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QST

H.R. HICK

19 MAY 16

THE AUDION AS A DETECTOR OF UNDAMPED WAVES.

League News

The Queries Department.

A MAGAZINE DEVOTED EXCLUSIVELY TO THE AMATEUR.

Volume I MAY, 1916 Number VI

Q S T

A MAGAZINE DEVOTED EXCLUSIVELY TO THE AMATEUR

CONTENTS

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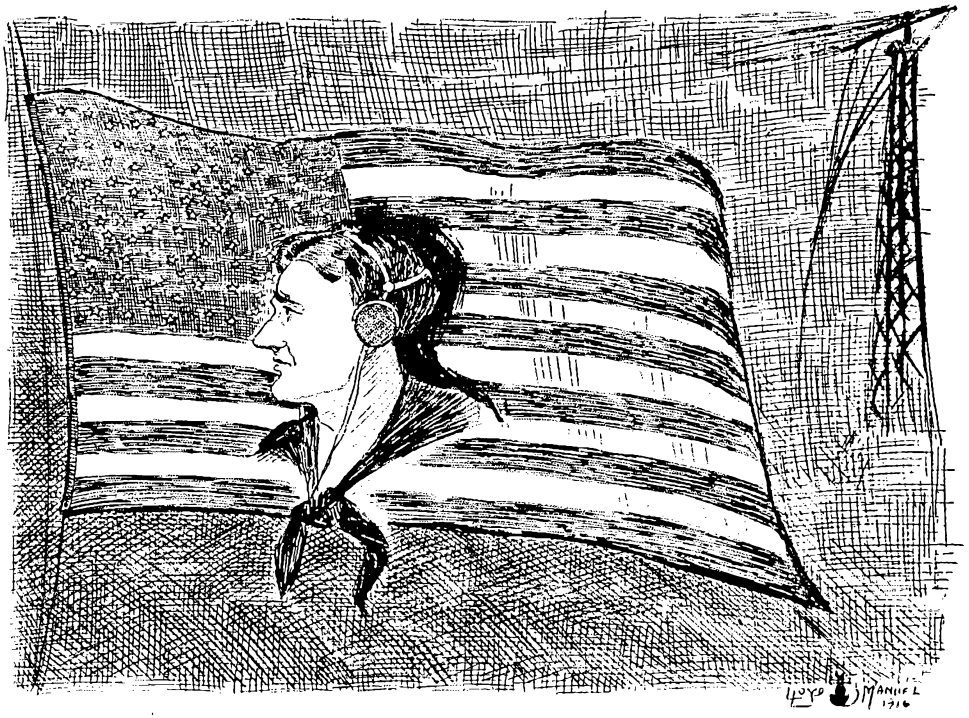


With the respect and admiration of
the Amateurs of the U. S. A.

May Radio Relay Bulletin

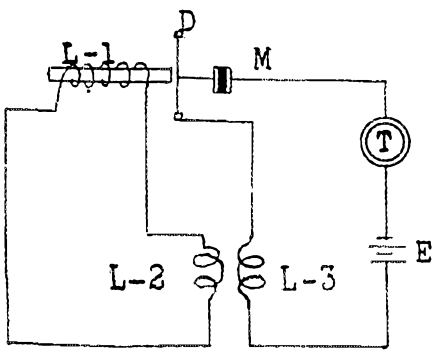
The Audion as a Detector of Undamped Waves

With introduction by the Editor, and description
by C. D. Curtis and W. O. Horner.

INTRODUCTION

NUMEROUS articles have appeared on the oscillating Audion and various hook-ups have been devised, but in this article the purposes is to show the W. Ross McKnight circuit and a simple connection which can be attached to an RJ5 DeForest Audion. The working principles of the Audion as a detector of high frequency oscillations is well-known to the amateur field. It is generally granted that the audion works on a "trigger" principle rather than as a rectifier. The working of an Audion with undamped waves may be understood by reference to a simple little analogy shown in Fig. 1.

On closing the battery circuit "E", a current is induced in the coil "L-1." If the windings of "L-1" are properly selected with regard to the magnet which forms its core, the induced current will cause an attraction of the diaphragm "D". This increases the resistance of the microphone "M" and results in a decrease of the current in the battery circuit. The resulting fall in current induces a current in "L-2" which acts through the magnet and repels the diaphragm. This time, the microphone resistance is decreased and once more the current in "L-3" is increased and the cycle starts anew. With a sensitive magneto-microphone relay, a comparatively large current is set up in the battery circuit. This alternating current may be heard in the telephone "T."



This condition of affairs is nearly the same in an oscillating Audion hook-up. One circuit we may assume to be the secondary of the loose coupler, together with the grid and filament of the bulb. The second circuit is known as the wing circuit which consists of the inductance coil, filament, wing, telephone receivers, batteries, and condenser. The incoming signals set up oscillations in the grid circuit which repeat themselves in the wing circuit and thereby produce variations in the high potential battery which may be heard in the telephone receivers.

A more complete discussion of the question may be found in text books and in the Proceedings of The Institute of Radio Engineers. The short explanation which has been given will help the reader to understand what he is working for. The articles which follow by Mr. Curtis and Mr. Horner describe the apparatus and give a careful description of the workings. Every amateur who has done no work with the oscillating Audion now has an opportunity to read an article which is correct and written by those who have obtained results.

CONSTRUCTION

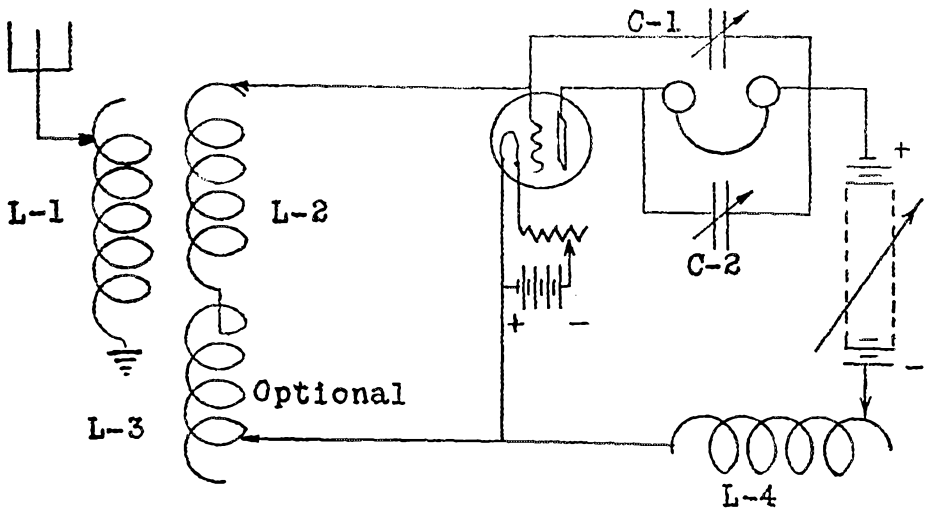
by C. D. Curtis

Superintendent of Schools, Pembina, N. D.

The Wireless Club in Pembina consists of about six members, all of whom have experimented with the Audion. The results for successful work I take pleasure in

presenting to the readers of "Qst." Drawing No. 1 is simply a modified form of the McKnight hook-up. This combination has been used very successfully since last October.

One of the most important pieces of apparatus which one needs if he is trying to get into long distance receiving is a loose coupler, capable of receiving long waves. While the average undamped wave is in the neighborhood of 10,000 meters, we



built our loose coupler capable of tuning to nearly 30,000 meters. Strange as it may appear, this loose coupler will also bring in 200 meter amateurs from all over the country. The primary and secondary of the loose coupler are respectively numbered L-1 and L-2 in the drawing. The primary is 24″ long and 8″ in diameter, wound with No. 24 D.C.C. copper wire. The secondary is of the same length, but only 7″ in diameter and wound with No. 26. The writer finds that 18 taps give sufficient variation in the tuning system. Coil L-3 is a duplicate of L-2, but it is optional as the circuit works with scarcely any difference, whether the coil is in or out. Coil L-4 is a small one, being about a foot long and 5″ in diameter. This coil is wound with No. 26 D.C.C. and has 12 taps.

No description need be given about the wood work of the loose coupler. Every amateur uses his own methods and his own ideas in that part of the apparatus. However, it might be well to say that the writer found it necessary to construct his own tubes which consisted of two thicknesses of cardboard of proper size, which were sewed together lengthwise. Two coats of shellac were given on the INSIDE to keep the cardboard from shrinking. After the winding one coat of shellac was put on the outside.

In the accompanying drawings the variable condenser marked C-2 can be exchanged for a fixed. The writer took eight sheets of heavy tinfoil, 2½″ wide and 6″ long with heavy brown paper as a dielectric. When the right capacity was found, this fixed condenser worked as well as a variable and once the right capacity was found it required no further changing. Besides, it will save one's pocketbook as it cost about ten cents and ten minutes' time.

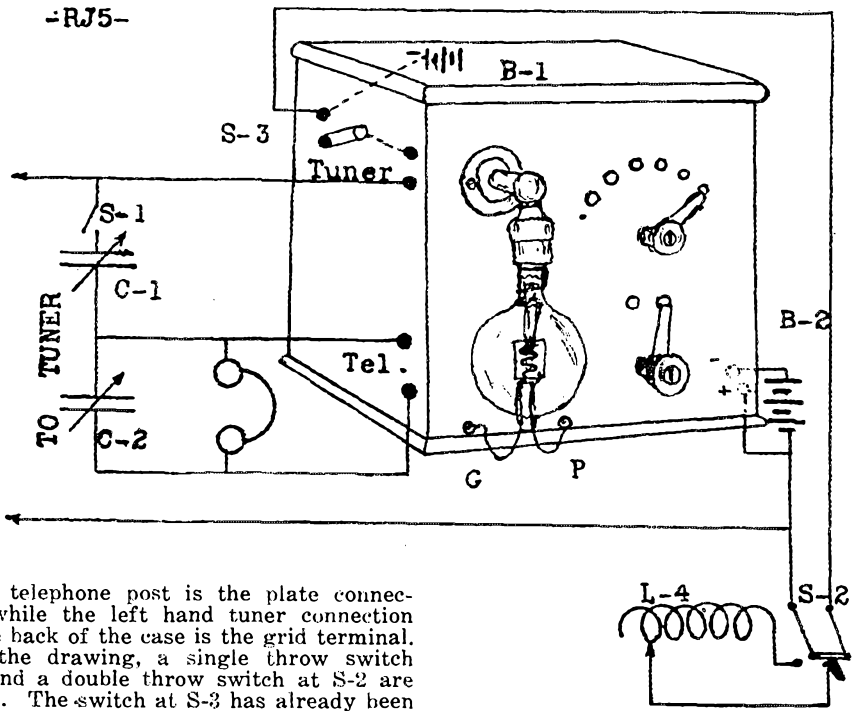
The primary coil is very large but the writer finds that rarely more than four inches are used. All the Government stations using undamped waves may be heard on just one inch of primary winding. When coil L-3 is not used, every turn of the secondary coil, L-2, is brought into play.

All of coil L-4 is also used. Condenser C-1 is a common rotary which costs about $4.00.

HOW TO TURN AN RJ5 INTO AN OSCILLATING AUDION

Drawing No. 2 shows the writer's double hook-up on an RJ5 Audion detector. The following explanation describes this circuit. A cover has been removed and the wire leading from the negative terminal of the flash-light battery to the upper tuning post has been cut. Here the writer has inserted a small nickel plated switch on the outside of the box whose terminals are marked "1" and "2". The ends of the cut wire are soldered to the posts of the switch on the inside of the audion cabinet.

This little switch adds to the beauty of your Audion and only costs about five cents and takes nearly a half an hour to insert. (Note: If you have an RJ4 model, cut the wire which leads from the positive pole of the illuminating battery to the first negative flash-light battery terminal. Then insert the switch as described above. This locates the switch in the upper right hand corner of an RJ4). In the RJ5 model the lower tuner post is the grid terminal, while the lower telephone post is the plate connection. A wire run to either D or P will give the same results. That is, either terminal may be used. In the RJ4, the upper telephone post is the plate connection while the left hand tuner connection on the back of the case is the grid terminal.

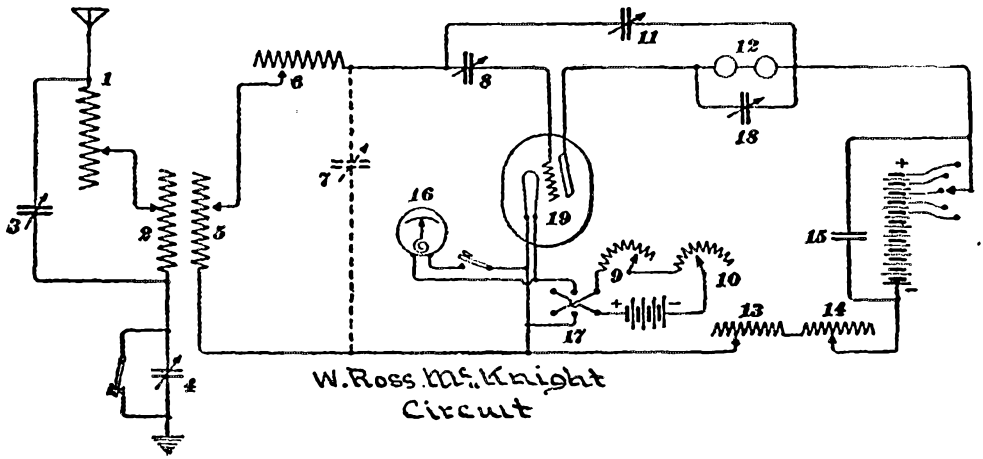


In the drawing, a single throw switch S-1, and a double throw switch at S-2 are shown. The switch at S-3 has already been described. For continuous or undamped waves, open S-3 and leave the two others closed. For spark stations, close S-3 and open both S-1 and S-2. One may observe that closing S-3 places the Audion in exactly the same hook-up as before the wire was cut. While opening S-1 and S-2 cuts out both condensers and the extra coil, L-4. If one wishes to use a variable condenser, across the secondary, it can be used for spark signals without interfering with the ing on continuous oscillations and they certainly have a fine flute-light note. Without the slightest inconvenience, I can work the switches and brighten up the bulb then NAA comes in with a loud, clear, distinct note. With the same facility, I can change to the other system. I am using the same batteries, both high potential and illuminating, also the same Audion bulb, with which I started last October. I have never lit the second filament except to test it for a few moments. During experiments, I have tested out six bulbs and all oscillate quickly without the slightest sign of trouble. Germany has been clear here all winter, but I have not heard the German station for nearly a week and I don't suppose they will be heard again until Spring.

THE ROSS McKNIGHT CIRCUIT

By W. O. Horner, Cleveland, Tenn.

The writer is pleased to place before the readers of "QST" an efficient circuit for



undamped waves originated by Ross McKnight with whose permission, the circuit is shown. I am using a triple Audion amplifier, together with a two-step Multi-Audi-Fone, a loud speaking phone and horn. With this equipment I hear the NAA spark station and many high power undamped stations. Strong signals can be heard at two city blocks from the apparatus. The keen whistle note sounds like a tin whistle and by tuning condenser No. 11, it gives a musical note resembling a clarinet. I use double pole double throw switches so I can cut out the inductance coils and condenser in order to receive time signals from NAA. As soon as I have picked him up, I throw in a portion of No. 13 and 14 inductance which acts as an amplifier. Lastly, I finish up with condenser No. 7, and throw in the loud speaker which shouts Arlington's time so that everybody in my jewelry store hears it.

We have picked up the Radio Telephonic experiments conducted by the big Naval station at Radio, Virginia, on a wave length of about 5,000 meters, as well as the European stations. The Experimenter who wants one of the best and most sensitive stations should try out this circuit.

Monthly Report of Trunk Lines "C" and "D"

A. A. Hebert, Manager, Nutley, N. J.
(2ZH.)

April 17th, 1916.

The manager takes pleasure in reporting that the lining up of Trunk Lines "C" and "D" is progressing very satisfactorily.

Trunk Line "C." Messages are now being relayed between Boston and Philadelphia, usually in one relay. It is, however, the intention to have relay stations every 25 miles so that during "QRN" uninterrupted communication can be carried on. Whenever possible the messages for distant points will be handled by "Star" Stations, those being able to work at least 100 miles or more. So far, Trunk Line "C" has been arranged as follows, the gaps we desire to fill appearing under a question mark:

Boston, Mass..
Mansfield, Mass.
Providence, R. I.
Westerly, R. I.
New London, Conn.
Middletown, Conn.
Hartford, Conn.
Waterbury, Conn.
Ansonia, Conn.
?
?
Port Chester, N. Y.
Port Washington, N. Y.

Yonkers, N. Y.
[Leonia, N. J.]
[Lakeview, N. J.]
[Nutley, N. J.]
Newark, N. J.
Elizabeth, N. J.
[Roselle Park, N. J.]
[Westfield, N. J.]
New Brunswick, N. J.
Trenton, N. J.
[Abington, Penna.]
[Philadelphia, Pa.]
[St. David's, Pa.]
Vineland, N. J.
Wilmington, Del.
Baltimore, Md.
?
Washington, D. C.
?
Fredericksburg, Virginia.
?
Richmond, Va.
?
?
Portsmouth, Virginia.
?
?
?
Raleigh, N. C.
?
?
Wilmington, N. C.
?
?
Summerville, South Carolina.
Charleston, S. C.
?
Savannah, Georgia.
?
?
Jacksonville, Florida.
St. Petersburg, Fla.
Miami, Fla.

Any one whether or not a member of the League, knowing of Amateurs in Cities not appearing above, who could fill in the gaps represented by question marks, will confer a great favor on the Manager by writing him a letter with the information.

It is the purpose to print in the June number of "QST" the different station appointments under their respective Cities, giving the Call Letters, and name of the owners.

The cities appearing in brackets, are within a short distance of each other, with good sets, and will act as relief to each other in the relay work.

Trunk Line "D" So far not much work has been done in connection with Line "D" for the reason that there are too many long distance gaps which we are trying to bridge over. From the present outlook New York City, will be the junction point of Line "D," although not much relay work will be done by the stations in this city on account of "QRM," same being taken care of by the stations at Leonia, N. J., and Lakeview, N. J. on account of their desirable situations. It is to be hoped that with the next issue of "QST," the names of the Cities on this Trunk as well as the Stations, will

Mr. A. A. Hebert

appear, but information is desired on how to bridge between Cincinnati, Ohio, and Nashville, Tenn. via Louisville, Ky. as no record can be found of any station in Kentucky.

One test message was sent on Trunk Line "C," Monday, April 10th, being addressed to Headquarters at Hartford, Ct., and was received direct by one of the relay stations 102 miles away. During the week regular work was carried on by "2ZE" (Leonia, N. J.) with "1LE" (Boston, Mass.) a distance of over 200 miles. Special mention is made of "2ZE," his record for one night last week was the clearing of 56 messages. It is the intention of the Manager of this District to send out a test message every Monday and Thursday nights, at 11 o'clock, addressed to some distant relay station, to be sent farther by this station in accordance with instructions contained in the message. A prompt acknowledgement by the receiving station should be made. This test message will be sent on a wave length of 450 meters. Cooperation is asked, and suggestions will be cheerfully received.

A. A. HEBERT.

Radio Station 9IK,
1316 Carmen Ave.,
Chicago, Ill.

April 15, 1916.

Mr. H. P. Maxim,
Pres. A. R. R. L.

Dear Sir:

After my appointment as District Manager of routes A and E, I wrote a number of circular letters, which I sent to all the long distance stations that I had heard or worked with, along those routes. In these letters I stated the purpose of the test message, and asked for cooperation with me in their organization. I was more than gratified at the answers which I received.

Using these stations as a basis, I then plotted out the routes; and the present arrangement of the stations is as follows:

Mr. H. G. Mathews

Route A

East from Chicago—9IK, 8NH, 8ZI, 8JZ, 8JX and 8QB, 2AGJ, 2IB.
West from Chicago—9IK, 9BD, 9XN and 9YG, 7BD, 7ZH.

Route E

9IK, 9GY, 9NN and 9JT, 5XO, 5ZC. No stations farther west.

I appointed 9EF of Chicago as my assistant. These stations are not an absolutely fixed appointment, as, if on trial, this arrangement does not work satisfactorily, more stations will have to be filled in between those already appointed.

On Thursday, April 13, the first test message was sent over the routes as above. At 8:30, 9:15, 9:30 and 9:45, 9EF and 9IK both sent the following message as a QST to local amateurs.

QST to all amateurs! Copy! Copy! Copy!

Please suspend all operations promptly at ten P. M. on account of testing of new American Radio Relay Routes.

Signed

R. H. G. MATHEWS.

This QST was very effective, as at ten there was not a single local station sending, and there are nearly 500 in Chicago. By this time it was raining hard here and my audion detector was almost constantly polarized. The temperature in Chicago was 80 degrees, and altogether, the weather conditions were the worst possible. At ten ten I sent a test for purposes of tuning, and promptly at ten fifteen I started the test message, calling 8NH, 9GY, and 9BD in order. The message was as follows:—

To relay stations of the A. R. R. L.

Congratulations on handling first msg over new routes.

Signed 9IK.

8NH and 9GY immediately answered me, the former saying that she had received most of the msg, and requesting me to repeat it once more. By this time the static was awful, and my audion was almost useless. 9KU of Winnetka, Ill. came to my rescue, and since he uses a galena detector, he was able to help me out on those parts which I missed. I repeated to 8NH and got her OK and heard her repeating the message to 8JZ, at Cleveland.

9 NN at Cape Girardeau, Mo., then called me and said he was unable to get msg from 9GY. I then sent it direct to him, but he was only able to get part of it through the increasing static. I have subsequently learned that 8JX, 9NN, and 9JT all got parts of the message in a letter which I received from 8NH, she says that she could easily read me through the worst static through which she ever attempted to work, and which made it uncomfortable for her to keep her phones on.

While the message was not a success, as to reaching the ends of the routes, it was highly successful, in that it showed that the amateurs had a real and live interest in a relay system, and were willing to sacrifice for it. We will continue to send out our test messages every Monday and Thusday at ten-fifteen Central time, until we can easily transmit a message from the Atlantic to the Pacific in one evening. The gaps at present, are between 9NN and 5ZC, (5XO is not in operation very often) and from 5ZC west.

There is also a rather long working distance between 9XN or 9YG and 7BD and between 7BD and 7ZH, but I hope to fill up these holes soon.

The response of the amateurs to this relay system has left no doubt in my mind as to the ultimate success of such a system, if the interest is kept alive. We must not allow ourselves, however, to be discouraged by a few comparative failures.

I wish to especially thank Mrs. Chas. Candler, of St. Mary's, O., Mr. Lyon H. MacCandless, of Rochester, Pa., and Mr. G. W. Carter, of Ft. Wayne, Ind. for the work which they did through all the weather difficulties possible. I also thank the amateurs of Chicago for their compliance with my request as to sending after ten o'clock.

Hoping that this report may meet with your approval, I am

Yours sincerely,

R. H. G. MATHEWS, "9IK,"

District Manager.

In a subsequent letter to headquarters Mr. Mathews reported the following information: "I am today (April seventeenth) in receipt of a letter from 2AGJ, of Albany, N. Y., saying that he picked up the message from 9PC, Ft. Wayne, Ind., while the latter was trying to get it to 8JK, Rochester, Pa., and forwarded it to 1ZI at Great Barrington, Mass. The message, therefore, reached the end of the eastern route, and was an entire success in that direction. In addition to those already thanked in my previous report, I wish to express my thanks to 2AGJ for his wonderful work."

Rotten Sending

By the Old Man.

I have been sitting by my instruments late into the night and saying nothing, but have done a pile of thinking. I hear pretty much all the boys have to say to each other, and hear these test messages and greetings and inquiries about the condition of somebody's health, and whether or not it will be convenient to come up next week, ,and a lot of different kinds of sending have passed through my phones. I want to break my periodical silence and bust forth once more in the columns of QST, which I am coming to enjoy more and more.

A while back I remember it was the fashion among some of the smart ones to spell out everything and never use figures. YOU was always spelled out, NIGHT was always spelled right, and never wrong, and the sign in was all blurred together so as to sound like some of the bum commercial operators.

This fashion had its day. Now, we have swung to the other phase of the cycle. Now, it is the fashion to abbreviate and misspell every word that can be abbreviated or mis-spelled. HAVE is now HV. NOW is now NW. NIGHT is now NITE. ABOUT is now ABT. HERE is now HR. I tried to get one the other night which had every single word butchered. I could not get the sense with certainty, but had to guess at a lot and I will make it a ten to one shot, that the fellow doing the receiving did a lot of guessing too. It is bad enough to guess any way, when you have to, but to do guessing just for the sake of guessing, always seems to me to be putting a premium on making mistakes. Radio communication requires enough guessing as it is. I am not in favor of taking these chances, but I suppose it is because of the gray hairs on the top of my head, most of which have been brought about by mistakes made as a result of a wrong guess.

The fashion also at the present time runs to a kind of drawling out of dots and stringing on queer kinds of dashes. I know one of our best relay stations, one which is heard all over the eastern part of the country, who has formed the habit of dragging out his sign in so badly that it certainly must be copied wrong by a lot of people. I can take twenty-five a minute from any one of the Navy stations, or WHB, but I cannot take twelve a minute from this young man. And he is some punkins too.

Once in a while a station comes along who seems to think it good business to make a dot sound like a dot, and a dash sound like a dash. An attempt evidently is also made to give rhythm and cadence to the sending. It comes in strong and steady and clear and fast, and you know just what to expect in the way of steadiness and speed, and say, believe me friend,

it is great stuff taking it down. I know one amateur whose spark I believe I could read at thirty if he would handle it the way he handles twenty. You can get it through QRM and QRN and the baby crying down stairs, and the 'phone ringing and the trolley passing, and it sounds like music. And it isn't it queer, this station never sends out a signal unnecessarily. You would think he was paying for his juice, the way he economizes with it.

Now, don't get the idea that a grouch is on the air tonight. I am just dashing this off along about time to go to bed, after listening to an especially choice selection of rotten sending. CUL OM GN SK.

Courses Planned for the Advancement of the Wireless Amateur

By J. E. Smith.

THE writer has been asked to present to the readers of "QST" the method of instruction developed by The National Radio School in its Correspondence Courses for the systematic training of the ambitious Wireless Amateur, during his spare time at home, so he may qualify for a Government Commercial License.

During the first year of the school's existence many inquiries were received asking if Correspondence Courses were taught. The constant demand for this type of course led the instructors of the National Radio School to formulate an outline of the subjects which should be included in this preparation. The next step was to devise efficient methods for accomplishing these results.

The selection of the proper books was not as difficult a task as one might find in other cities since in Washington one has access to all books copyrighted in the United States by going to the Congressional Library. Three books were chosen. Instruction book No. 1 treats of the elementary laws and principles of electricity as applied to wireless telegraphy. Book No. 2 explains the different types of apparatus used in this country for wireless communication, describes its theoretical aspect, its constructive features, its methods of operation and shows diagrams of the hook-ups to other apparatus which make up the complete unit. Book No. 3 is the U. S. Laws on Radio Communication.

The problem of teaching the International Morse Code was next considered and led to a study of the different types of machines already on the market for such purposes. While none of them seemed to answer the purpose in all respects, one was selected and new attachments designed which makes our National Universal Sender give to the ear, by aid of a headband receiver, sounds which resemble in every respect a real wireless message. The Operator by the slight movement of a rod may change the intensity of the signals. He may make it loud to correspond to a nearby sending station or faint to resemble a long distance message. The speed may be adjusted to values from 4 to 40 words per minute to suit the ability of the operator.

In order to prove the efficiency of this Automatic Sender for the teaching of the Code it was tested, with our written instructions, on a young man who did not know the letters of the Code on starting. In four months our test student was able to read the entire weather forecast sent out by the Arlington station at 10 p. m.

The results from this test and others of recent date has led to its adoption in our home school. We have a Universal Sender on our head operator's desk which is used to test the speed of our students from week to week. Most of our Washington students have one of these machines in their home for practice purposes.

The results of our tests, extending over more than a year, assures us that Wireless Telegraphy can be taught by mail in a most satisfactory manner. Our Correspondence Courses have been open to the public for nearly a year and we have students from nearly every state in the Union. Many of our students have prepared themselves for the Government Examinations for a Commercial License. The students become deeply interested in the study and are fascinated by the wonders of the Automatic Sender.

Our Courses require the student to pre-

Continued on Page 118, 1st Column

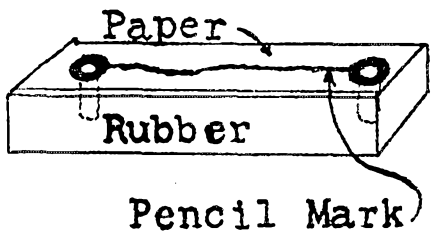
Another Audion Hint

By A. B. Cole.

FROM time to time operators write that "the Audion occasionally goes out of commission and although it restores itself, does not do so immediately". The reason is easy to explain. The highly perfected state of the present Audion is the cause. It is so extremely sensitive to very small impulses that when a powerful station nearby begins to transmit, or a charge of "static" strikes the receiving aerial, the bulb becomes choked or "paralyzed." If the bulbs were made less sensitive, they would not be affected by these impulses to so great a degree, but the greatest aim has been to make them as sensitive as possible.

The "Paralyzing" feature, while not serious, nor even comparable to that in other types of detectors, is annoying, but is easily overcome by connecting a path of very high resistance between the plate and grid wires.

The best form of resistance shunt is made by pasting a sheet of paper on a block of hard rubber about 2 by 4 inches by ¼ inch thick—a hole is drilled near each end of the block and around the holes to make a circle ½ inch in diameter, a coat of graphite is



placed by rubbing with a pencil on the paper. A binding post is then placed over this circle at each end, so that a good contact is made between the post and the graphite.

If one binding post is connected to the plate wire and one to the grid wire of the Audion Bulb, and a very light pencil mark is drawn between the two circles connecting the binding posts, the paralyzing will be prevented. If the line is too heavy, all signals will be weakened. If it is too light, the Audion will still paralyze. A little experimenting will produce the proper weight, and thereafter the "static leak" should be left alone.

Atlanta Radio Club

From the Government Radio Service Bulletin.

THE following letter which has been received by the Bureau of Navigation is published in full because of the fine spirit of cooperation manifested therein. Read and remember.

College Park, Ga.,
January 13, 1916.

Dear Sir: I would like to give you a few facts about the Atlanta amateurs. As president of the Atlanta Radio Club, it is my duty to see that you do not get a mistaken impression of us.

I have one of the oldest stations in this section and have watched with much interest the increase of the number during the last two years. At first I could hear only one or two amateurs. The number commenced to grow, and soon interference became a problem. By this time most of us knew each other and, being congenial, we decided to band together and discuss our problems.

There were about 10 of us to start with. We secured the use of one of the small anterooms of the Carnegie Library Building and there held our first few meetings The club grew rapidly. The small room was soon so crowded that we had to seek larger quarters. Several of our number who were members of the local Y. M. C. A. obtained permission to use a large room on the third floor of the 10-story building. We have held our meetings there on alternate Saturday nights since last summer. A

Continued on Page 118, 2nd Column

EDITORIALS

Statement of the Ownership, Management, etc. required by the Act of August 24, 1912, of "QST," published monthly at Hartford, Conn. for April 1, 1916. Editor, Clarence D. Tuska, Hartford, Conn.; Managing Editor, Clarence D. Tuska, Hartford, Conn.; Business Manager, Clarence D. Tuska, Hartford, Conn.; Publishers, Hiram Percy Maxim and Clarence D. Tuska, Hartford, Conn.; Owners, Hiram Percy Maxim and Clarence D. Tuska, Hartford, Conn.

Stockholders holding one percent. or more of total amount of stock: Hiram Percy Maxim and Clarence D. Tuska, Hartford, Conn.

Other stockholders holding one per cent. or more of total amount of stock, none.

Known bondholders, mortgagees, and other security holders, holding one per cent. or more of total amount of bonds mortgages, or other securities: None.

CLARENCE D. TUSKA.
Business Manager.

Sworn to and subscribed before me this 31st day of March, 1916.

CECIL POWELL.
Notary Public.

For six issues, the Editor has worked hard. He has succeeded in producing "QST". As you all know, this magazine is the only periodical devoted entirely to amateur wireless telegraphy. It contains an atmosphere which can be found in none of our contemporary papers, and we feel that every amateur should become a reader. At the present time, only a small portion of the Licensed stations see "QST". We want "QST" to be read by EVERY amateur and you should feel it your duty to introduce "QST" to all your wireless friends. If you help the publishers to obtain the circulation which "QST" deserves, you will be helping yourself, for with every increase in circulation will come a few more pages in our publication. You want "QST" to grow. Will you not give a few minutes today and get one subscriber?

MR. HERBERT AND MR. MATHEWS

After reading what Mr. Herbert, District Manager for Trunk Lines C and D, and what Mr. Mathews, District Manager for Trunk Lines A and E, have to report, we must all feel very proud of our American Radio Relay League.

These gentlemen illustrate the real Radio spirit. They have undertaken the work of organizing their Trunk Lines, and all of the letter writing and detail which is inseparable from a work of this kind, and they not only have gone at it with smiles but have accomplished results.

We all owe them a debt of gratitude, and it is certainly up to the rest of us to give them a helping hand whenever the chance comes our way. It will, of course, take them some time before they can get their Trunk Lines in working order so that test messages can go out every Monday and every Thursday night to the end of each line and be receipted back; but it will be done eventually. A great many of us realize that our position on one of these Trunk Lines means better station efficiency. Already we have noticed a great many improvements in equipment, and we are informed of much new apparatus being ordered to better handle Trunk Line traffic.

The present season is coming to an end in a couple of months, and we shall probably not have things in full working order by that time. But we predict great things for the coming season when hundreds of stations will have improved their equipment.

PACIFIC COAST DISTRICT MANAGER

No District Manager has yet been appointed for the Pacific Coast Trunk Lines. The reason is because no one on the Coast has made any efforts to volunteer help. This ought to be attended to by our membership who live on the Coast.

The matter has been left for some one else to attend to, probably, and as every one's job is always no one's job, nothing has yet been done.

We have made one or two efforts from this end of the line to get the fellows of San Francisco or Los Angeles to suggest somebody who would be a proper person to act as District Manager for the Trunk Lines running north and south, and to the east. So far our best efforts have produced no results. We suggest that as soon as this notice reaches the eyes of our friends on the Coast, that they look among themselves for one who has the natural talent for organizing the Trunk Line stations and for handling the correspondence that is necessary. It requires some one who has a little time, who is a good fellow, and who is willing to put in a little hard work just for the fun of the thing.

\$0\$ \$0\$ \$0\$

Our printer is a good fellow, but when he prints QST, he has one mighty bad fault. He expects us to pay for it.

It takes money to pay your good friend, and it also takes a lot of postal cards, no-

tices, reminding, pleading and exhorting to dig up this money. The membership of our League is no worse than memberships in other organizations. Indeed, there are the best of reasons for saying they are quite a good deal better. If the fellows could only be made to realize how much harder it makes it for us here at Headquarters, when they do not do their share, they would undoubtedly be more prompt.

But, to get down to brass tacks, we must do something to increase our income so that we can improve QST and put into operation several splendid schemes we have in mind, and which will help the amateur whether he is in the League or not. The plan we propose to try is to have yearly dues, which every member is supposed to pay, and then supply the station certificate without charge. These dues have been placed at $1.00 per year, which is not much money but still enough to keep us going. Where the $1.00 is not available, we will take it in two installments at fifty cents each, or four installments of twenty-five cents each. Of course it costs us more here at Headquarters to handle the business where we have to send out notices four times a year, but as all of us are not where we can always spare a $1.00, we must make the best of this, hoping that all who can put up the whole dollar at once will do so.

This dollar pays the annual dues for membership in the League, and brings the Certificate of Appointment in the League. It also brings a pad of message blanks. The plan is to ask all members who have not yet sent in for their 1916 station Certificate, to send in their dues, paying either the whole dollar for the whole year, a half dollar for six months, or a quarter for three months. All of those who have sent in for their Certificate of course are paid up for 1916.

When it comes to QST the subscription price for a year is $1.00, for six months 50c. and for three months 25c. Every one who has sent in his dollar for QST is paid up for a year from the date of his subscription. Those who have not, should attend to it, sending either a six month's subscription or three months, whatever they can afford.

With both of these, we can keep things going in fine shape IF EVERYBODY WILL DO HIS PART.

It is funny how many of us do not do our part. We have roughly speaking, over one thousand members in our American Radio Relay League, most of them of the best class of wireless station owners. Out of this one thousand less than half have ordered their station certificates and less than half have subscribed to QST. It is simply a case of putting it off, because we have received hundreds of letters saying that the League is doing a fine work, and that QST "fills a long felt want," is "just what the amateur has been wanting," is "deserving of every encouragement," etc. etc.

Just to remind the large number who have not yet done their share, we suggest tying a big knot in the handkerchief. Don't untie it, either, until this little matter has been attended to. Whether you are in the League or not, whether your station is in commission or not, and whether you are an expert operator or not, you at least must see every copy of QST so as to keep yourself informed regarding what is going on among amateur wireless enthusiasts. Especially ought you to keep abreast of the times in the matter of developing our League Trunk Lines. This latter matter is advancing rapidly, and the most amazing things are happening. If we go on the way we are now going, we are going to be one of the big things of this decade.

To finish off this little sermon, and point a moral, do you know that we amateurs of the U. S. A. have been the cause of increasing the sensitiveness of receiving apparatus more than any other cause or influence. The reason for this is that we are always striving to get through a message and as we are limited to power imput, we are obliged to take advantage of every bit of efficiency that radio science has to offer in order to reach the distant points we aim at. We heard a prominent radio apparatus manufacturer say the other day that the average commercial station did not approach, in receiving efficiency, the average Relay League amateur Station.

There you have it, fellow bugs, come on and do your bit, and help us better the game.

THE SUMMER SEASON

The much dreaded summer season is approaching. Already, we hear faint signs of our ceaseless enemy, The Static. In past seasons, it has always been a custom among some of us to lay down our receivers and take to swimming or some other sport. But is this just right? Should we not attempt to fight the enemy? Must we continue in a state of unpreparedness or will some one conceive of a system which eliminates Static? We must do something. Let us see if we cannot make our sending more efficient and our receiving less susceptible to strays.

The Static eliminator will arrive and there's no reason why each one of us should not attempt to become the famous inventor of a Static Eliminator. The Editor of "QST" hopes that each suggestion and discovery will be sent in and published for the benefit of all. A combined system of our various ideas may develop what is necessary. Let us rally to fight The Static.

A QUERIES DEPARTMENT

With this issue, we are starting a new department—The Queries Department. As explained, this department is open to your use, Gratis. However, the Publishers of "QST" are not in a position to answer questions requiring a long mathematical solution. The types of questions which we solicit are the practical amateur difficulties which interest all of us as one reader suggests: "I do believe that a Question Department would be fine for 'QST.' It makes no difference how far one is advanced in his work, as he always has a hard nut to crack."

THE WESTERN COAST

We have been informed by readers that the Western Coast has been neglected regarding news items in "QST." The Editor wishes to help the Western Coast as much as any other, and to remedy this difficulty, "QST" will appoint several Western Correspondents. These Correspondents will collect the news and handle a subscription agency for amateurs in the Sixth and Seventh Districts. Now, Mr. Amateur, of the Pacific Coast, here is your opportunity to have yourself represented. We are hoping that this move will induce a number to subscribe to the publication and at the same time, help the Correspondents by getting into communication with them. In the next issue, we hope to publish the names and addresses of these Western representatives.

DISTRIBUTION OF LEAGUE MEMBERSHIP BY STATES

Alabama	4
Arizona	2
Arkansas	2
California	89
Colorado	6
Connecticut	45
Delaware	3
District of Columbia	6
Florida	8
Georgia	8
Idaho	2
Illinois	42
Indiana	11
Iowa	20
Kansas	10
Kentucky	2
Louisiana	4
Maine	22
Maryland	13
Massachusetts	90
Michigan	31
Minnesota	3
Mississippi	1
Missouri	15
Montana	6
Nebraska	2
New Hampshire	4
Nevada	1
New Jersey	75
New York	149
North Carolina	2
North Dakota	8
Ohio	87
Oregon	11
Pennsylvania	119
Rhode Island	13
South Carolina	3
Tennessee	2
Texas	10
Utah	2
Vermont	2
Virginia	6
Washington	24
West Virginia	4
Wisconsin	21
Canada	6
*Total	1006

The accompanying list shows the distribution of the Membership of The American Radio Relay League in the various states. We find every state in the Union excepting Oklahoma, New Mexico, South Dakota and Wyoming, is represented in the League. As it will be noted, several states have the scant membership of two or three and we hope before long these states will be in a position to say that they are among the leaders rather than at the foot. It is peculiar to note that the Trunk Lines proposed in the February "QST" escape altogether two states which were not represented by a single member. In the other two cases, the Trunk Line extends through the state and we trust the operators of radio stations along these lines will send in their names for membership.

If one places the map which appeared on Page 21 of the February "QST" alongside this list, he can see at a glance where the Trunk Lines are weak and where strong. Every member of the League should feel it his duty to communicate with the District Superintendents and strengthen up the ragged parts of our system. From this same comparison, it seems evident that Trunk Lines A and D with a part of C are the strong ones. Along these Lines a message should easily find its way.

There are nearly 6,000 licensed amateur stations throughout the United States and with this field to work upon we should be able to double our membership before next year. Every member of the League should bear in mind that we do not wish to double the membership with a lot of stations who will be "dead heads" and never "on the job." In picking out a prospective member, give consideration to his apparatus, his geographical location, his operating ability, and aid to the League.

* A number of stations have been added

since this list was compiled.

x A limited number of copies of the February "QST" are on hand. They may be purchased from headquarters at 10 cents each. This issue contains the map and is one of the most interesting numbers.

AMATEUR OPERATORS' LICENSES SUSPENDED

The radio inspector, customhouse, Boston, Mass., has reported to the Bureau violations of the radio laws by amateurs in his district, resulting in the suspension of their license privilege by the Secretary of Commerce for periods of from one to three months:

Two at New Haven, Conn., reported for operating a radio station without a license for the station and without having an operator's license; license suspended for one month and two months, respectively.

One at Stoneham, Mass., reported for using profane and abusive language in transmitting messages; license suspended for three months.

The operators mentioned here have been notified that should they be reported for other violations of the radio laws, such leniency may not be shown them by the department.

THE RADIO CLUB OF AMERICA

The monthly meeting of The Radio Club of America was held Friday, April 14th, at 8:15 P. M., in The Engineering Building, Columbia University, New York City. Mr. Melville Eastham presented a paper on "Inductances and Oscillation Transformers". Recent experimental investigations have developed new forms of apparatus which were carefully considered in Mr. Eastham's paper. The marked advance in this phrase of Radio Development was clearly brought out. The lecture was illustrated by apparatus and lantern slides. The large attendance was proof of the rapid growth of the Club.

THE INSTITUTE OF RADIO ENGINEERS

At the monthly meeting of The Institute of Radio Engineers held in New York City on April 5th, Doctor Louis W. Austin, head of the Bureau of Standards, presented a paper on "Experiments at the U.S.S. Naval Station at Darien, Canal Zone". Some interesting data on the ultra-audion in reception and the effects and reduction of strays was included in the paper.

THE HAWKEYE RADIO ASSOCIATION

The Hawkeye Radio Association has elected a new Honorary Member, Mr. Morris E. Packman, B.S., E.E. Mr. Packman is one of the pioneer wireless men of the State of Iowa and at present is Dean of The Radio Telephone Department of Dodges Institute, Valparaiso, Ind.

The Club has purchased a new wave meter which will be passed around among the members who must make application for it in advance. The Association has also selected an official pin of neat and unique design. Many members of the Association are connected with The American Radio Relay League and look forward each month to "QST."

CORRECTION

April "QST," Page 76, "Amplifying Receivers With Mica Diaphragms."

Mr. Thomas Appleby writes us that he misquoted Mr. A. L. Groves in regard to signals from KIE. Mr. Groves states that the signals from KIE usually die out about sunrise, but sometimes they can be heard until the sun is about one and one-half hours high. Mr. Groves gives the additional information that he now hears MFT, Clifden, Ireland, working with VBG, Glace Bay, during the daytime. He hears MFT's signals two to eight inches away from his amplifying receivers. KIE, Koko Head, Hawaii, comes in with greater regularity than KET and can usually be heard until noon. Both KET and KIE work with JJC, Japan, and on two occasions Mr. Groves thinks he heard JJC, but its not yet certain. Mr. Groves can hear NAR 23 feet away from the receivers, and can read US and UCJ six to eight feet away. He has obtained other amplifications equally great.

During the months of February and March the Secretary of Commerce has issued commercial extra first-grade licenses to the following operators: Arthur Griffiths, William O'Connor, Fred Muller, and James B. Barriette.

This new department has been opened up for the benefit of the readers of "QST". Letters should be addressed, "QST", care of The American Radio Relay League, The Queries Department, Hartford, Conn. The questions will be answered free of charge and as promptly as possible. The answers will in each case, appear in "QST", provided however, they are of interest to the average reader. We are not in a position to answer questions requiring a long, mathematical solution.

J. M. H., New York, writes us:

Question 1: What is the difference between two frequencies I hear spoken of in Radio work?

Answer 1: This question is one which troubles the average beginner. First, there is the frequency with which your condenser discharges. This discharge is of very high frequency and is not the audible note. The condenser discharge frequency is a function of the velocity and the wave length; that is, the frequency equals the velocity divided by the wave length. It is recommended that this be called "Radio Frequency".

The second frequency is the note frequency or audible note which one hears in the phones. Each impulse of the note frequency is made up with a number of high frequency or Radio Frequency oscillations. This frequency may be termed "The Audio Frequency".

Question 2: Why is stranded wire used in place of solid in wireless work?

Answer 2: All currents of radio frequency are known as skin currents; that is, these currents travel on the surface of a conductor and do not penetrate the cross section. A stranded wire has more surface than a solid wire of the same weight. This makes the stranded wire a better conductor than a solid wire of equal weight.

H. R. S., Littlefield, N. J., asks:

Question 1: What are the dues of The American Radio Relay League and what is its object? Also, can anyone join?

Answer 1: The American Radio Relay League is an organization whose object is to develop relay work between Licensed amateur stations of the United States and to assist wireless work throughout the country. Each member pays yearly, fifty cents in station dues and the money collected in this manner helps to maintain the cost of correspondence, clerical work, etc. Any Licensed amateur is eligible for membership and should apply to the Secretary of The American Radio Relay League, Hartford, Conn.

X.X.X., Your communication is beyond the scope of this department. We are not in a position to make long, mathematical calculations and we would refer you to some text book such as, "Text Book on Wireless Telegraphy by Rupert Stanley," or "Zenneck's Wireless Telegraphy."

EDITOR'S NOTE: The following questions have been submitted by one of our troubled subscribers. The editor has not had an opportunity to answer these queries and he leaves the task to those who have more time and a greater knowledge of psychology.

1NUT has a dandy spark and seems to be a pretty good sort of a chap, but he is the longest windedest cuss I have ever heard. He talks with 2BOOB every night and always begins with "How are you?" Now why does he want to know how 2BOOB is? Why doesn't he take a chance and guess that his health is as good as his spark?

And why does he call him six times, send his DE, and then give his own sign in also six times, every time he calls and no matter how long they talk? Oh why does he do this, Mr. Editor?

Why does he, when he answers some question, call six times, sign six times, say O. K. five times, then follow this up with R about six times more, and then add YES, YES, YES seven times? Why does he do this Mr. Editor?

Why doesn't he call the station he wants, say twice, give his own sign twice, send a K once, and let it go at that?

And why, after he has begun communication, does he not answer questions by simply sending R and one YES or one NO? Oh why does he not do this, Mr. Editor?

Why does he send such queer things at the end of every message? The regulations say that the end of a message is ARK. If the whole job is done is says to send SK. Now what in the world does this man mean by sending SN, or a period, or some other mixture of dots and dashes? Oh what does he mean by this, Mr. Editor?

Why is it that this nuisance never waits when he hears one station calling another, to find out if the other answers? Why does he jump in the minute he hears anything? Is he afraid some one else will use the air?

And finally, dear Mr. Editor, why does this noise-maker always sign in his own call letters so mixed up and so fast that unless you know his spark you cannot possibly tell what he is signing in? Please, please, dear Mr. Editor, tell me these things.

THE JAP QUESTION, ONCE MORE

Question 1: Just what is the idea of the Japanese letter which appeared in the February issue of "QST"?

Question 2: What is the real, correct technical answer to his question?

Answer 1 and 2: The Japanese letter which appeared in "QST" was evidently a straight-forward question by Kathis Kathkan, a Japanese radio student. Unfortunately, however, the most distinguished Mr. Kan was sending on a broad wave and this caused a strange phenomenon called "beats" to take place, thereby causing an unusual chemical reaction upon his English. It seems as though Kathis really asked this question: Where does the charge reside after I have charged an air condenser and removed the plates?

As Mr. Kathkan stated, when glass or mica are used the charge resides in the surface of the dielectric, i.e., the dielectric of a condenser during the charging is strained and in this strain resides the charge. The exact nature of this strain is not known, but it is some kind of a molecular displacement. We can say this with the surety for glass and similar substances, but air is slightly different. In the case of a Leyden jar, the glass dielectric acts as a reservoir and the charge is not given up in one spark, but often three or four discharges will result from one charge. This shows that glass does not act as a perfect dielectric might be assumed to work; in other words, a more perfect dielectric would return to its original condition, as before it was subjected to the strain. Air does act this way. When under a charge, the air is not in a strained condition, nor would a strain exist. If the plates of the condenser were separated after charge, one plate would contain a positive quantity of electricity while the other an equal negative amount. This answers Mr. Kathkan's question. The charge resides on the plates of the air condenser. Our Japanese friend was evidently misled by considering that glass as a dielectric could be supplanted by air which we have shown to act under a different theory.

"QST" kindly help me out by answering two questions:

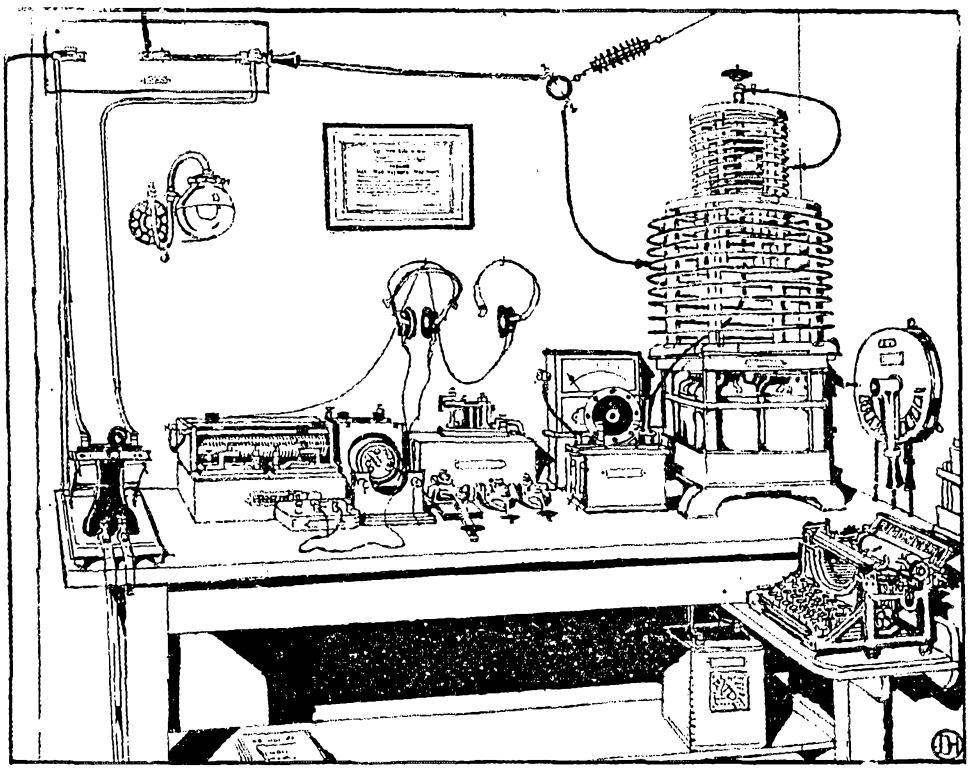
Question 1: Why is a hot wire ammeter placed in the ground circuit instead of the antenna lead?

Answer 1: A hot wire ammeter is a device to indicate the flow of current into an antenna. The object is to indicate the maximum amount. The meter is placed in the ground connection as there the current is at a maximum, while the voltage is very low. While the current in the ground lead is at a maximum, the voltage at the free end of the aerial is the highest, and the current in this end is at zero. If you should place the meter in the aerial circuit, the reading would not indicate the maximum current.

Question 2: Why is it that I only use 1,000 watts transformer input and get out five amperes and 20,000 volts or 100,000 watts which appears to be 100 times as much energy as I put into the system?

Answer 2: This is the old, old question of something for nothing. The modern theory of mechanics, matter, electricity and all science asserts that we never get any more energy out of a machine than we put in. A theoretically perfect machine would give out as much work as was put in. This has never been equalled in practice and the highest efficiency is about 98% which is obtained in a transformer. In your sending set, there is a very large power factor; that is, there is a large lag between the voltage and amperage. Your instruments register the volts and the amperes but do not take into account the lagging effect. When the voltage is at 20,000, the amperage may only be one one-hundredth of a whole ampere. The readings which you get only show the maximum value and you should realize that when the amperage is five, the voltage is nearly zero and vice versa when the voltage is at a maximum, the amperage is very low as suggested above. The Editor would advise you to consult some text book on Alternating Currents to clear this point up, if this answer does not solve your problem.

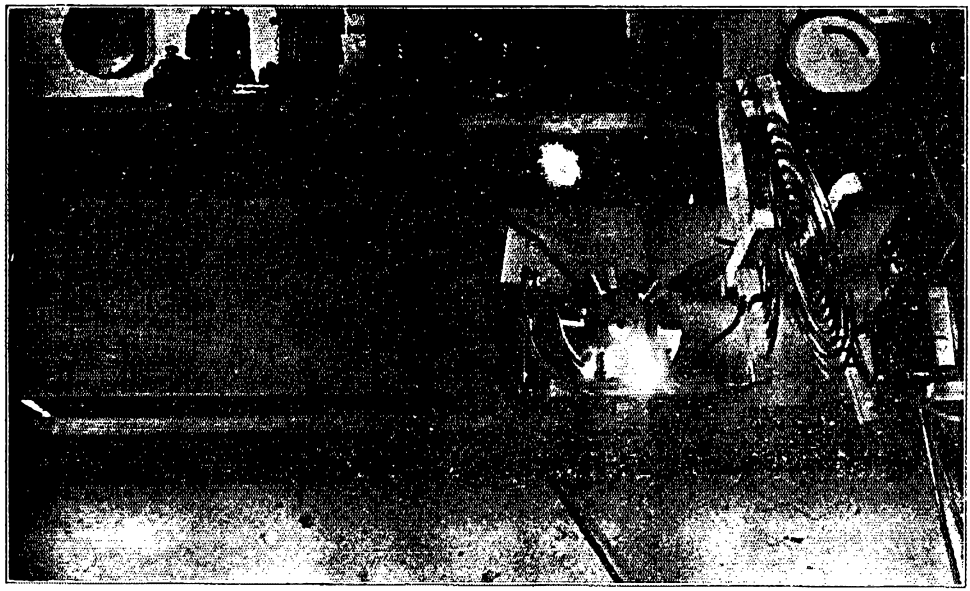
The Editor hopes to receive a large number of interesting questions for the next issue. He trusts that you will make your questions of general interest and will refrain from asking questions which you can answer by consulting the Radio Laws and the Call Letter books. "QST" does not wish to pad this department out with a series of uninteresting, foolish, questions.



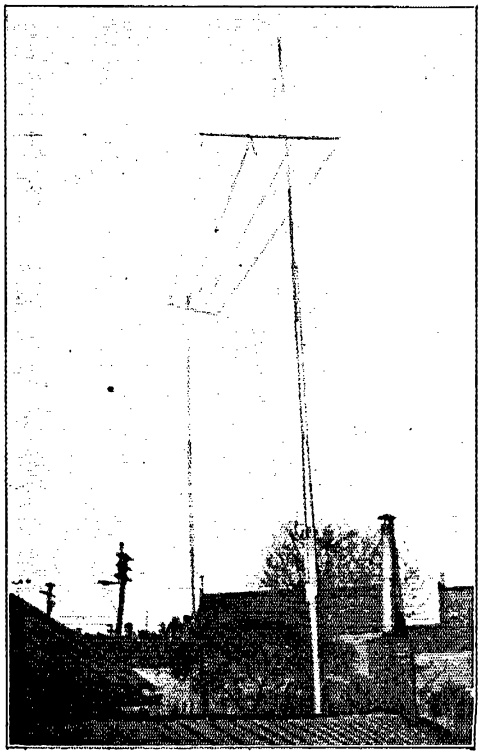
RADIO STATION — J. DONALD HAIG MERCHANTVILLE, N.J.

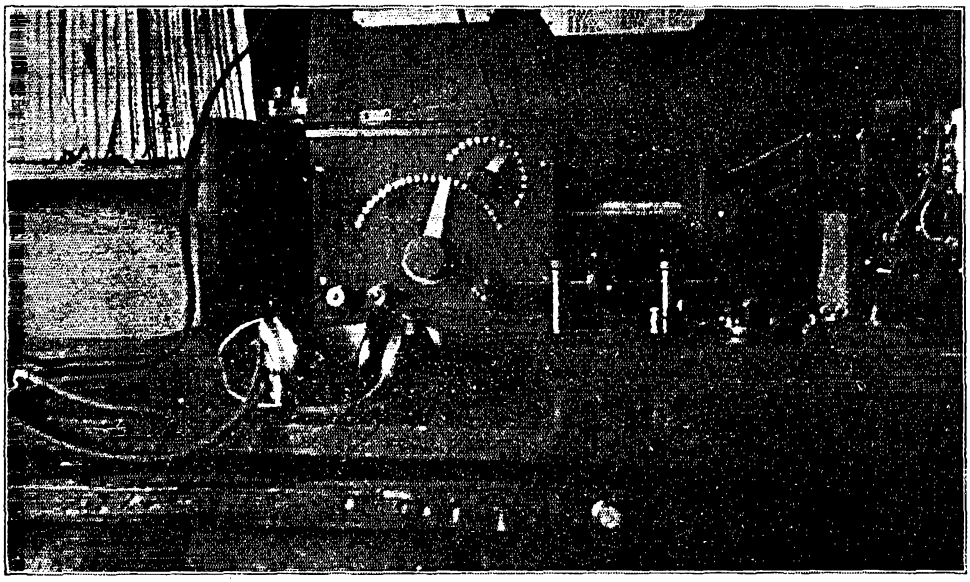
The accompanying sketch, drawn by Mr. Haig, illustrates one of the American Radio Relay League Stations. The sketch is drawn in exact proportions so that we may comment on the various pieces of apparatus. The sending set is neat and compact, Leyden jars being used for a condenser and a large oscillation transformer with a rotary gap. The receiving apparatus shows the same neat workmanship as that of the sending and we feel sure that any one who is able to draw such a beautiful illustration must surely be an expert operator.

Radio Station of Mr. Corwin, Jefferson City, Mo.

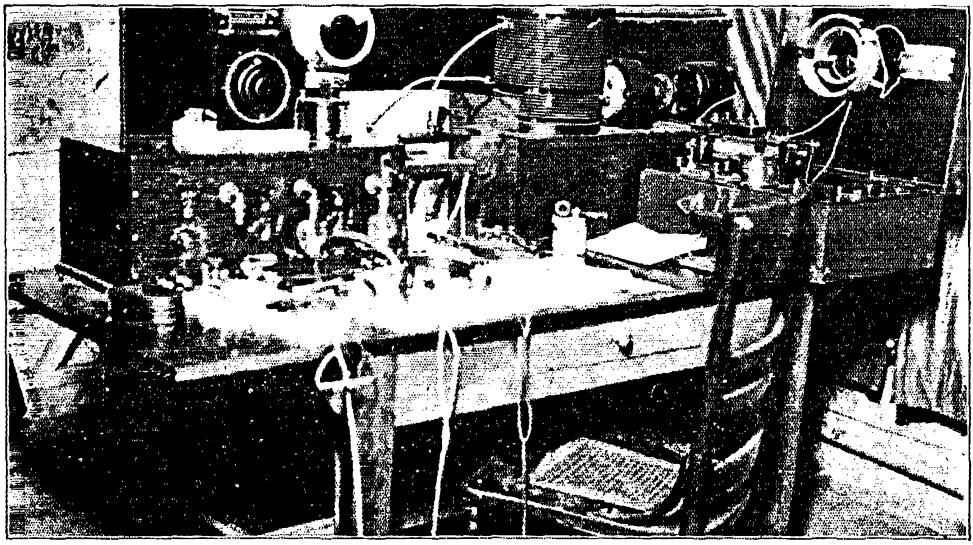


The three accompanying illustrations show the sending, receiving, and aerial of Mr. Corwin, Jefferson City, Mo. In the sending set, the condenser is of the oil type. Mr. Corwin tells us that his oil condenser gives twice the radiation which he obtained from one of the rack type. The rotary gap is of the owner's design. The photograph hardly does the gap justice. It is six inches in diameter, having six rotary studs, each one inch long and one-quarter inch wide. This gives a large sparking surface. The studs being long, narrow, and radical, the spark is not permitted to drag. The oscillation transformer is of the pancake type. Signals from this set are heard in Ohio, over six hundred miles away.



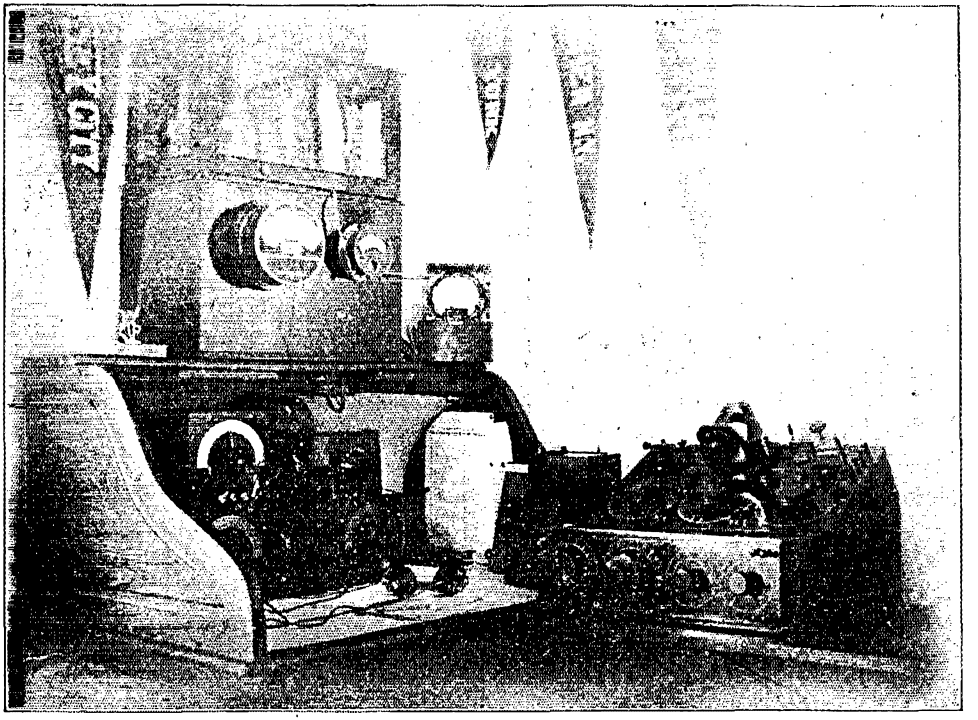


Another One of the Famous Relay Stations



This illustration showing the home and portable sets of 8AGN, A. M. Lindsay, Jr., Rochester, N. Y. Everything is neat and business-like and explains itself. 8AGN was in on the famous relay.

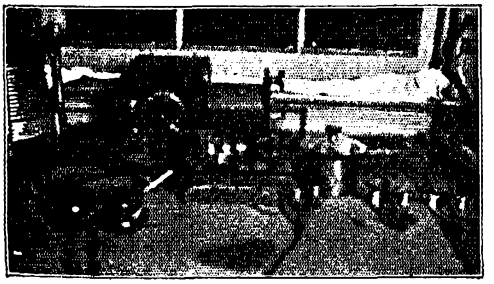
Receiving Sets of L. Spangenberg, Lakeville, N. J.



This photograph illustrates the two receiving sets of L. Spangenberg, Lakeville, N. J. Two separate sets are used as shown in the photograph. In the desk, is a variometer set using an oscillating audion for work with all amateurs. This circuit brings in stations with their natural spark tone and some of the amateurs in the eighth district have been heard with the phones three inches away. In this set are three variometers, two variable condensers, one inductance, and the audion itself. The range of this apparatus is from one hundred to four hundred and fifty meters with very sharp tuning, but nearby stations can be heard on six hundred meters.

The receiving cabinet on the right is used for waves varying from two hundred to five thousand meters. Three circuits are used: crystal, audion, and one-step amplifier. All the stations along the Atlantic Coast may be copied without interference. The NAA time signals can be heard on the first floor of the house, the station being located on the second. Other signals are received in proportion.

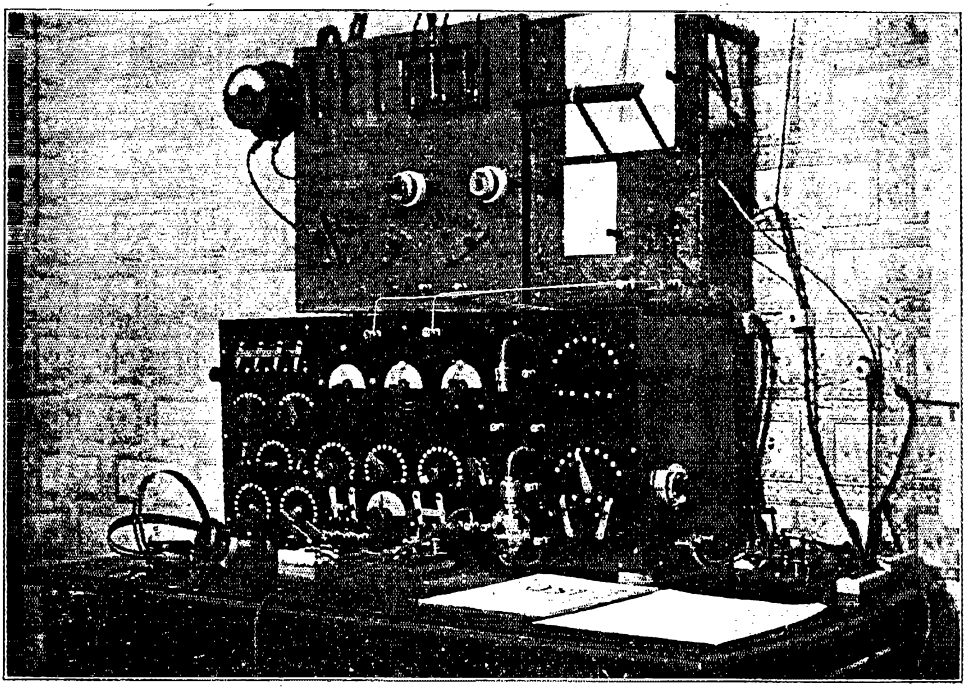
Transmitting apparatus is in the cabinet above the desk and consists of a one Kw. transformer with three variations of power: four hundred, six hundred, and nine hundred watts. Under full power three and one half amperes are radiated.



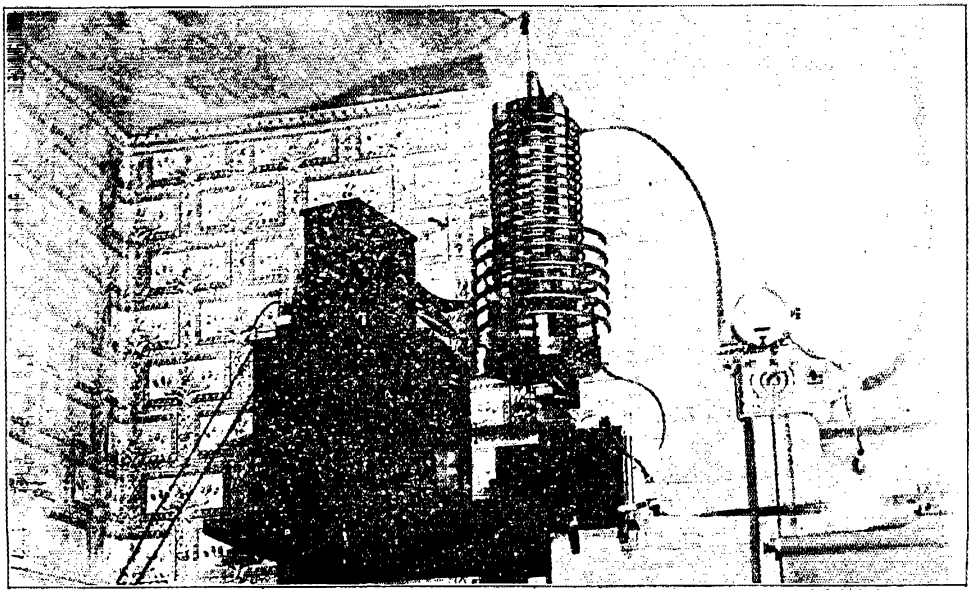
Radio Station of W. A. Parks

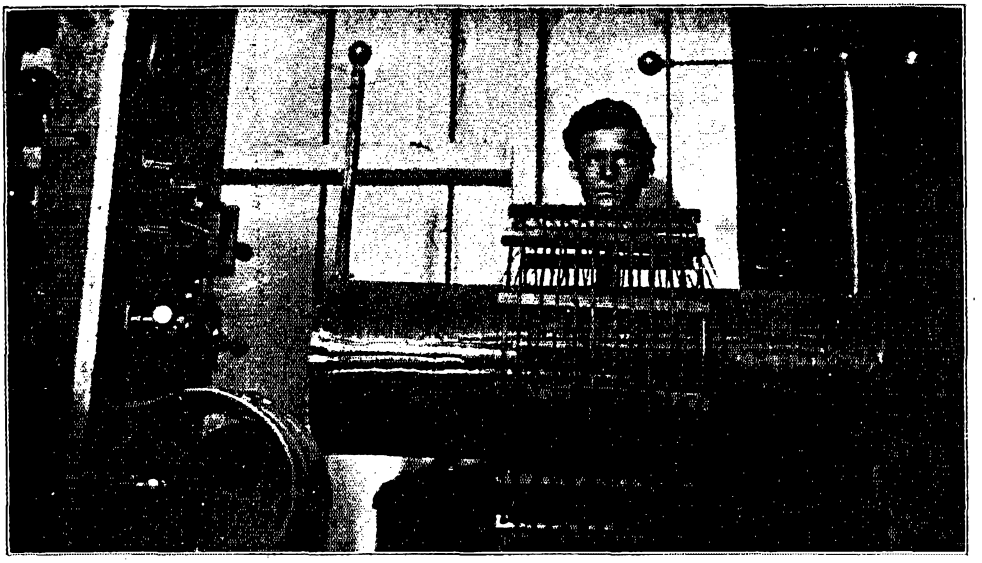
This receiving apparatus can boast of excellent work. While the photograph is slightly out of focus, the set is never out of tune. On this apparatus, W. A. Parks of Washington, D. C., received the relay of February 22nd. Mica diaphragm receivers are used. Mr. Parks says the results are excellent.

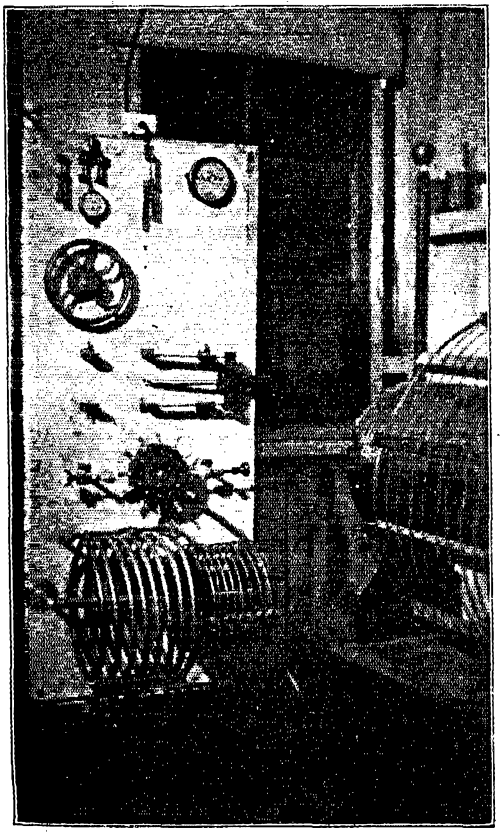
A Well Equipped Station



The accompanying illustrations show an American Radio Relay League Station owned and operated by E. E. House of Battle Creek, Mich.



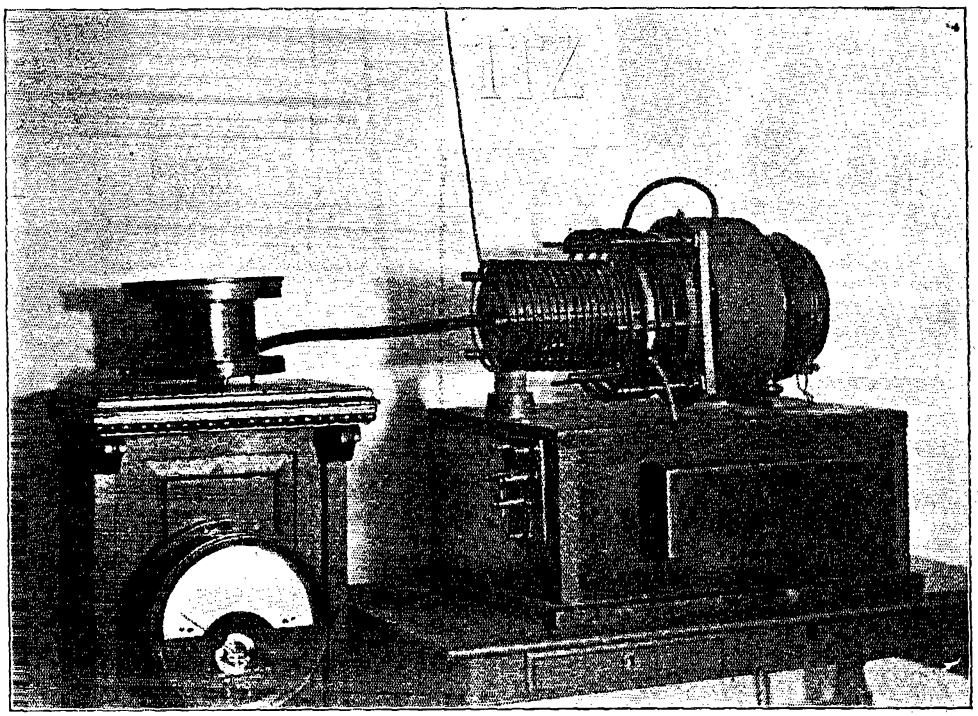




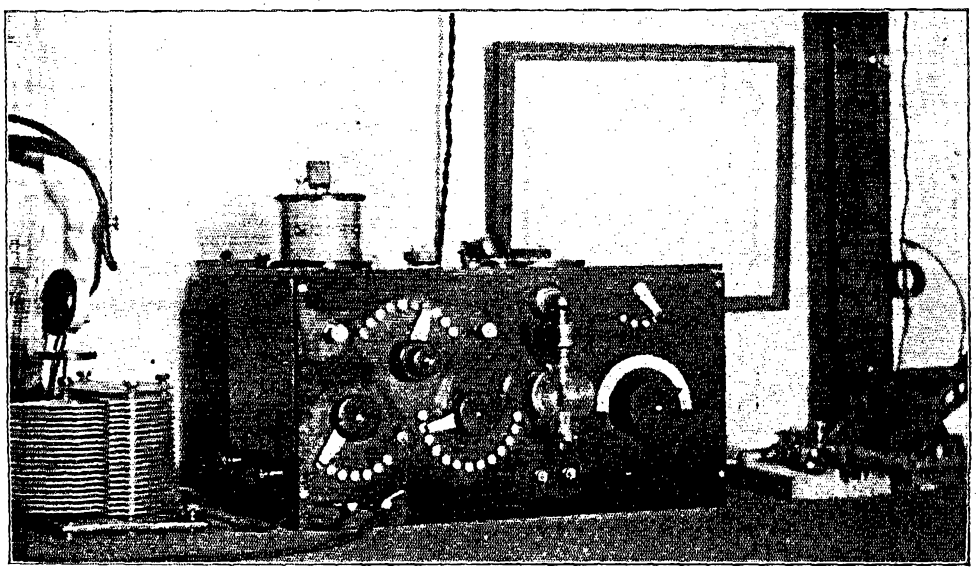
Radio Station of R. M. McLain
Huntsville, Alabama

Mr. R. M. McLain of Huntsville, Alabama, is the owner of this neat, business-like switchboard. Mr. McLain has also constructed the twenty-three inch spark Tesla coil as shown. The switchboard construction seems a very desirable one for everything is neat and constructed to stay.

Radio Station of Mr. St. James



1IZ, R. T. St. James, sends us the accompanying photographs which illustrate his radio outfit. Mr. St. James has taken pains to produce an efficient sending set. Those who have heard him know how strong his signals are. The oscillation transformer is of unique construction, and we hope Mr. St. James will furnish us with a description.



RADIO COMMUNICATIONS BY THE AMATEURS

HOW MR. DILLON OF THE 8TH AND 9TH LOOKS AT IT

March 20, 1916.

Mr. Hiram Percy Maxim, President,
American Radio Relay League, Inc.,
Hartford, Conn.

Sir:

I have your letter of the 14th instant, setting forth the views of your organization regarding the locations and necessity for special licensed stations for promoting the work of the American Radio Relay League at points in the 8th and 9th radio districts.

In my letter of May 10, last, my views regarding special privileged stations were set forth at some length, and nothing in my experience during the interval has tended to change the views expressed therein. On account of the fact that an inspector is often compelled to act as umpire in the adjustment of controversies arising from complaints of interference, monopolization of the circuit, etc., it is considered undesirable to go on record as endorsing the claims of any particular candidate for special privileges. Nothing is known against the record of ————————.

In general, it is thought that any person applying for a special license should at least hold a commercial second-grade license, or higher, before submitting the same, as there are few special stations in operation whose radiation does not reach the field of commercial communications.

It is a notorious fact that sometimes during the tenure of their licenses, 60% of the general amateurs apply for special license with the use of higher power and longer wave lengths. It is my opinion that if the same amount of energy was expended in developing the efficiency of amateur stations on the 200 meter wave length and one kilowatt power input, that they expend in their efforts to secure special privileges, that they would find their range increased sufficiently for all practical purposes. There are stations in these districts working on a 200 meter wave length with one kilowatt power, that have efficient communicating ranges of from 300 to 500 miles, and it would seem desirable that the American Radio Relay League and kindred organizations should require the development of maximum efficiency at the 200 meter wave length before recommending special privileges.

Respectfully,

J. F. DILLON,
Radio Inspector.

March 19, 1916.

Mr. Hiram Percy Maxim,
Pres. A. R. R. L.,
Hartford, Conn.

Dear Sir:

In regard to my results, would say that I can hear the following stations almost any night: 9FY, 9XT, 9XE, 9BD, 9DB, 9HQ, 9KU, 9IC, 9IT, 9LT, 9LR, 9PC, 9GHS, 9CF, 9FP, 9NN, 9LO, 9HX, 9SP, AN, 9AAB, 9YA, 9AAU, 9QF, PWR, 9WF, 9FW, 9CF, 8NH, 8AEZ, 8YL, 8YO, 8CS, 8ZW, 8JZ, 5XO, 5BV, 5ZC, 5ZM, and many others. I have also heard 4CL and 9DD at Denver, while using only galena. In fact, all but one or two of the above stations have been frequently heard using galena. It may be of interest to some of the readers of "QST" to know that they have been heard here.

My sending results have also been fair. I have worked with a good many stations over 300 to 400 miles and farther. My signals have also been heard at IHB and are quite often heard at 9YG. Transformer input during test, a little over 10 amperes, rotary frequency, about 250 cycles.

I have received all the copies of "QST" so far and am certainly very well pleased with it. It surely is an excellent little magazine for the price.

Thanking you again for recommending my license blanks and wishing the League and "QST" every success, I remain

Very truly yours,

L. A. KERN, 9GY
Dist. Mgr. Central Radio Assn.

Danville, Va.,
April 8, 1916.

Clarence D. Tuska, Sec'y. and Treas.,
Hartford, Conn.

My dear Sir:

"QST" is on the right track, I am sure, and will eventually, become the real magazine for the wireless experimenter. I fully realize that it is no easy task to get out just what the amateurs want in the first few issues, but at the same time, the little magazine has been good, and I shall take the liberty of making a few suggestions, with the view of aiding you in your work.

1st. Let's have a "Question and Answer" department, and let's make it a big one. This will, I believe, prove a big boost, and a great source of information to the amateurs.

2nd. Maintain a good Amateurs Department, "With the Amateurs," with plenty of detail as to the real good station.

3rd. Frequent articles on the care and operation of stations, with diagrams showing how to get best results.

4th. "How to-make-it" department, eliminating all articles, except those of real merit.

I should think that, in most cases, articles should be written in a very simple way so that they may be understood by the beginner, as well as by those who are further advanced.

It affords me much pleasure to co-operate with you in any way I can, for I believe that the magazine can be made the best there is to be had, and moreover, the interest of the amateur will be paramount. We would have all know that the League is a co-operative affair, with nothing to sell but subscriptions and advertising space, and furthermore, when an "ad." appears it will prove a very good assurance that the apparatus advertised is meritorious.

Yours very truly,

(Signed) W. T. GRAVELY.

Let us do everything which Mr. Gravely suggests. His suggestions cover the point and, if followed, will produce what every amateur wishes for—a thoroughly wireless magazine. Help to carry out the suggestions by doing your share. Editor.

To the Editor of "QST":

I wonder how many amateurs have been bothered while receiving from a distant station by the fiend who attempts to play "Home Sweet Home" or "Rock Me to Sleep, Mother, Rock Me to Sleep" on his rotary. It is as bad as QRN. Many times, I have been receiving from a certain station and hear at the same time, another fellow on about the same wave, but with a different pitch. Everything is lovely until the alleged musician varies his gap speed so as to have the same pitch as the one you are receiving from. Of course, you lose your man and don't get him again for some time.

This is all nonsense, and I am surprised to hear some stations with a range of 500 or more miles indulging in it. There is, or was, one special station I might name that used to make a practice of it.

Another brain storm: During the long distance season, the ether is crowded with wireless waves and lots of them are unnecessary. For instance—one station will call another, comparatively close by, as many as fifteen or twenty times and then sign off with as many or more signals and after raising his man, starts off again with the same thing, keeping it up every time he answers. If he happens to interfere with anyone, he puts that unfortunate out of business until he is through.

Why not use a little judgment in cases of this kind? We can do away with this unnecessary interference. This method of 117 call signals may be justifiable where stations are at a great distance and communication difficult, but when such is not the case, it should be done away with. Give the other fellow a chance.

To sum up—keep your rotary at a uniform speed while sending and do no unnecessary calling or signing. Live up to these rules and hundreds of amateurs will appreciate it.

F. W. KEELER,
Superior, Wis.

Editor's Note:

This communication of Mr. Keeler's checks up what a great many would like to say. It may be safely said that 85% of amateur interference is unnecessary, and furthermore, certain types of interference are expressly PROHIBITED by the laws governing Radio communication. Let us all see if we cannot work together and during the summer eliminate this interference. The 15% which we must have under the present system of wave lengths is bad enough, so do your part to see that the other 85% is eliminated.

Acampo, Cal., Mar. 21, 1916.

American Radio Relay League,
Hartford, Conn.

Gentlemen:

Enclosed find a Bank Draft for one dollar ($1.00) for which please enter my yearly subscription to "QST". I have enjoyed the four months "sample" immensely and am heartily in sympathy with the magazine for I believe that it is to be of great help to us amateurs, especially in promoting the relay idea. It apparently has the backing of the best amateurs in the country and I hope for its success.

I have made some records recently which might be of interest to you and possibly to the readers of "QST". I have received letters from 7DJ Hoquiam, Wash., 7ZH La Grande, Ore., and KDP Portland, Ore. containing msgs. that I sent to near-by amateurs. 7DJ is 650 miles from me and uses a three step amplifier and has copied me through near by QRM. The latter two are each 500 miles away. 7ZH uses a single bulb and reads me through static. I have worked 7ZH but not very satisfactory for I am only using galena. I have ordered an Audion however, and expect to carry on regular relay work with these fellows then for they seem to get my spark regularly and the Audion sets near me copy them almost any time. I understand that I have been heard 250 miles South also.

I consider my sending set sort of a "ford" joke but it may offer some suggestions to amateurs who have no transformers on account of their cost. A garage dealer gave me four Ford spark coils for the asking. I used one to send short distances for a while and loaned the others to my near-by friends for they have a vibrator that gives a tone that is very high and surpasses any vibrator I have ever heard. I wanted a transformer for a long time and finally I hooked all of the coils up in series after tearing them apart and placing laminated iron strips across the ends of the cores. The spark it gave was very short and I could not use it on an ordinary rotary so I finally rigged up the wheel of an eight day clock to run by a string belt from a fan motor. I left the wheel in its frame and had to lag the axle for a pulley and I filed out about two thirds of the points, the points are small but do not seem to burn down very fast for I have used it for quite a while. This is the set that I worked the 650 miles with. Can you beat it? I use a three turn helix of No. 6 copper wire, and 8 plates in my condenser. I use heavy leads in the closed circuit made of sheets of tin foil folded. My condenser plates are stuck on with bees' wax and are covered on the edges with wax which helps out greatly. The aerial I use is a "T" type only 60 feet high. I believe however that a large share of results that I get are due to the several ground connections that I uses. I have a No. 8 wire running down a well for 50 feet and a connection to the surface water pipe and also a lot of chicken wire spread out over the ground. I had never reached any long distance till I added the last two ground connections that I use. I believe if one would run a lot of copper ribbon out in all directions like the spokes of a wheel either under or on top of the ground that it would be ideal.

I expect to put in a 1 KW set this summer and will have my Audion. Then I can relay to any one maybe? I might say that my transformer input is less than 200 watts.

Yours in relay work,

PAUL T. NESBIT,
de 6PN.

528 Riverside Drive,
New York, April 10, 1916.

My dear Mr. Tuska:

I have read with great interest the letter by 9XE "Of vital interest to all of us." The value of such a department for the good of the amateur world in general is unquestionable.

The policy of such a department, however, must be conducted in such a way as to encourage honest advertising, rather than to discourage advertisers by one sided and over-critical statements. The New York Tribune, which is one of our most progressive papers, has conducted a department of this kind, and, I understand, has lost slightly in advertising as a result, although there was nothing in the department offensive to the regular users of its advertising columns.

But, as soon as commendations, as well as criticisms were included, and as soon as it was raised from the standard of a sort of "dead-beat exposer" and prizes were offered for letters from readers either commending honesty and fairness of treatment by merchants, or exposing dishonesty in advertising, the interest and value of the column was greatly enhanced.

So far as "QST" is concerned, a column of this kind might include a short discussion of the advantages and disadvantages of specific makes of instruments, by the amateurs, and also a catalog description of same.

Continued on Page 118, 1st column

FOR SALE & EXCHANGE

FOR SALE: Audion receiving set for undamped oscillations; capable of receiving 8,000 to 12,000 miles. Also, 2" spark coil and other sending apparatus. For further particulars write or call, Arthur Loub, 445 East 88th St., New York City.

FOR SALE: One Murdock Oscillation Transformer, No. 423; also one section of Murdock Moulded Condenser. Sell both for $4.00 or $2.50 for O.T. and $1.50 for Condenser. Carlisle Benjamin, P. O. B. No. 298, Clyde, N. Y.

FOR SALE: One pair Brandes' Superior 2,000 ohm phones, complete head set, in perfect condition, $4.00. One battery ammeter 0-30 amperes, $.60. One oscillation helix (for coils), $1.25. One $15.00 Blitzen receiving transformer, new $9.50. Walter A Meyer, 1832 N. 13th St., Sheboygan, Wis.

FOR SALE: One DeForest Audion bulb; two 6V-60AH Exide storage batteries, and other apparatus in first class condition. Would like to buy a ¼ K.W. Winger transformer, or exchange. John Mooney, Jr., 2903 Gerard Ave., Philadelphia, Pa.

FOR SALE: A new Type AA Crystaloi in fine condition and very sensitive. Will sell for $3.50. Also have an oscillation transformer for $2.00. R. J. Iverson, 422 South 16th Ave., Maywood, Ill.

MUST SELL AT ONCE, on account of moving. A ¾ Kw. transmitting set including Marconi transformer, fixed and rotary spark gap, condenser, oscillation transformer, keys, etc.; also a receiving set with two pairs of double receivers, all up to date apparatus. G. B. Darby, Jr., Bala, Pa.

WANTED: Audion, good or broken audion bulb, parts of or finished Navy receiving transformer, stranded aerial wire and variables. Will pay cash or exchange for sporting or electrical apparatus. Leroy E. Mason, Alden, Minn.

WANTED: Kodak with high grade lens and shutter. Will pay cash or give new wireless apparatus in exchange. Chas. A. Stanley, Wichita, Kansas.

FOR SALE: 1 Kw. type "E" transformer worth $60.00. First $30.00. In perfect condition. Guarantee attached to transformer. All correspondence answered. Wm. Kenneth Thomas, 400 Minton St., Pittsburgh, Pa.

FOR SALE: Pair of Holtzer-Cabot light weight phones, $4.50; also Murdock loose coupler $4.00. Both in good condition. A. M. Hunt, 42 Madison Ave., Newtonville, Mass.

FOR SALE: One Marconi type "D" tuner, in excellent condition, $25.00. F. W. Keeler, 634 W. 4th St., Superior, Wis.

FOR SALE OR EXCHANGE: Pair 2000 Ohm phones, good make, fine condition, nearly new, sacrifice at $4.00 cash. Also, 1 pair 2 volt, 20 Ampere Hour Storage Battery Plates, charged once, great condition, will sell for $1.00 cash. Need three or four rotary variables, must be in extra good condition and reasonable. Will consider unmounted ones, but prefer mounted ones in original factory cases. Need two 23 plate ones, a 31 plate one, and three 43 plate ones. Preferably of Bunnel, Murdock or Blitzen make, but must be in good condition. State all in first letter. Write quick. Wm. F. Justus, 273 S. Monroe Ave., Columbus, Ohio.

FOR SALE: ¼ Kw. Blitzen transformer, four Murdock moulded sections, homemade oscillation transformer, one pair of Western Electric 1300 Ohm phones, receiving transformer, fixed condenser, Galena detector, two 40 foot poles, 80 foot aerial complete, lightning switch and 30 feet of No. 4 copper ground wire and accessories, including switches, etc. First $35.00 takes this bargain. Richard Schell, Jr., Rosebank, P. O., N. Y.

WILL EXCHANGE: Film-plate Premo camera, post card size, for wireless apparatus; good tuner and receivers wanted. Lee Henry, Bennington, Kans.

WILL EXCHANGE: Navy type loose coupler and Packard ½ K. W. transformer for a 1 K. W. Thordarson transformer, or will sell loose coupler for nine dollars. Also have ¼" spark coil, $1.50, and $6.00 moving picture machine with electric light, $3.00. Am willing to trade machine. Hodge Alexander, 537 Center St., Grove City, Pa.

FOR SALE OR EXCHANGE: Type AA Crystaloi in good condition. Russell Blair, 3930 Ivanhoe Ave., Norwood, Ohio.

FOR SALE OR EXCHANGE: Edison mahogany amberola phonograph and fifty records in first class condition, cost $225.00. Will exchange for commercial wireless goods, or will sell cheap. A good honest deal for someone. Lloyd Manuel, 6 Nicol Terrace, Newport, R. I.

FOR SALE: Crystaloi type AA detector in excellent condition, $3.50; Brandes Translantic phones, $5.00; 17 plate variable condenser; fixed condenser, buzzers and key. Also have 1½" and ½" spark coil which I will sell for any reasonable price. Address Edgar Gruda, 1165 National Ave., Milwaukee, Wis.

Continued from Page 116, 2nd Column

For instance, one number might contain a discussion of variable condensers, and makers' cuts of a few, for instance, Murdock, Blitzen, Bunnell, and Albany condensers, with very short description and information as to price as the first portion, and experiences of amateurs with same, in brief form as the second portion.

Variable condensers are a poor illustration, but with phones, crystal detectors, loose couplers, transformers, etc., interesting results might be accomplished.

The point I desire to bring out is that a one sided affair with only criticism is not beneficial to the policy of the magazine, no matter how warranted such criticisms might be. Advantages and disadvantages should go well, and might help with advertising, if properly conducted. Advertisers would surely furnish cuts for material in copy of magazine, and might be encouraged to put in a larger ad on the date of discussion of their particular line, especially if they are furnished copy of your material so that they can write up their ad to suit this copy.

Let me congratulate you, as I feel like congratulating you after every copy of QST, of the improvement from number to number. More illustrations, and a little humor go a very long way toward improving the make-up and I am sure subscriptions are coming in.

Most sincerely,

EDGAR FELIX.

Continued from Page 99, 2nd Column

pare about ten pages per week in the text book after which he is to answer the ten questions given on the assignment card. The answer papers are corrected and returned with printed answer cards, to the student. There are twenty-eight (28) question cards in the whole set containing two hundred and eighty questions. The last twenty questions are test questions dealing with the most important points of the Course.

Every possible attention has been given to the making of improvements from time to time where experience has proved the wisdom of such changes.

The isolated Wireless Amateur who a few years ago had little or no access to instruction in the art may now master the code and make himself proficient in the construction and operation of Wireless apparatus by the help of a Correspondence Course.

Continued from Page 100, 2nd Column

temporary aerial has been erected on top of the building and we use it for receiving tests.

After our constitution was drafted we proceeded to draw up a set of operating rules. These rules consisted of the Government Radio Service regulations and a few which dealt with the local conditions. In addition to the usual club officers we elected a club radio inspector, whose duty it is to enforce these regulations. It is also his duty to visit each station once every 60 days for the purpose of suggesting improvements.

We decided that the objects of our club should be to promote interest in radio communication and to increase knowledge and operating efficiency. To promote these objects, we have decided to rate each member according to the percentage he makes on competitive examinations to be held every three months. These examinations will be very similar to the Government examinations as given to operators. They will consist of questions on the radio laws and regulations, questions on the theory and operation of the apparatus, and an operating speed test. We believe that by creating a spirit of rivalry among the members the interest will be stimulated and

operating efficiency increased.

We want you to understand that Atlanta is as alive "wirelessly" as she is in other respects. During "electrical prosperity week" last December we were invited to enter an exhibit in the electrical show. We realized that this was beyond the scope of the average wireless club, and quite an undertaking for so young an organization. However, after discussing the matter we decided that it would be beneficial both to ourselves and to the public at large. Luckily we were allotted a space right beneath a skylight. Some of our energetic and enterprising members obtained permission and erected an aerial on top of the 17-story building on the ground floor of which the show was held. Thus it was that we were able to have a station in actual operation in the exhibit. Several of the boys were always present to explain the mysteries of wireless to the eager spectators. Taken altogether, the venture was a glorious success. The Atlanta newspapers all gave us good writeups and we secured many new members.

The probable reason for the late start of wireless in this vicinity is that there are no Government or commercial stations within 250 miles of Atlanta. In order to hear anything at all the first amateurs had to have comparatively large aerials and very sensitive instruments. Until recently these instruments were beyond the reach of all but the wealthy experimenters. (It is a curious fact that I have noticed that rich amateurs are few and far between.)

As we are so far beyond the zone of interference, most of us use transmitting waves somewhat over the limit prescribed by the Government. We do this knowingly, but we feel that we are still obeying the spirit of the law, which is to prevent interference with Government and commercial stations. If we had the faintest idea that we were causing interference we would immediately cut down our waves. We will not allow any member to use power enough to reach the coast under any conditions unless he either uses a short wave or else has a special license.

As to our loyalty to the United States, we hope that we are not less loyal than the most patriotic citizen in the whole land. We are planning to put our loyalty into practical use. We expect in the near future to form a volunteer signal corps and to practice field work under as near actual war conditions as possible. In the meantime we can be depended upon to discover and report any unneutral or unfriendly station which might attempt operation in this vicinity.

Hoping this may be of service to you, I beg to remain,

Very truly yours,

FRANCIS F. MERRIAM.

Our Enemy The Static

As Seen by a Q S T Reader

Latest List of Additions to American Radio Relay League Stations

DISTRICT OF COLUMBIA			
Washington	Raymond Davis	1422 Perry Place, N. W.	3 WL
ILLINOIS			
Chicago	David Richardson	5711 Blackstone Ave.	9 OV
INDIANA			
Indianapolis	Richard D. Craig	1807 N. Meridian St.	9 BI
Indianapolis	Leo G. Munchhof	2046 N. New Jersey St.	9 BJ
KANSAS			
St. John	Don I. Shepherd		
KENTUCKY			
Covington	Austin Edwards	99 East 4th St.	9 UZ
MARYLAND			
Hagerstown	Samuel W. Piper	133 E. Antietam St.	3 TA
MASSACHUSETTS			
Brockton	Louis F. Eaton	165 Belmont St.	1 EIN
West Townsend	Ian M. Rusk		1 RR
MONTANA			
Lewistown	A. C. Campbell	Box 1036	7 BD
NEW YORK			
New York City	Walter Belsky	1134 Findlay Ave.	2 AGA
OHIO			
Lima	M. B. West	511 W. Eureka St.	8 AEZ
Norwood	Russell Blair	3930 Ivanhoe Ave.	8 ACK
PENNSYLVANIA			
Canonsburg	Walter Lacock		8 ALD
Lancaster	Chris. M. Bowman	150 E. Chestnut St.	3 AIX
St. Davids	M. K. Salen		MS
Wayne	H. Clifford Hunter	226 E. Lancaster Ave.	3 ARP

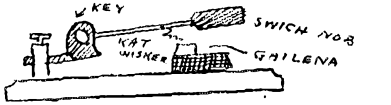
HOWE TEW MAK IT. INSTRUKSHUNS IN THE ARTE OF THE MANAFAKSHUR OV HI CLAS RADIO INSTRUMENTZ.

by Cohering Theodore

TEW MAK A LOSS CUPPLER - TAK A BIRD SEDE BOX AND A RECORD BOX. WIND THEM FULL OV WIRE SWIPED FRUM THE

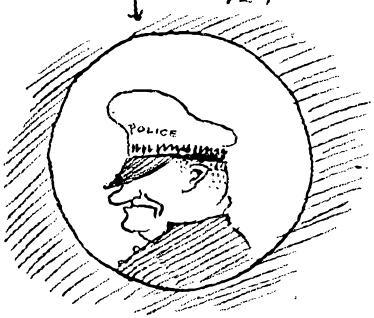
FRONT DOOR BEL. FOR KONTAKT PINTS - USE BRAS HEDED TAKS - FOR SWICH LEVERE. GO TO NEAREST FRATE YARDE. PAT. IN IRELAND.

BAL + SOKET DETECTIVE. SWIPE KEY FRUM KLOCK AND BEND AZ SHOWD.



FASTEN IN BINDIN POSTE - CUT CLAPER OFFE DOR BEL + PLAC BAL IN BENT KEY - PAT. IN HESTER ST. N.Y.

LIGHTNIN ARRESTER — DO YEW GET ME?



MOR INVENSHUNZ WIL APPERE WHEN TH INVENTORZ IN-TILLEK IS RIPE.

TEW MAK THES STURDIE NASTE — TAK TH OLD LADIES CLOZE POLES (3) + NALE TOGETHER AS SHOWED.

FOR GUYS GO TO NEREST THEATRE AND NOTE WO IS SETTING IN TH BAL HEDED ROW. IF NO GUYS R THERE SWIPE A CLOZE LIGHNE.

PICSHUR OV TH INVENTORE

NOTIS = GIT WIZE AN JOIN THE OLNY GOOD RELAY LEAGUE. THATS THE American Radio Relay League,

ARIAL RUFE INSERLATOR. TAKE A CUT GLAS TUMBLER AND ON THE

TOP - PUT A HOLE THRU SAUCER - CONNECT WITH A BRAS ROD - THREDED ON EACH END. ALSO GET FORE NUTS TO SCREW ON ENDZ UV RODS. NUTS ARE BOUGHT IN CONFECTIONARY STORES — PAT. APL'D FOR —

ONE SPREDER

GOOD SPREADERZ R MADE FRUM YOUR HOUSEHOLDE BROOM HANDLE - OR YOUR FATHER'S RAKE HANDEL + THIS AINT PATIENTED — THEODORE)

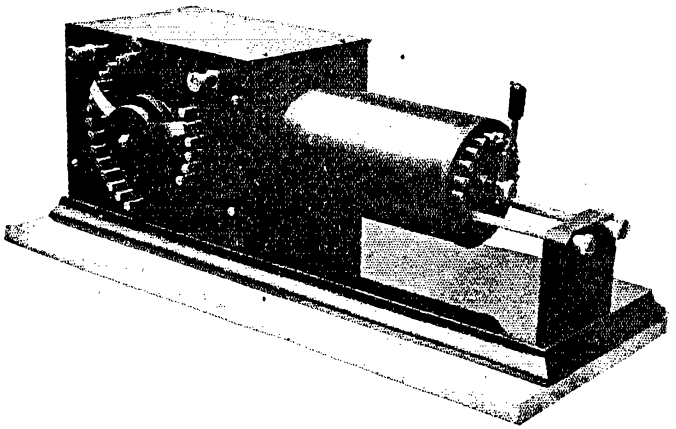
LOYD MANUEL — 1916.

Our Advertisers

Is your favorite firm omitted? Do you miss seeing his monthly advertisements telling of new apparatus? Tell US. Tell HIM. Let us see what can be done about it. We all know the firms who advertise here are the ones who help to support Q S T, and it's up to everyone of us to buy from them. If your firm is not represented here, there is something wrong. Let's all boost the Q S T advertising department; it's something we must have. Watch for an announcement—

A New Idea Along These Lines

Arnold Navy Type Loose Coupler



Price, $15.00

Owing to the peculiar construction and winding of this instrument it is possible for those desiring to hear the Arc Stations to do so on this instrument. A special Hook-up is needed in order to get up to the wave length

To those ordering an instrument such Hook-up will be furnished gratis.

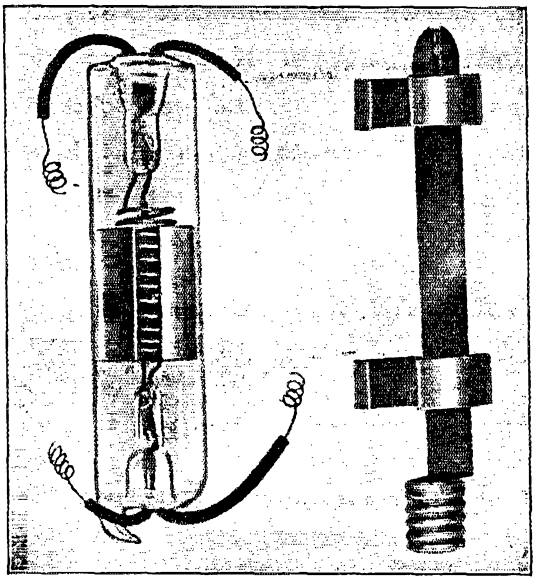
It is as in the past the right instrument to do all first class sending with. Workmanship and material the best

J. F. ARNOLD

135 East 119th Street, New York City

ANNOUNCEMENT

For the benefit of the amateurs, and particularly the ones who cannot afford to purchase a complete Audion Detector, we now offer for the first time, the genuine DeForest Type T Tubular Audion SEPARATELY. As many may be purchased, without the instrument or accessories, as may be desired, without returning old tubes.



The Type T Tubular Audion has a single, straight-line filament of tungsten. It gives very loud response to signals. It passes our usual careful test against a standard which is fully 50 percent. more sensitive than any other known form of detector.

This type of Audion is not interchangeable with our round Audion Bulbs, which will be sold, as heretofore, for renewals only for our instruments, on return of the old bulb.

The adapter illustrated fits the tube to a regular screw socket. Price, 40 cents extra.

The Type T Tubular Audion will be furnished at $5.50 each with the guarantee that it has passed our test and that it will be delivered safely to our agents or users, but no further guarantee can or will be made covering accidental breakage or burning out thereafter by the operator.

NEW BULLETIN R16 WILL BE SENT IF STAMP IS ENCLOSED

DeForest Radio Telephone & Telegraph Company

101 PARK AVENUE

New York, N. Y.

Announcing the Tubular De Forest Audion Bulb

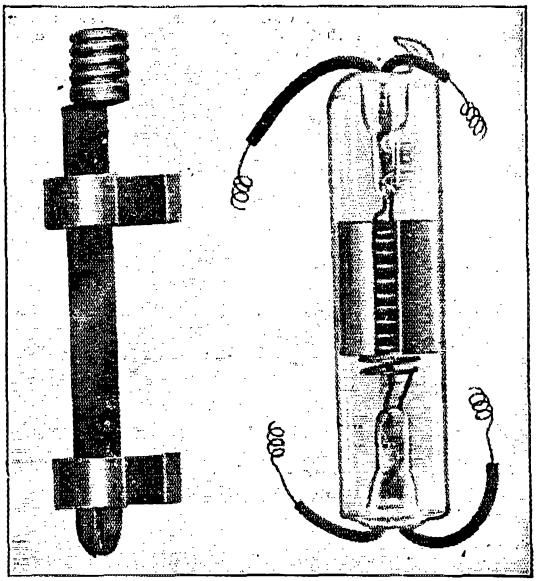
"There is only one Audion-the De Forest"
The New Type T Tubular Audion Bulb gives very loud signals from powerful stations. It has a large cylindrical plate, a spiral grid and only one filament of tungsten. As this is a long, straight-line filament, it has a long life. Edison effects are completely eliminated. The plate is in contact with the heavy glass tube, preventing overheating.

Sold Separately, $5.50 each

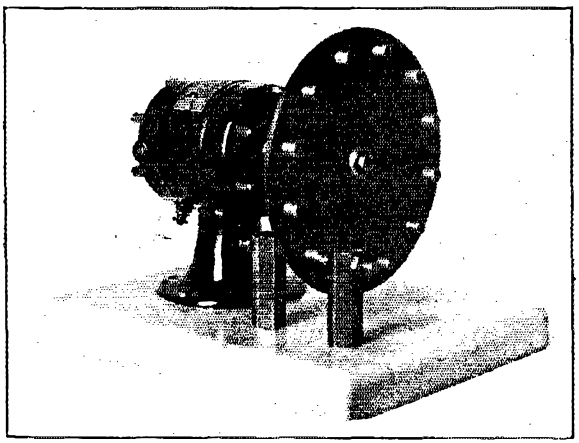
The special adapter fits this type to the screw base receptacles of De Forest apparatus, and is furnished at 40 cents extra.

Send stamp for Bulletins D16 and B16

The Wireless Mfg. Co.
Canton, Ohio



Klitzen Apparatus means Efficiency



Klitzen Rotary
complete

$12.00

Marble base, Bakelite Disc, Universal Motor, operates on 110-130 volts AC-DC. 25-60 cycles. 6000 r.p.m.

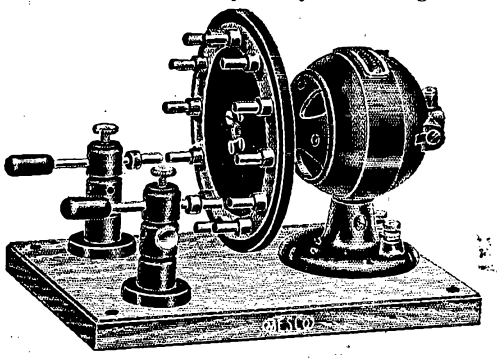
Motor only, $6 50
Disc complete, $2.50

Klitzen Wireless Apparatus Company
1123 Herrick Avenue, Racine, Wisconsin

New Mesco Radio Apparatus

ROTARY SPARK GAP

A Rotary Spark Gap is required in every transmitting station by the Federal authorities, for the reason that this type of gap produces a pure wave of low damping decrement. It also increases the efficiency of any transmitting station from 20 to 30 per cent.



This Rotary Spark Gap emits a high musical note, more audible to the human ear, can be heard at greater distances than the note from the stationary type, and cannot be mistaken for static or other atmospheric disturbances, a fault common with the stationary gap due to its low frequency note.

The rotating member has twelve sparking points mounted on a hard rubber disk and is carried on the motor shaft.

Also fitted with two stationary electrodes with special adjusting devices.

The Gap can be successfully used on any of our spark coils or transformers up to and including 1 K. W. capacity.

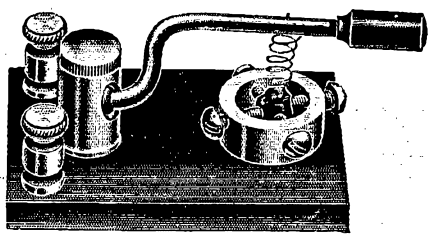
Our standard Globe Motor is used, which will operate on 110 A. C. or D. C. circuits and attains a speed of 4,500 R.P.M. Also made with our Globe Battery Motor, which can be operated on a six-volt circuit.

List. No.		Price
222	Mesco Rotary Spark Gap, 6 volt	$12.00
223	Mesco Rotary Spark Gap, 110 v., A. C. or D. C.	13.00
216	Rotary Unit only, with two Stationary Electrodes, 1 3/16 in. shaft	5.00

UNIVERSAL DETECTOR STAND

This Stand has a heavy brass cup, with four binding screws, capable of holding crystals up to and including ¾ in. diameter.

A hollow standard encloses a brass ball. Through an opening in the wall, a brass arm with hard rubber handle is secured fast to the ball, making a ball and socket joint, allowing it to be adjusted at any angle or used in any position.



A hole for the introduction of different size wires extends through the arm. A set screw in the side of the arm binds the wire.

Supplied with two binding posts. All mounted on a heavy genuine hard rubber base 2¼x 4¼x⅝ in. All metal parts nickel plated. A spring rests on the ball in the hollow standard and sets into a cup under the adjusting screw, so that varying pressures can be had as circumstances require. Remains permanently in adjustment under jars and vibrations of every description.

List. No.		Price
248	Universal Detector Stand	$3.00

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