bnu. 6bur. (6buy). 6cgw. 6cmr.
6erw. (6gg). 6of. 6pl. 6tw. 6xad. 6zag. 6zar. 6zp.
6zt. 7akk. 7ald. 7bj. 7fq. 7f. 7od. 7to. 7zu. (8ada). 8aip.
8aiw. 8ape. 8aw. (8azg). (8azp). 8bcp. 8bca. 8cc. 8cci.
(8cjp). 8cpc. (8scr). 8ctp. (8ewp). 8ex. 8cmz. 8dau.
(8daw). (8dc). (8dcy). 8dfb. 8dhq. 8dp. (8ji). 8ky.
8pl. (8rv). 8sup. 8xak. 8xhd. 8zcd. (8zk). too many
9's.

Can.: 2dn. 2fv. 3fc. 3jc. (3je). (3ms). 3xf. (3xi).

Cuban: 2vw.

Mexican: bx.

Jack Butts, Jr., P. O. Box 667, Sweetwater, Texas
1all. laur. lodo. lcvy (?). lva. 2brb. 2by. 2cla.
2czz. 2ll. 2rb. 3aaz. 3add. 3bg. 3bda. 3fc (?). 3hh.
3kq. 3xn. 4ba. 4dv. 4er. 4fz. 4kl. 4rr. 4sh. 6aao. 6aag.
6abk. 6agh. 6ajk. 6aja. 6ang. 6atn. 6aur. 6awq.
6bai. 6bbc. 6bbw. 6bij. 6bob. 6bq. 6bl. 6buh. 6cbu.
6cfm. 6civ. 6cmr. 6cmu. 6eng. 6enn. 6ja. 6aj. 6su. 6ux.
6zcd. 7ajt. 7ak. 7ald. 7er. 7di. 7fr. 7gc. 8aed. 8ah.
8aip. 8ak. 8apt. 8art. 8ate. 8avl. 8bec. 8bet. 8bdu.
8bfe. 8bfv. 8cc. 8cci. 8cei. 8cix. 8cky. 8cpd. 8cqh.
8crb. 8ctp. 8cwk. 8cwr. 8cxm. 8xsu. 8cy. 8dal. 8dbz.
8ddc. 8dff. 8dgp. 8dlb. 8do. 8fm. 8iy. 8li. 8lh.
8nb. 8ri. 8rn. 8dga. 9abf. 9add. 9afm. 9af. 9agy.
9aim. 9aix. 9ahz. 9akd. 9alc. 9alv. 9amb. 9amx. 9any.
9ato. 9av. 9avn. 9aw. 9apu. 9ayx. 9az. 9bcs. 9bgh.
9bgi. 9bhy. 9bjp. 9bky. 9hof. 9hog. 9bpu. 9br. 9brs.
9bsi. 9bsj. 9bsh. 9bss. 9bwc. 9bxu (?). 9ccs. 9ccw.
9caa. 9cea. 9ceg. 9cdh. 9cka. 9cko. 9cfi. 9cjc. 9jy.
9ciu. too many to mention.

Spark: 3adb. 5aki. 5lm. 5aep; 5qh. 7rr. 8cwr. 9apu.
9ccs. 9ees. 9er.

Pone: 5anw. 5lj. 5mf. 5og. 5qd.

Can.: 3co. 3kq. 4aj. 4cb.

6AFT. 9509 Vermont Ave., Los Angeles, Calif.
1ajp. 1amf. 1bom. 1lv. 1os. 1xam. 1xw. 2agb.
2atf. 2azy. 2bz. 2ciz. 2jd. 3ajd. 3ath. 3bdi. 3bg. 3bj.
3ccx. 3hh. 3jx. 3lg. 3oh. 3oi. 3pz. 3yo. 4by. 4bz. 4cb. 4cs.
4io. 4it. 4jr. 4my. 4oa. 4xe. 4xr. 4xw. 5aaq. 5aw. 5aw.
5adb. 5agz. 5aic. 5aiy. 5ajb. 5ajt. 5alm. 5alv. (5amo).
(5az). 5be. 5bz. 5ce. 5ev. 5de. 5eh. 5ft. 5ia. 5gf.
5gm. 5jh. 5jl. 5kc. 5mz. 5na. 5nn. 5og. 5pa. (5ql).
5qy. 5rg. 5sd. 5sk. 5sp. 5tj. 5uo. 5uv. 5va. 5vm.
5xab. 5zav. 7ach. 7adi. 7adg. (7ael). 7ajq. 7av.
7ax. 7cq. 7em. (7fq). (7fs). 7ft. 7ih. (7ke).
(7lh). 7ob. 7qc. 7qu. 7rd. 7sh. (7sy). (7vn). 8abm.

8acy. 8ada. 8ago. 8ajf. 8amr. 8aol. 8apt. 8ate 8bjv.
8Bk. 8Boc. 8Bnh. 8Brrn. 8cgl. 8cko. 8cmu. 8cto. 8ctp.
8cwp. 8cwr. 8dae. 8dat. 8abu. 8dgp. 8dhn. 8djd. 8dkb.
8dnh. 8fy. 8hn. 8hv. 8it. 8pl. 8qd. 8rn. 8sp. 8st.
8xbh. 8xlp. 8xbq. 8xs. 8yd. 8abf. 8ac. 8agf. 8ahq.
9aim. 9aic. 9avg. 9ayf. 9bav. 9be. 9bcu. (9bp).
9bpy. 9brk. 9bll. 9bze. 9ccv. (9ccz). 9cka. 9cvo. 9cx.
9czz. 9dak. 9dlf. 9ddp. 9dfh. 9dix. 9djb. 9dnd. 9dpx.
9dqu. 9de. 9dtn. 9dun. 9dwn. (9dy). 9dyr. 9cam.
9ca. 9eca. 9ecs (apk). 9eht. 9eky. 9eld. 9mc. 9ss.
9xak. 9xw.

Can.: 3bq. 4ao. 4bk. 4co.

KDEF.

6ARB. C. E. Duncan. 3029 Acton St., Berkeley, Calif.
1fd. 1jv. (lsw). 1yv. 1xw. 1xz. 1aer. (lavj). 1bbu.
(lboa). 1xak. 1xas. 2bg. 2bj. 2gk. 2ayv. (2brb).
2xab. (2xna). (3bb). 3mb. 3me. 3te. 3yo. 3zl. 3ckj.
4by. 4bz. 4cn. 4hi. (4io). 4ll. 4oa. 4yo. (4xc). 4xe.
(5ac). 5bd. 5nn. 5ny. 5ph. 4qf. (5ay). (5tj). 5xd.
5aar. 5aaw. 5auu. 5amb. (6cu). (7bj). (8pl). (8ad).
8alf. 8arv. (8boe). 8ckv. (8scr). 8ctp. 8xbh. 8xbr.
8xpb. 9mc. 9cr. 9vm. (9yy). (9az). 9ais. (9amb).
9ape. 9ac. (9azg). 9bab. 9bed. (9cu). 9cnc. 9cjc.
9clz. (9cmk). 9cxp. (9da). 9ddp. 9dfq. 9dkb. 9dro.
(9eca). (9eky). (9eld). 9xax).

Can.: 3bq. 2ni. 4cb. (4cr). 4dq. 4hh. (5aky).
9al.

6RVG. 1926 Delta Street, Los Angeles, Calif.

(Feb. 1st to Mar. 31st)
1abf. lcmp. lcmx. (ler). lxah. lxam. lwx. 2atz.
2chu. (2rk). (2xab). 3bz. 3mb. 3gt. (8xqa dalite).
4dq. (4io). 4oa. 4ot. 4xe. (4cc). 5aar. (5adb). 5aic.
(5ad). 5dw. 5ek. 5ht. (5lr). 5ov. 5pl. (5tj). 5tr.
(5vm). 5xat. 5xab. (6cu). (6cfz). 7abb. 7ad. 7afe.
7bj. (7fs). (7io). (7ke). (7ps). 7od. 7to. 7ly. 7tt.
7z. 7zu. 8akd. 8arv. 8bbf. 8cgu. 8hv. (8pl). 8xpb.
8xs. 8yu. 9agf. 9aif. 9apf. 9azg. 9aom. 9amb. 9aac.
(9ama). 9bly. (9bu). 9bu. 9bvf. 9bvp. 9bwp. 9cd. 9clz.
9ckw. 9ckj. 9eko. 9cjc. (9dhd). (9dix). 9dfn. 9dro.
9dpx. 9ry dalite. 9ry. 9ss. (9xba). (9xbd). 9xbe.
9xb. 9xi. 9xak. 9xw.

Can.: 3bq. (3ni). (4w).

KDKA. WGY on 100 meters.

7AJT. Basin, Wyoming
1bsz. 2afp. 3bz. 3rg. (both usa). 4jr. (vy qsa often).
5ado. 5aga. (5aiu). 5aj. 5amu. 5azu. (5ef). 5lr.
5rg. 5gd. 5fg. 5ql. 6acv. (6adt). 6afa. 6awq. 6bbw.
6blm. 6brj. 6cmi. 6cmu. 6ckr. 6ei. 6fm. 6gr.
6oz. 6gp. (6zbu). 6zh. 7aby. 7ads. 7ael. (7afk). 7afo.
7ahs. 7ajq. 7alk. 7akz. 7ayd. 7er. 7di. 7fq. 7fs. 7gi.
7gv. (7gw). 7ju. 7kv. (7ih). 7nc. 7om. 7ot. 7ry. 7rn.
(7pc). (7qd). 7zi. 8atc. 8bby. 8ci. 8bfh. 8cky. 8clc.
8cmv. 8cnw. 8dae. 8ded. 8dhn. 8dio. 8gx. 8hn. 8hv.
8jy. 8kj. 8wp. 9's too numerous.

Can.: 3rg. 4co. 4eo. 4uv.

ICW: 1uj. 5cn. 5qd. (7el). 8ga. 9aim. 9cip.

(7CW). (9aec).

Fone: 5akf. 5qd. 6fm. 7co. 7qc. 9azg. 9efi.
Dalite CW: 5agn. (7co). 9agf. 9amp. 9bhi. 9bqy.
9bvm. 9bxt. 9cym. 9cyx. 9dej. 9df. 9dnd. 9eak.
9egu. 9ekf. 9eky. 9hk.

7BJ. Vancouver, Wash.
1agh. 1are. 1aur. lomp. (lfs). 1oj. 1xak. 1xar.
2agb. 2by. 2brb. 2xna. (3apv). (3aia). 3bj. 3cz. (3gc).
3me. 3ot. (3qv). 4db. 4fs. (4hs). 4jo. (4rr). 4xc.
(5aic). 5aij. 5jt. 5ab. 5dm. 5dw. 5qd. (5nw). 5pa.
5ph. (5zav). 8aii. (8arm). (8awi). 8arv. 8c. (8scr).
8ctp. 8cwp. (8cvm. (8cxm). (8dcy). (8die). 8dha.
8om. 8qm. 8xpb. 8xbh. (9acx). 9aem. 9agb. 9agl.
9aic. 9aju. 9alc. 9axx. (9ab). (9bbs). 9bez. 9beu.
(9bop). (9bvn). (9bze). 9bvp. (9ca). (9ccw). 9ccx.
9cfx. 9chc. 9cwf. 9dhh. 9dyr. 9dyz. 9dxk. 9ec. (9egw).
9eld. 9elz. 9eiv. 9ez. (9ry). (9yy). 9xbe. 9xaw. KDEH.
Can.: (8bq. 3adn. (4hh). 4cr.

SCFS, Freeport, Pa.
1aw. 1bl. (1ci). 1ek. (1db). (1dl). 1er. (1ez).
(1fd). 1gn. 1gl. 1gs. 1hn. 1kc. 1kv. (1la). 1oj.
1qr. 1se. 1sk. 1um. 1uo. (1xm). 1xu. (1yb). 1abx.
1aen. 1ain. (1aki). 1ala. 1ami. 1aol. 1apu. 1arp.
1ary. 1asu. 1av. 1aw. 1awy. (1axa). 1axn. 1axz.
1bbo. (1bgc). 1bgt. 1bie. (1bns). 1bsz. 1br.
(1bv). 1cbh. 1cbj. (1cpj). 2al. 2as. 2ay. 2bz. 2cg.
2cl. (2cx). (2el). (2lu). 2jd. 2js. 2kf. 2kr. 2ks.
2le. (2om). 2qb. 2rb. 2rk. (2sq). 2ade. (2adu).
(2ana). 2ann. 2apa. 2asm. 7. (2ay). 2bw. 2bgo.
(2bqb). (2bgg). 2bql. 2bq. 2bt. 2br. 2bwp. 2bx.
2bxp. 2byk. (2cgt). 2chu. 2chz. 2cja. 2cjj. 2cjk. 2cmz.
2col. 2cpa. 2cpz. 2cqi. 2cqz. 2ca. 2cuo. 2cwl. 2cwp.
2czh. 3av. 3bz. 3bx. 3bz. 3ek. 3fs. (3hg). 3iw. 3jx.
3lg. 3lk. 3li. 3ly. 3mi. 3mo. 3oe. 3oq. (3pz). 3qt.
(3sm). 3wf. 3xa. (3zm). 3zo. 3abw. 3ade. 3adp.
3aek. (3alx). 3apc. 3aut. (3avk). 3bay. 3bco. (3bdr).
3bdu. 3bei. 3bez. 3bg. 3bgz. 3bic. 3bip. 3bml. 3bms.

3bnu, 3brf, 3bta, 3bwt, (3cbz), 3ccu, 3ccv, 3ccx, (3cdc), 3cjin, 3ckl, (4af, 4af, 4eq, 4ft 4gn, 4hr, 4jr, 4ll, 4my, (4og), (4pk), (4su), 5bc, 5cn, 5ek, 5gr, 5jl, (5mb) 5ml, 5na, 5nt, 5qd, 5ql, 5rg, (5sp), (5ua), 5uk, 5vm, 5xa, 5yd, 5zb, 5ado, 5aiu, (5air), 5ajh, 5alv, 5amh, 5amu, (5zav), 7co, (9bk) (9ce), 9dp, 9ed, 9ei, (9ep), 9eq, 9es, 9gz, 9hv, 9ih, 9le, 9lz, 9mc 9pb7, 9ql, 9qw, (9rc), 9ta, 9vc, 9vk, 9wc, 9wn, 9zg, 9aag, 9aau, (9abf), 9aep, 9afi, 9afz, 9ahh, 9ahj, 9ahq, 9ail, 9amf, 9ami, 9amu, 9aol, 9aor 9aps, (9aqd), 9aru, 9ash, (9atn), 9aue, 9aus, 9auy, 9avn, 9aw, 9awp, 9awu, 9awx, 9awz, 9aza, 9bal, 9bcn, 9bdc, 9bge, 9bgk, 9bjj, (9bjq), (9bly), 9bof, 9boc 9boz, 9bqj, 9brk, (9brs), 9bsp, 9bttm, 9btt, 9buk, 9bvz, 9byf, 9caz, 9ccs, 9efc, (9egy), 9cjc, (9ejm), 9cjt, (9ckh), (9ckp), 9ckq, 9cnv, (9cow), 9cpd 9etz, 9ctv, 9cui, 9cvo, 9cwy, 9czm, 9daw, 9dbf, (9dcp), 9dgh, 9dhr, 9dhw, 9dia, 9djz, 9dlw, 9dnn, 9dnp, 9doc, 9dof, 9dpl, 9dpw, 9dso, 9dtn (9dwa), (9dy), 9dyy, (9efz), 9egb, 9egz, 9eky, 9eib, 9ell, 9elv 9ewa, 9xbe.
 Can.: (3bg), (3he), 3hi, 3ml, 3nf, 3rg, 3ws, 3wv, (3zt), 3afz.

Geo. Krivitsky, Scottville, Mich.

6aaq, 6agk, 6ajh, 6alo, 6ape, 6aps, 6bad, 6bbc 6bbh, 6bm, 6bri, 6bse, 6bsg, 6bv, 6cbw, 6cfm, 6cfz, 6cjr, 6cka, 6cmu, 6cnn, 6gm, 6ja, 6nx, 6qj, 6ry, 7aby, ael, 7aj, 7di, 7fq, 7ge, 7iw, 7jy, 7no, 7qc, 7qu.

L. F. Strohd, 680 Yale St., Akron, Ohio

laac, lahl, laiy, laj, laju, lair, laiw, laan, lapw, lar, laze, larp, laaf, latj, lavj, law, layt, lbc, lbb, lboa lbqd, lbrl, lcaz, lccx, lode, lci, lomp, lcmx, ldq, lfd, lfs, lgl, lij, liv, ljt, lju, lkc, lkx, lle, llp, lml, lmy lrs, law, lvc, lvv, lxak, lxj, lxw, lxz, lyw, 4ai, 4ba, 4bq, 4db, 4eq, 4er, 4fs, 4jr, 4jl, 4ll, 4my, 4na, 4oa, 4og, 4rr, 4si, 4sk, 4wc, 4xc, 4xe, 4xr, 4wt, 5aaz, 5abd, 5ac, 5aic, 5air, 5aiu, 5ajy, 5ajb, 5ajj, 5ajt, 5alv, 5amf, 5amg, 5ami, 5amu, 5amz, 5ap, 5ek, 5fc, 5fu, 5gl, 5hj, 5kq, 5lr, 5mi, 5mo, 5mz, 5nw, 5ot, 5ov, 5qf, 5qh, 5ql, 5qy, 5rg, 5rh, 5ts, 5tw, 5vc, 5vt, 5vv, 5xa, 5xab, 5xat, 5xd, 5yw, 5za, 5zb, 5zc, 6aaq, 6ada, 6afr, 6age, 6ahp, 6ajh, 6bjp, 6ais, 6akw, 6bbc, 6bbw, 6bcl, 6bic, 6bjj, 6bm, 6bou, 6brf, 6bri, 6buu, 6cbw, 6ccy, 6cgw, 6cjr, 6clb, 6cmr, 6cmu, 6cng, 6eb, 6fo, 6fp, 6fv, 6nb, 6qj, 6ux, 6zh, 6zt, 7acz, 7adi, 7ajt, 7akh, 7co, 7fq, 7ij, 7qc, 7qu, 7st, 7zu, 9aal 9aap, 9abc, 9aci, 9adr, 9afr, 9agb, 9agt, 9ago, 9aah, 9aib, 9aim, 9aki, 9amp, 9ape, 9apf, 9aqg, 9ari, 9arp, 9ato, 9atu, 9avb, 9avc, 9avn, 9avo, 9avs, 9avt, 9aw, 9axx, 9ayj, 9ayy, 9bab, 9bfn, 9baz, 9bbc, 9bcx, 9bdq, 9bdc, 9bgh, 9bhh, 9bhs, 9bhx, 9bhy, 9bis, 9bix, 9blg, 9blr, 9bmx, 9bow, 9boz, 9bpc, 9bqy, 9brk, 9bri, 9bss, 9bte, 9bto, 9bt, 9bun, 9bvv, 9bye, 9bze, 9caa, 9ccs, 9ccm, 9cdi, 9eel, 9efi, 9cgk, 9chl, 9cht, 9cjc, 9cjr, 9ckm, 9cd, 9cmk, 9co, 9cog, 9cov, 9cpt, 9cpk, 9cpu, 9cpz, 9crd, 9ctg, 9cvo, 9cvg, 9cyn, 9czm, 9dai, 9dao, 9dba, 9dfh, 9dhw, 9dip, 9dia, 9dij, 9dnd, 9dvw, 9dot, 9dot, 9dpl, 9dpw, 9dqu, 9dr, 9dro, 9dte, 9dvi, 9dwi, 9dwx, 9dww, 9dxn, 9dxy, 9eae, 9eac, 9ear, 9ebh, 9ebt, 9eer, 9eii, 9eku, 9eky, 9elz, 9fr, 9gs, 9hm, 9ig, 9ln, 9mi, 9ry, 9st, 9xax, 9xbd, 9xw, 9yau, 9zt.

Can.: 1dj, 2az, 2ce, 2cg.
 Short waves: laac, lar, lbc, lfd, lif, liv, lju, lsw, lxak, lxw, lxz, 4oa, 4xe, 4xe, 4xr, 4zw, 5aic, 5lr, 5tw, 5xab, 5xat, 6bjj, 7ij QRA?, 9xax, 9xbd, 9xw. Canadian 2az.

9CXP, Minneapolis, Minn.

(laac), lael, laf, lafn, lagh, lagr, laiw, larp, laur, laur, lavj, layf, lber, lbeg, lbqc, lbhm, lbnt, lbsd, lccx, lomp, lomm, lfd, lfz, liv, lju, lkc, lka, lmc, lmy, lom, lsw, (lvc), lxah, 7xak, (1xi), 2aay, 2abn, 2agb, 2age, 2arz, 2ay, 2ayv, 2az, 2bbx, 2be, 2bpl, 2bqb, 2bqw, 2buq, 2by, 2bxd, 2cbp, 2cei, 2civ, 2cla, 2cvu, 2gk, 2gm, 2xab, 2xn, 2abw, 3acy, 3adb, 3ade, 3adi, 3adu, 3aeb, 3aek, 3arg, 3arp, 3arz, 3atb, 3bev, 3bdi, 3bei, 3bcg, (3bj), 3bmn, 3bn, 3bnu, 3bq, 3bo, 3bva, 3bv, 3bwj, 3cbx, 3ccz, 3cjin, 3ckj, 3ekl, 3ec, 3ex, 3kq, 3ms, 3ol, 3uu, (3vw), 3wg, 3xx, 3qg, 3yo, 4bg, 4cr, 4db, 4dg, 4dv, 4ea, 4fg, 4ft, 4fv, 4hh, 4ik, 4io, 4jt, 4jr, 4ll, 4mb, 4nc, (4oa), (4xc), 6aaq, 6abc, (6abk), 6age, 6aid, 6ajf, 6ajs, 6alk, 6alv, 6amg, 6aoe, 6aqv, 6arb, 6avp, 6avr, 6bbu, 6bcl, 6bdt, (6bez), (6bic), 6bh, 6bj, 6bjj, 6bky, 6bnu, 6bou, 6bqb, (6bql), 6brf, (6bui), (6buo), 6bur, 6buu, 6bvr, 6ccn, 6cdj, 6cej, 6cfm, 6cfz, 6cgw, 6che, 6cl, 6civ, 6cka, 6ekr, 6cmd, 6cmj, 6cmu, 6cn, 6cnc, 6eal, 6aw, 6gj, 6gq, 6ja, 6ji, 6nx, 6of, 6pl, 6pu, 6qj, 6tu, 6tv, 6uw, 6vw, 6wn, 6xad, 6xbe, 6xe, 6zh, 7acm, 7ad, adi, 7adr, 7adt, (7afn), (7afv), 7afy, 7age, 7agt, 7aha, 7akh, 7aid, 7ald, 7ali, 7co, 7cw, 7de, 7ey, 7fa, 7gd, 7gr, 7gs, 7if, 7il, 7ij, 7io, 7kg, 7kr, 7mc, 7nr, 7ob, 7oy, 7qd, (7qu), 7to, (7tt), (7yi), (7zu).

Can.: 1bq, 2az, 2dn, 2bn, 2cg, 2do, 2ei, 2be, (3aac), (3bq), (3adu), 4co, (4fv), (4ao), 4au, 4dd, 4rr, 4cr, 4io, 9cf, 9al, 9ap.
 Mex.: bx.
 wnp, kgv, kdef.

9DJP, Lincoln, Neb.

lagf, laiu, lajp, lasu, laxn, lbqz, lbsz, ler, lil, lke, lrv, lu, 1uj, 2ak, 2na, 2aoz, 2azy, 2by, 2cee, 2cgl, 2cl, 2cup, 2czz, 2gl, 2ga, 3acy, 3ajg, 3bt, 3bva, 3bvh, 3bwt, 3bz, 3ckk, 3cin, 3ds, 3iw, 3lg, 4ab, 4bc, 4er, 4eq, 4ha, 4it, 4jr, 4jz, 4ny, 4og, 4pb, 4pk, 4xc, 6aaq, 6acu, 6age, 6ajh, 6ak, 6akw, 6akz, 6akr, 6amw, 6aol, 6arf, 6auu, 6av, 6bbc, 6bcl, 6beg, 6bh, 6bij, 6bik, 6bjr, 6bmn, 6bm, 6bnf, 6bn, 6bou, 6bpm, 6bqb, 6brf, 6bvs, 6cbe, 6cbu, 6cfz, 6cgs, 6cgw, 6ckr, 6cmu, 6fp, 6gr, 6mg, 6nx, 6pl, 6qh, 6jt, 6ue, 6uw, 6ux, 6vf, 6xe, 6zcd, 6zh, 7adf, 7ads, 7af, 7aj, 7co, 7fr, 7fq, 7ks, 7tl, 7ns, 7ob, 7ot, 7qd.
 Can.: 2fu, 3adu, 3fc, 3ok, 3mf, 3ni, 3ms, 3oh, 3pz, 3ws, 5xi, 4zt, 4co, (4fz), 5go.
 Porto Rican: 4je.

9XBE-9ZY, La Crosse, Wisconsin

1aj, 1fb, 1fs, (1gb), 1il, (1iv), 1oj, 1pf, (1sw), 1ur, 1xa, 1xj, 1xu, 1xz, (1xw), 1yb, 1yk, (1zt), 1abb, 1abf, (1aac), 1aun, (1ahl), (1ajp), 1ajx, 1are, 1avj, 1awe, 1bqg, 1bom, (1bap), 1xae, (1xah), (1xak), 1xar, 2at, 2by, (2gk), 2nw, 2rb, 2xi, (2xq), (2yt), (2acs), 2na, (2bgj), 2bh, 2brb, 2bzc, 2bxd, (2csi) 2cvu, (2cwj), 2xab, 3ab, 3bj, 3qg, 3cc, (3hh), 3oc, 3ot, (3pz), (3qt) 3z, 3te, 3xi, 3yo, 3air, 3av, 3avy, 3ba, 3bc, (3bdi), (3bji), (3bva), 3bwj, (3cjin) 3ckf, (3ckj), 3xag, 4er, 4fg, 4hn, 4hs, 4ik, (4io), 4jr, 4ku, 4lj, 4mb, 4on, (4rh), (4r), (4xc) 4xr, 4dm, 5ip, 5ir, 5mi, (5nn), 5qd, (5ua), (5ut), 5zk, 5xk, 5xyv, 5aar, 5aas, 5aiu, 5ajb, 5ajj, (5akf), 5akn, (5alk), (5amu), (5anf), 5xat, (5zav), 6dd, 6ev, 6gt, 6od, (6of), 6nx, (6ux), (6av), 6acu 6acy, (6age), (6aja), (6arb), (6arf), (6axv), (6bjj) 6bny, 6bui, (6bwd), 6cbh, 6cdg, (6cee), 6cgw, 6cmu, (6xbc), (7co), 7em, 7fd, 7fq, (7gr) 7kz, (7tt), (7wp), 7afv, (7akh), 7alk, 7sk, 7ym, 8yr, 8zk, (8ate), (8bd), (8ci), (8die), (8xpb), (8xqj).
 Can.: 1bq, 1cg, 1dj, (2an), 2be, 2bg, (2bn), 3he, 3kg (3th), (3xi), (3xn), (3z), 3adn, (3aac), (4bk), 4cb, (4cr), (4ea), (4fz), 4io, 4cf.

THE TRAFFIC DEPARTMENT

(Concluded from page XII)

route on short waves are: 4CL, 4CW, 4DQ, 5CN and 5CT.
 Stations holding new O.R.S. appointments are: 4AB, 4DQ, 4CW, 4IO, 4CL, 5AK, 5AH, 5EJ, 5AS, 5GO and 9BP, and only stations with new certificates are eligible for work of official nature.
 4CL gave us a dash or two about his leaving for Vancouver. Edmonton has been holding its own, but if 4CL leaves we will have to get another live station up there. The R. I. for Calgary is a ham working under the call 4AX and has offered his assistance.
 ALBERTA—4IC is away for the month. 4DQ got on again the last part of the month and worked into Illinois and Texas. He also established the old 4DQ-5CT route again. 4AB is on regular and doing good work on a 10-watter, keeping traffic going east and south. 4CW takes the "berries" for the month. He reports great results on 110 meters. What has become of all the live hams in Calgary who were installing transmitter? 4IO has too much work QRM and has not been able to get down on low waves yet.
 VANCOUVER—With the removal of 5AS to Vancouver there are no active stations outside Vancouver City. 5AH, with a 50-watter, will be on short waves when he gets it perkin' good. 5AK is handling traffic up and down the coast. 5EF and 5HG are still pounding away. 5EJ has not been on because too much business. 5CN is on again with the old 50-watter.
 EDMONTON—4CL will be off the air for a while having left for Vancouver. This leaves only 4HF, an old time op and a good station. 4HL is a new station about to open up with a 5-watter. WNP has not been worked for some time.
 THE YUKON—The most northern station is 5AW of Whitehorse, owned by L. Geary. He logs WNP regularly, Canadian 3NI, 4DQ, 5CN, 4CL, also American ones, twos, threes, fours and lots of fives and nines. His transmitter is spark coil C.W.
 VANCOUVER ISLAND—D.S. Reeves sent in a report with little activity on the Island. He has not heard from 5EK who is the second station there. 5CT is back on the air after repairing his broken mast, and down on a short wave, too.