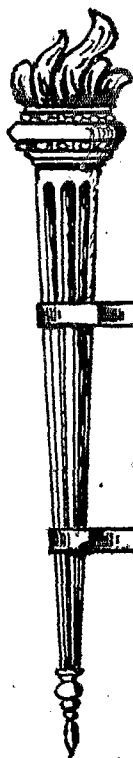
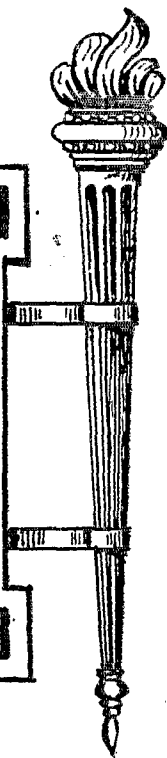


An Amateur Wireless Magazine

PRICE 10 CENTS



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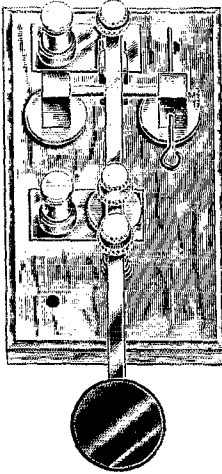
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**The American Radio
Relay League**



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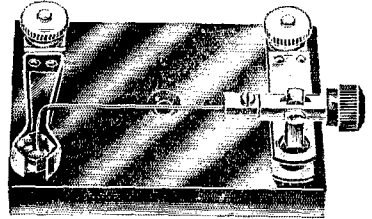
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ANNOUNCEMENT

¶ Q S T is published by and at the expense of Hiram Percy Maxim and Clarence D. Tuska.

¶ Its object is to help maintain the organization of the American Radio Relay League and to keep the Amateur Wireless Operators of the country in constant touch with each other.

¶ Every Amateur will help himself and help his fellows by sending in 25 cents for a three months' trial subscription.

THE PUBLISHERS OF Q S T

December Radio Relay Bulletin

SEASON OPENING.

The cool weather has arrived, "static" is getting better every night, and the owners of relay stations are returning to their instruments. It is time to send out another official QST from headquarters. There is much to tell not only our membership, but also every amateur in the country.

First of all, we are confronted with extremely serious national questions. Our country has never before faced a more serious situation. National defense has become a question which every American realizes concerns him personally. The President is preparing plans and the Army and the Navy are both studying carefully every phase of the problem. One of the most important factors is Radio Communication. The great possibilities of the American Radio Relay League, with its organization of over six hundred relay stations in nearly every state of the Union are bound to attract prominent attention. The directors of the League have anticipated this, as will be noted on another page.

Of equal importance is the matter of RELIABILITY and CELEBRITY, as far as the transmission of messages by the League is concerned. We have had a year's experience and we have learned many things. We have found our membership enthusiastic and willing but we have not been efficient always in getting messages through. The directors have something to say on this point, which the membership should carefully note.

The matter of frequent issue of Bulletins to the membership has been something which has been given thought, and every amateur should think carefully about what the Directors say about this important subject.

NATIONAL DEFENCE. OUR SERVICES OFFERED TO GOVERNMENT.

When it became evident that our government intended to seriously take up the question of improving our national defense,

the following letter was prepared and sent to the Secretary of the Navy:—

Secretary of the Navy,
Washington, D. C.

Sir:—

In connection with your plans for national defense, it may be that the organization of the AMERICAN RADIO RELAY LEAGUE, INC. will be of service. We respectfully present the following information concerning this League.

It has been in operation one year. Its membership consists of over six hundred amateur radio stations in thirty-eight states of the Union. Except for gaps in the southern tier of states, we are able to communicate to all important points at the present time.

A list of our official relay stations is given in the enclosed "LIST OF STATIONS." There are over two hundred additional stations which have been appointed and which are awaiting publication of the third edition of our List.

The development of this League of amateur wireless telegraph stations has been carried on under the full knowledge of the Bureau of Navigation, Department of Commerce. Frequent conferences are held between our Chairman and the Commissioner of Navigation, and his assisting District Radio Inspectors. The League is managed strictly in accordance with a spirit of co-operation with Government authority. Our influence in correcting small technical infractions of the radio laws has already been successfully exercised in several instances.

In order to insure transmission along trunk line routes, the Bureau of Navigation have issued to certain stations indicated by this League, a Special License to use a transmitting wave length of 425 meters. The regular amateur is limited to 200 meters. Several of the Special Licenses have already been issued where the geographical location suggests their value. During the next sixty days, we hope that several new Special Licenses will be issued to stations in the Middle and Far West, which will be of great assistance to us in reaching Pacific Coast points with certainty and despatch.

The American Radio Relay League is purely an amateur organization. The exchange and delivery of messages is absolutely complimentary, and no consideration for transmission of a message is allowed under any circumstances. Regular radio telegraphic methods are employed. A sample of our official message blank is enclosed herewith.

The membership consists of middle-aged men, young men, and boys. There are many men of wealth in the membership, and who make wireless telegraphy a form of recreation. Many of our stations have had no expense spared upon them, and are equipped better than most commercial stations. The management of the League is in the hands of business men. The writer is the founder and chairman.

Some of our stations have already been of public service in establishing communications when floods have prostrated the regular telegraph and telephone lines. Our organization can unquestionably be of value in the event of similar disasters or invasion. A fire which happened to destroy the telephone and telegraph central stations in a city would stall communication. Our organization could fill this interval while repairs were made. Most of our membership is along the Atlantic and the Pacific Coasts. It is not impossible that we might be of value to our fleet standing off our coast in time of war.

We respectfully offer the services of our organization, and its facilities.

Respectfully,

THE AMERICAN RADIO RELAY
LEAGUE, INC.

HPM:P HIRAM PERCY MAXIM,
Chairman.

In response to this, we received from Secretary Daniel's the following:—

Mr. Hiram Percy Maxim,
Chairman, American Radio Relay League,
Hartford, Connecticut.

Sir:—

I beg to acknowledge your interesting letter of August 7th with inclosures, and to express my appreciation of your patriotic offer of the services of the League in connection with the national defense.

The Department has a plan outlined for the employment of the services of amateur stations in time of war as may best serve the interests of the country and the Office of the Superintendent of the Naval Radio Service is in immediate charge of matters relative to the co-ordination of means of radio communication, so far as the Navy is concerned, in the event that the necessity arise for controlling and using stations other than those under naval jurisdiction.

I should be glad to have you address the Superintendent of Radio Service direct on

this matter, stating as fully as possible what facilities in the way of personal and material you may have available and giving in as much detail as is possible the character of the organization, especially as to the method employed for the interior control of the amateur stations constituting the League.

Very respectfully,

JOSEPHUS DANIELS.

Upon receipt of this letter, we sent full information to the Superintendent of the Naval Radio Service, and he now has a list of all of our stations and will no doubt take them into consideration in planning Radio Communication from ships to shore. It is easy to imagine the importance of some of our coast relay stations in the event of anything happening to any of our big naval coastal stations or in the event of a warship wanting to communicate with low power so as not to be "overheard."

A similar letter was written to the Secretary of War as follows:—

Secretary of War,
Washington, D. C.

Sir:—

In connection with your reported prospective program for increased National defense, your attention is respectfully directed to the existing organization of amateur wireless telegraph stations, known as The American Radio Relay League, Inc.

This League has been in working order one year. It has over six hundred actual radio stations in thirty-eight states of the Union. Except for certain gaps in the south, it is at present possible to transmit messages from coast to coast, and from points in Canada to points as far south as Atlanta on the east, and Los Angeles on the west by several routes.

A list of these stations appears in our official "LIST OF STATIONS," copy of second edition of which is enclosed herewith. It may be that a record of these stations and the additional stations, which are awaiting publication in the third edition, may be of value to the War Department in any defensive program.

The building up of this League has been carried on with the full knowledge of the Bureau of Navigation, Department of Commerce. Frequent conferences are held with the Commissioner of Navigation, and his assisting District Radio Inspectors. This has maintained the League on a proper legal and official plane, and insured avoiding interference with Government and Commercial Radio work. In order to insure relay work over long gaps, the Bureau of Navigation have issued Special Licenses to certain stations indicated by this League. This

Special License gives permission to use a wave length of 425 meters when conducting long distance relay work. Already several of these licenses have been issued to the better class of amateur stations, whose geographical location is such as to assist in trunk line relay work. Several new stations in the Middle and Far West, will probably be appointed in the next sixty days and communication with the Pacific Coast will be certain and quick.

This League is a purely amateur organization. The exchange and delivery of messages is purely complimentary. A regular radio telegraphic methods and systems are employed, however. A sample of our official message blank is enclosed.

Many of our stations have already been of service in establishing communication when flood has prostrated the telegraph and telephone lines. We believe we can be of service to the country under many conditions similar to flood, such as fire or the wrecking of the telephone and telegraph central stations in any city or town. Our membership is rapidly growing and we unquestionably will be in touch with a large proportion of most of the states of the Union by this time next year. Many of our stations are owned by men of wealth who have not hesitated at any expense in equipping themselves with the best apparatus obtainable. There are many members who are young men, and a few who are distinctly boys. The management of the League is in the hands of men. The writer is its founder.

If we can be of any service to our country, we shall be glad to serve in any capacity requested. We offer to you our complete organization and facilities.

Respectfully,

THE AMERICAN RADIO RELAY
LEAGUE, INC.

HPM:P

Chairman.

This brought the following response from the U. S. Signal Corps:—

From: Office Chief Signal Officer.

To: Hiram Percy Maxim, Chairman, American Radio Relay League, Hartford, Conn.
Subject: Radio communication.

1. In reply to your letter of August 7, 1915, addressed to the Secretary of War and which has been referred to this office, you are advised that the Signal Corps is pleased to receive the information contained in your letter, also the list of stations operated by the American Radio Relay League.

2. Should at any time it be found that these stations will be of service to the War Department, you will be further communicated with.

SAMUEL REBER,

Lieut. Col., Signal Corps,
Acting Chief Signal Officer.

From this it is evident that for land or interior service we would come in contact with the Signal Corps if the Government decided to avail itself of our assistance in time of war.

In times of peace we also have confronting us sudden disasters, such as flood, fire or strike. Dayton, Ohio was an example of a disastrous flood, which destroyed telegraphic and telephonic communications, and made it possible for the amateur wireless operator to render invaluable help. A fire which destroyed the central station of the telegraph and telephone Companies in a city, would also place that city in a very dangerous situation. The amateur wireless station would be the first place looked to in such an emergency.

To sum up, the organization of our League, in efficient working form is a work which is of national importance, and we may have the knowledge that it represents a patriotic and a dignified effort.

RELIABILITY AND CELERITY.

The words of the Radio Inspector of the First District, Mr. H. C. Gawler cover this point as well as it can be put. Mr. Gawler said:—"It seems to me your work is pretty well cut out for you and is very clearly defined. The value of this organization would depend entirely on the volume of business which could be handled by your stations in a PRECISE, ORDERLY and EFFICIENT manner. Few realize the amount of work involved in bringing this condition about, and it is my opinion the more local aid you can enlist on your side, the better the results will be. It is not sufficient to have stations which merely could transmit and receive messages over certain distances, but THEY MUST CONTINUALLY DO SO IN ORDER TO ASSURE GOOD COMMUNICATION BETWEEN THESE POINTS WHEN NECESSITY WOULD REQUIRE."

No one realizes the truth of the above better than those of our members who have handled any quantity of messages during the past year. Unless we can have something approaching RELIABILITY and CERTAINTY, all the hard work and money spent in getting our organization together is wasted. We must not let this good work go to waste. The hardest part was done when we got over 600 stations together. It only remains now to perfect some system whereby we can always be fairly sure of getting through. The Directors have given this a lot of hard study ever since last spring. This is what we have finally arrived at, and although it may not be perfect, yet we want every station to follow the spirit of the idea even though they cannot follow it to the letter.

REGULAR HOURS FOR LISTENING.

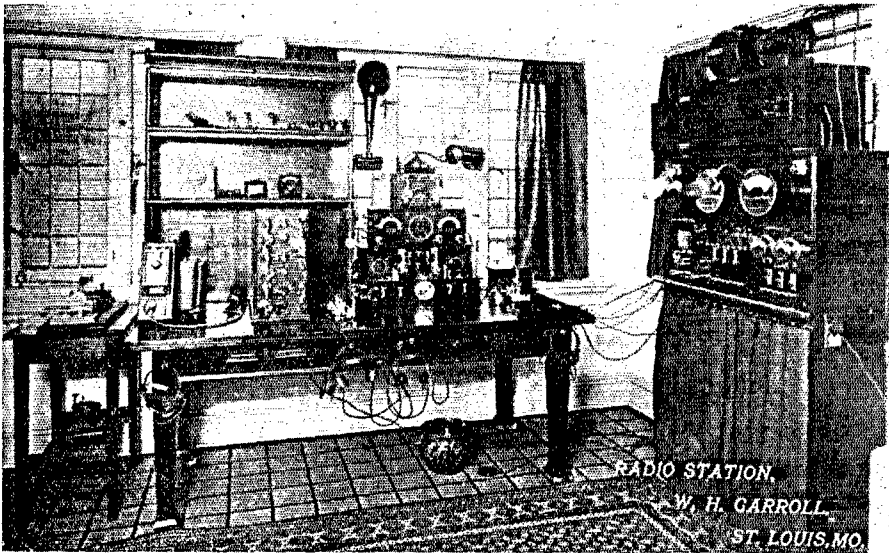
Our greatest difficulty in getting messages through is because the other fellow is not "on." Most of the stalling of messages is due to this one thing. What we must do is to have regularly established and definite times at which we will be on duty. Then if a man in Northampton has a message going West and he knows just when the station at Buffalo or Waynesfield or Kane, for example, is working he can work with some hope. As it is, he tries at any old hour and unless the other man is a regular night hawk and sits up half the night every night in the week, he misses him.

To make it better, it is suggested that every station send out a QST followed

by a QRU with his town or city at a definite hour every evening. This will indicate that this station is ready for anything coming his way.

An example of what the plan is may be taken from the way we have begun to work it at headquarters. Between 8:45 and 9:15 p. m. every night, one of the Hartford stations sends out the following at full power:
QST QST QST de IZT —. —. —. QRU
Hartford ? QRU Hartford ? QRU Hart-
ford ? de IZT . —. —. —.

This makes it known that Hartford, Connecticut, is ready to receive any messages for or via it. If all other cities would agree among themselves to carry out this same plan, it would help get messages through without a doubt.



One of the best equipped Stations in the League

THE LIST OF STATIONS BOOK AND THE OFFICAL LEAGUE LICENSE.

Another vitally important factor in securing reliable transmission is the LIST OF STATIONS book. This book must be at hand ready for instant reference at any moment. Over six hundred stations are listed in this book, and it is the one which the Government would use in attempting to work through an amateur station in case help were needed. The book was distributed among a few stations late in the spring. The summer season came before many members had ordered it. EVERY MEMBER OF THE LEAGUE AND EVERY AMATEUR WHO HAS A STATION OR EXPECTS TO HAVE ONE OUGHT TO ORDER THIS BOOK IMMEDIATELY. It gives all the latest call letters of relay stations, their

address, the name of the owner and operator, his transmitting power, what kind of a spark gap he has, how far he can send, the number of words per minute he can receive, his usual listening in time, what kind of a license he holds from the Government, and whether or not he has a telephone near at hand for delivering or receiving local messages. The book also contains a lot of extremely interesting letters from amateurs who are operating and covering long distances. The book is sent to any one whether a member of the League or not, upon receipt of fifty cents in stamps or otherwise, which just covers the cost of printing and distributing. Every one reading these lines is not doing his share unless he gets this book. If you have not sent in your order already, you ought to attend to it today.

OFFICIAL LEAGUE LICENSE.

Another important matter which will assist materially is the ordering of the official license certificate for Licensed Relay Stations. This certificate is issued only to members of the American Radio Relay League who have qualified as owning and operating a practical radio relay station. The certificate is similar to the United States Government certificate, and makes a dignified document which any radio operator might well be proud of. It is sent upon paying the license fee of fifty cents, provided of course the applicant is a member of the League. If you have not obtained your License, you ought to order it at once so as to have it framed and hanging up in your operating room when the time comes that you want your station to look well. Send a dollar, and we will send your Book, package of Official Message Blanks and your License all at the same time.

APPLICATION FOR MEMBERSHIP.

Any owner of a wireless station may become a member of the American Radio Relay League by filling in an application blank and sending it in to headquarters for consideration. If the application blank indicates that the operator has a practical working station, and can receive a message, he is made a member. No money is charged, as the League is not a money making scheme in any sense of the word. Its single aim is to organize the different amateur wireless telegraph stations of the United States of America, so that we can relay messages between each other and thus reach any part of the country. The only money that is asked for, is to pay for the List of Stations book, and the License Certificate which are charged at what they cost to print and distribute.

An application blank can be obtained by dropping a postal to Headquarters, American Radio Relay League, Drawer 4, Hartford, Conn. All orders for books or License Certificates should be sent to this address.

SPECIAL LICENSES.

As is well known among most amateurs by this time, we have secured the co-operation of the Government to the extent that where it seems desirable for the purpose of relay work, a Special License will be granted by the Bureau of Navigation, provided the applicant holds a First-Grade Commercial License, and provided he is favorably recommended by the League.

This does not mean that everybody can secure a Special License. Distinctly the reverse is the case. No Special Licenses are issued except where it is very plain that the interests of the American Radio Relay

League require it. Therefore, if you have a good station and hold a First Grade Commercial License and are located away from the sea coast, and absolutely require a transmitting wave length of 425 meters in order to be able to handle relay messages, there is a chance that you may secure a Special License. But, unless you can make it very plain that you meet every one of these conditions, it is a waste of time for you to think about a Special License.

The program to follow, where a station is entitled to a Special License, is to write to the Radio Inspector of your District, and secure application blanks for Special License, and after filling these in, to send them to Headquarters for consideration. If it seems desirable that the station be granted a Special License, a favorable endorsement is made upon the application, and it is forwarded to the District Radio Inspector. It is then up to the District Inspector to either favorably or unfavorably endorse after which the application is sent to Washington where the Bureau of Navigation finally passes upon the matter.

First Issue of QST Nr. 1 December, 1915.

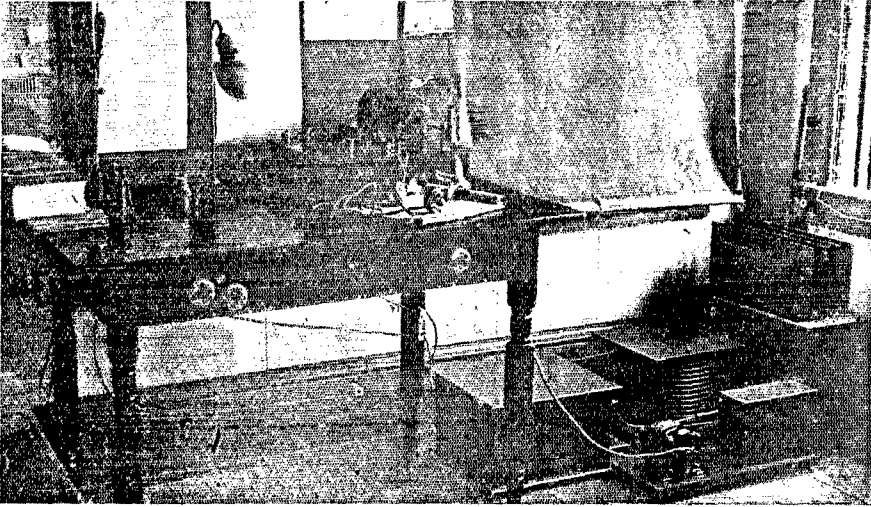
After considering the matter for several months, it has finally been decided to issue regularly some kind of a bulletin to League members. During last winter, the need for this was very apparent. Many stations would have been brought together which never got together, if there had been a regular circular distributed which contained general information. The difficulty has always been how to pay for it. The members did not order the new List of Stations book and License Certificates as fast as they ought to have, and the officers had to go down in their own pockets to pay the printers bill, clerical help, postage, supplies, etc. It did not seem wise to continue to spend money on circulars or bulletins unless the members indicated enough interest to at least get the List of Stations book.

After obtaining the views of several members and thinking it over, the President and Secretary finally decided to risk a few more dollars on a different plan. This new plan was to make the circular or bulletin take the form of a magazine, which the membership would be willing to support. Enough money would have to be put in to distribute three or four issues of the magazine in order that the amateurs throughout the country could get acquainted with it and come to like it well enough to be willing to buy it.

After much hard work, the President and Secretary out of their own pockets have produced QST Nr 1. It constitutes the first bulletin of general information on relay matters, and they hope to follow it each

month with a new one. At the end of three months, the President and Secretary hope that QST will be able to pay for itself, and that the sale of Books and Licenses will have brought in enough money to pay back to the two officers mentioned, the sums which have been advanced to print and distribute the recent list of Stations Books, Message Blanks, License Certificates, etc.

Of course the success of this plan hinges upon whether the membership will send in their dollar right away for the List of Stations book and the License Certificate and also whether they will subscribe to QST. If they do, we are all right, and we have a fine future promised us. If they do not, then the President and Secretary will have lost their money and wasted a lot of hard work.



Relay Station

8 BE

J. Lippert

Book Review

The government edition "List of Radio Stations of the United States" for July 1st, 1915, is in the hands of the printer. The date of delivery is uncertain.

The Radio Service Bulletin is issued monthly by The Bureau of Navigation. The bulletin gives all the latest alterations and additions to the List of Radio Stations, and also comments miscellaneous radio matters. Single copies 5c, subscription per year 25c.

The Superintendent of Documents,
Government Printing Office,
Washington, D. C.

This is the first bulletin of the kind the League has published. Errors are sure to creep in, and the editor would consider it a favor to be informed of all errors. Criticisms will help to improve future editions,

The next Book of Radio Telegraphy by R. Stanley is a new book which covers an advanced up to date text, with simple mathematics, and clear explanations.

We are all pleased to see the 1915 edition of the Year Book of Wireless Telegraphy and Telephony in the Market. This is a book most amateurs can not do without. Its list of radio stations of the world is invaluable and its glossary contains very useful wireless data. It can be secured through the book department of the Marconi Publishing Corporation, 450 Fourth Ave., New York City.

All amateurs are requested to send articles on radio matters. Contributions and pictures will help to make the bulletin a success. Send in yours today.

Pictured Electro-Magnetic Waves

By Clarence D. Tuska, Assoc. I. R. E.

Many amateurs are proficient operators, but have only a vague idea of the theory of electro-magnetic waves. For example, you continually transmit Hertzian waves, but have you ever pictured what happens when you send a dash?

To explain the ether waves, let us consider a vertical aerial.

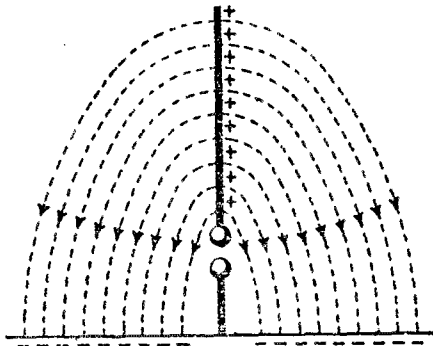


Fig. 1

When the aerial is fully charged, the lines of strain leave the conductor at right angles to its surface. (Fig. 1.) Upon the discharge the upper ends of the strain lines rush down to meet the lower which move comparatively slowly as they pass along the earth. The earth offers more electrical resistance than the ether. When the upper ends of the strain lines reach the bottom of the aerial, the discharging current has reached its maximum, and as it reaches zero, it charges the aerial in the reverse direction as shown in Fig. 2. Therefore the new strains are formed with their feet on the earth. As the new strain reaches its maximum, the looped strain dies out, but loops are set up in the ether beyond. These loops are set up because when the electrical

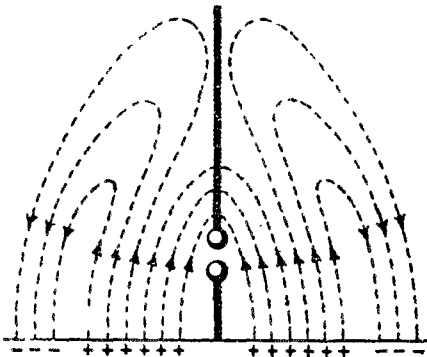


Fig. 2

strain dies out, it sets up a magnetic strain. Upon the collapse of a magnetic strain, another electrical strain is set up in the opposite direction to those existing before, as in Fig. 3.

This action keeps repeating at its tremendous frequency and the waves are propagated at 300,000 kilometers per second. In practice we do not use the plain vertical aerial. The action being similar to Fig. 4. (Figs. 4 and 5 here).

Now we observe that the lead in is about the center of the wave action, showing the electro magnetic field is stronger on the lead in side. This gives us a theory for directive aeriels. Upon the start of the waves, the peaks lean toward the aerial, but as the waves are propagated, their feet lag, owing to the resistance or impedance of the earth.

The peaks advance and approach receiving aerial as shown in Fig. 5. Now, if the transmitting aerial is slanting as shown in Fig. 4 with the lead at the higher end, the waves will point even more toward the sending aerial, but will reach the receiving aerial in a nearly vertical position. The nearer vertical, the waves reach the receiving aerial, the more energy they will impart to it.

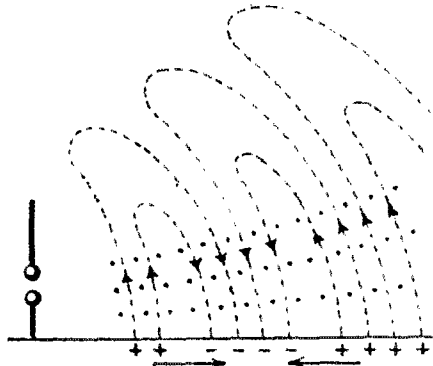


Fig. 3

By studying this important theory, we can see how mountains and oceans affect the waves. In crossing a mountain, the waves must pass over more ground at their feet in comparison with the peaks passing through the ether. This causes more lag than on level ground, and the peaks advance correspondingly. Naturally the waves reach the receiving antenna slanting more than if they had come over level ground and less energy is received. In passing over the water, the waves are propagated in a nearly vertical direction, as the

water is a good conductor. It will be seen from this explanation, that many factors have been omitted, but enough has been given to form the basis of a more elaborate theory.

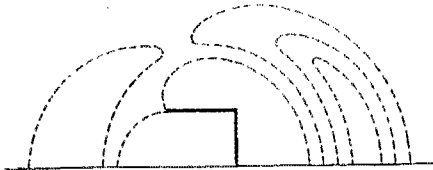


Fig. 4

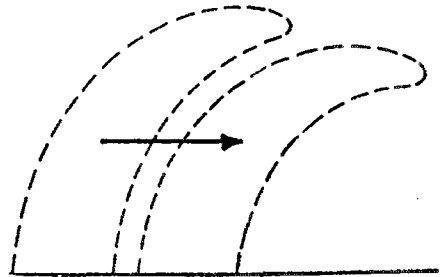
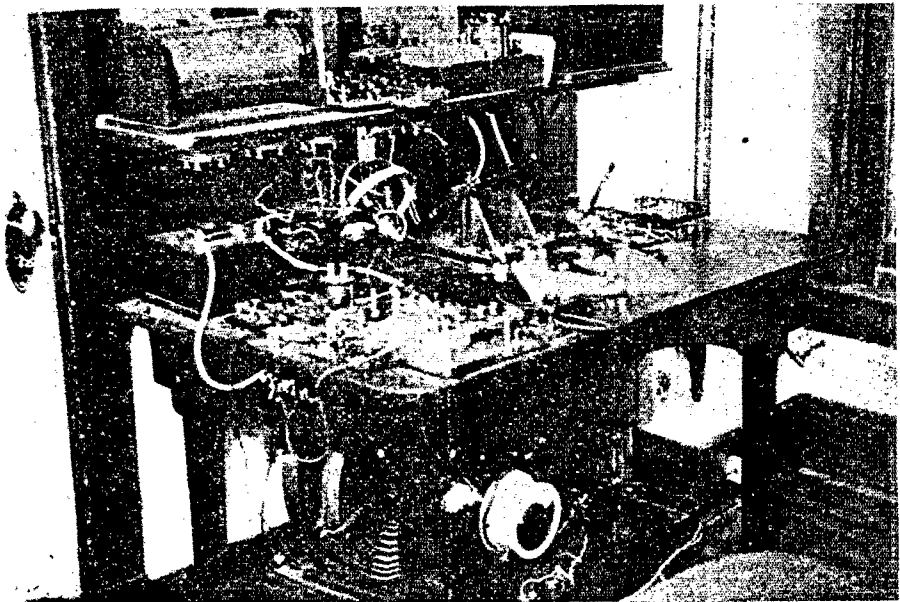


Fig. 5



Radio Station of Roy G. Burr, Norwalk, Ohio A Typical League Station

CUT OFF ON THIS LINE

SUBSCRIPTION BLANK

American Radio Relay League
Hartford, Conn.

Gentlemen:

Enclosed find 25c (stamps, currency, check or money order); kindly send me January, February and March numbers of Q S T.

Name

Street and No.

Town and State

Latest list of Additions to American Radio Relay League List of Stations

ALABAMA			
Huntsville	Robert M. McLain	513 West Clinton St.	5BS
Mobile	Ernest M. Curtis	350 Selma St.	5BR
CALIFORNIA			
Alameda	F. Arnberger, Jr.	3230 Garfield Ave.	6FA
Alhambra	{ Frederick Gilstrap	715 N. Curtis Ave.	6AAH
	{ Charles Linville		
Berkeley	J. A. Forsburg	1734 Sonowa Ave.	6JF
Berkeley	Frank Seeley	2615 Etna St.	6TF
Oakland	C. E. Cadwell	Monte Cresta Ave.	6AC
Pasadena	Jerome Miley	585 Bellefontaine St.	6QY
Redlands	Howard Hamilton	1218 Sixth St.	NA
San Bernardino	W. W. Gates	1075 Second St.	RW
San Francisco	Fred Neilsen	136 Caine Ave.	6OR
Sawtelle	Geo. E. Chamberlain	121 N. 6th St.	6QJ
COLORADO			
Denver	W. F. Lapham	1545 Milwaukee St.	CL
D. C.			
Washington	E. F. Ramsey	640 Irving St.	3PR
FLORIDA			
Jacksonville	Thomas R. Dunk	1424 Laura St.	4AZ
Tampa	Patrick H. Wall	258 Plant Ave.	4AW
GEORGIA			
Athens	W. B. Pope	197 Dearing St.	4AA
Savannah	E. W. Steinhauser	223 W. 40th St.	4AD
IDAHO			
Boise	Carl Eichelberger	715 N. 9th St.	7CE
Pocatello	P. C. Samms	415 S. 9th St.	7SP
ILLINOIS			
Carrollton	Stuart W. Pierson	214 Maple Ave.	9PY
Chicago	John A. Goorisich	2316 Clybourn Ave.	9SR
Chicago	Harold H. Shotwell	446 W. 61st Place	9EF
IOWA			
Cresco	Will P. Rathert	316 5th Ave. W.	PR
Dubuque	C. E. Fawkes	503 Hill St.	9FP
KANSAS			
Topeka	Wm. McClintock	1257 Topeka Ave.	BM
Topeka	Edison Pettit	Washburn College Ob.	WZ
MAINE			
Gardiner	H. and J. Cusick	21 Beech St.	HC
Gorham	Lawrence B. Robinson	R. F. D. No. 2	1FE
Portland	R. C. Carles	66 Evans St. S.	1FY
Portland	J. H. Nicholson	119 Washington Ave.	1FU
Sanford	O. W. Brown	12 Kimbal St.	1AC
Westbrook	W. P. Meggison	13 Mechanics St.	1FJ
Westbrook	Rahma W. Pratt	Longfellow St.	1AM
MARYLAND			
Baltimore	C. H. Baxley	1126 W. North Ave.	3SK
Highlandtown	G. L. Talbot	516 14th St.	3OF

MASSACHUSETTS

Belmont	Leon C. Runey	49 Fairmont St.	1LS
Boston	Fred F. Flanders	9 Norway St.	1OH
Cambridge	Lane Andonegui	1010 Mass. Ave.	1NA
Cambridge	Harold F. Hill	102 Trowbridge St.	1FV
Cambridge	Stanley Marshall	1 Hobart St.	1NG
Danvers	H. G. Campbell	86 Kenwood St.	1NU
Dorchester	C. V. Pursell	1257 Morton St.	1 MP
Dorchester	L. S. Bennett	2 Lawrence St.	1HY
Everett	D. J. O'Brien	152 Bridge St.	1QJ
Manchester	R. A. Scott	952 Franklin St.	1LT
Melrose Hglds.	R. A. Snow	19 Gage St.	1RT
Needham	M. A. Baylies	111 Grinnell St.	1MC
New Bedford	W. R. Black	32 Jefferson St.	1QK
Newton	H. D. Copeland	42 Huron Ave.	1OS
Taunton	Fred J. Cosgrove	57 Cedar St.	
Wakefield	M. C. Wood	14 Armory St.	1MM

MICHIGAN

Ann Arbor	O. C. Klager	611 S. Main St.	8RA
Battle Creek	Forrest Phippeny	R. F. D. 4	8CX
Detroit	P. E. Diederich	915 E. Grd Blvd.	8IJ
Detroit	L. M. Igenpritz	2 Forest Ave. E.	8ON
Detroit	R. J. Fowler	1209 E. Kearsley St.	8SF
Detroit	H. W. Livinggood	1825 Mich Ave.	8MR
Detroit	S. J. Miner	2253 Jeff. Ave.	8BR
Flint	G. H. Norris	77 Melbourne Ave.	8ID

MISSISSIPPI

Starkville	L. N. Goodman		5AS
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MISSOURI

Cape Girardeau	Harmon Deal	6 S. Fountain St.	9NN
Kansas City	A. I. Graham	3033 Park Ave.	9MQ
Kansas City	Guy E. Wilson	3922 Flora Ave.	9EP
St. Louis	W. H. Carroll	6334 McPherson Ave.	CW

NEBRASKA

Omaha	W. C. Reinhardt	3437 Taylor St.	9BW
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NEW HAMPSHIRE

Keene	R. F. Howe	94 School St.	1CR
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NEW JERSEY

Cresskill	J. B. Worth	Madison Ave.	2IW
Great Notch	Chas. Murray		2SK
Irvington	A. L. Pfeil	242 Cottage St.	2NZ
Jersey City	W. N. Baker	881 Montgomery St.	2LO
Midland Park	Karl G. Krech	316 Godwin Ave.	2BR
Newark	D. N. Corson	51 Berkeley Ave.	2AQ
Newark	V. F. Pennell	15 Baldwin St.	2AAZ
Ocean City	E. R. Bourgeois	901 Central Ave.	3SN
Westfield	H. B. Day	555 Mountain Ave.	2KK

NEW YORK

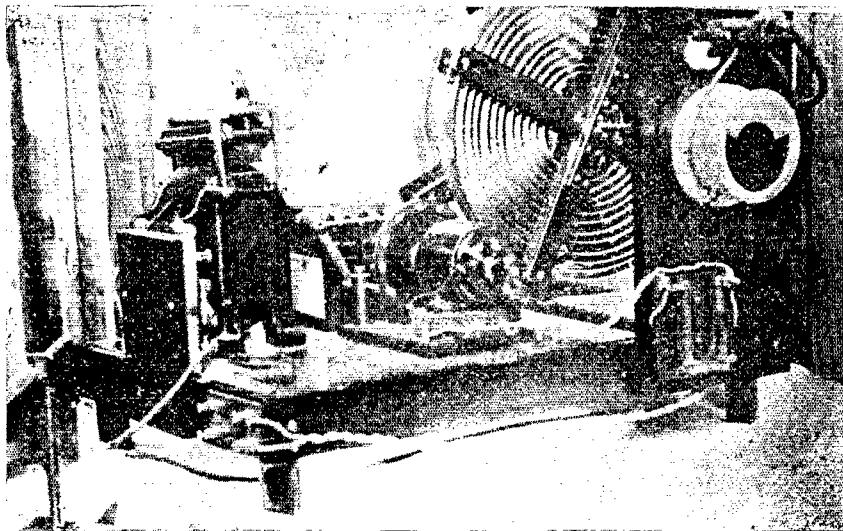
Brooklyn	Samuel S. Barriette	311 Macon St.	2PC
Brooklyn	P. B. Collision	172 Maple St.	2KN
Brooklyn	Charles Hallenbeck	1150 54th St.	2MA
Brooklyn	George Kirch, Jr.	364 75th St.	2BL
Catskill	E. C. Hoemer, Jr.	74 Spring St.	2AFK
Garden City	W. L. Hoyt	44 Hilton Ave.	2UE
Mt. Vernon	G. H. Scharrenbeck	126 W. 1st St.	
New York City	George T. Droste	1309 Pugsley Ave.	2EU
New York City	George Holmes	164 West 146th St.	2AFO
New York City	J. E. Johnston	1379 Clay Ave.	2SO
New York City	G. C. Meder	990 First Ave.	2NV
New York City	J. T. Smith	126 E. 114th St.	2DU

New York City	John Vegessy	437 6th St.	2GT
Roselyn Heights	R. G. B. Lee		2TU
White Plains	H. E. Dickenson	91 Greenridge Ave.	2TC
NORTH DAKOTA			
Pembina	C. D. Curtis		9GN
OHIO			
Cincinnati	Henry M. Rubel, Jr.	920 Burton Ave.	8ZF
Cincinnati	J. M. Schaaf	322 East St.	8PO
Cincinnati	Carl P. Goetz, Jr.	1518 Knowlton Ave.	8RY
Cincinnati	G. H. Kroeger	1837 Clarion Ave.	8BI
Cincinnati	Fred W. Stern	835 Glenwood Ave.	8OL
Bucyrus	A. C. Wiesemann	933 Bank St.	8UE
Cleveland	John P. Lippert	4 Stanwood Rd. E.	8BE
Cleveland	Myron R. Peseck	3288 Fulton Road	8SG
Cleveland	Robert G. Sidnell	1268 W. 115th St.	8KS
Euclid	Edward R. Williams	Stop 133½ Shore Line	8KE
Hamilton	Doron Bros. Elec. Co.	329 N. C. St.	8CU
Lakewood	George E. Grostick	1605 Wagar Ave.	8QR
Lakewood	Grant D. Rogers	2065 McKinkey Ave.	8DT
North Fairfield	Hoyt S. Scott		8LE
Oberlin	Ross Gunn	369 W. Lorain St.	8JA
Springfield	Wm. Haynes	102 Florence St.	8FH
Waynesfield	James M. Day, M. D.		8PI
Youngstown	T. J. Bray, Jr.	Wick Ave.	8ADP
OREGON			
Portland	George C. Henny	530 Heights Terrace	7GC
PENNSYLVANIA			
Easton	Paul F. Miller	38 S. 5th St.	3AGN
Edgewood Park	Harold Knapp	224 Elm St.	8RB
Greensburg	Frank G. Beck	122 N. Maple Ave.	8NS
Meadville	Walter Baird	674 E. Arch St.	WB
Ogontz	David B. Fell	19 Park Ave.	3TR
Philadelphia	W. N. Deerham	4618 Spruce St.	3VA
Philadelphia	J. C. Van Horn	5127 Arch St.	3CM
Philadelphia	Emil J. Meyer, Jr.	1919 Green St.	3PD
Philadelphia	Ernani Rancetelli	1435 S. Broad St.	3VC
Pittsburg	Jack O. Kleber	1135 Murray Hill	8GV
Pittsburg	Ralph C. Powell, Jr.	5236 Westminster Pl.	8QP
Pittsburg	J. Lauer Stauff	347 Oakland Ave.	8LH
Pottsville	Cotesworth M. Jackson	State Police	8JK
Wayne	C. Walton Hale	107 Aberdeen Ave.	3AIG
York	Harry G. Miller	1526 2nd Ave.	3TD
RHODE ISLAND			
Newport	Francis Horgan	239 Broadway	1TI
SOUTH CAROLINA			
Summerville	Mayrant Simons	Box 175	4BK
TEXAS			
Dallas	Frank M. Corlett	1101 East 8th St.	5BJ
Georgetown	Robert P. Ward	233 Orchard St.	5BU
VIRGINIA			
Portsmouth	Vincent Tabb	26 Court St.	3TH
WEST VIRGINIA			
Martinsburg	W. A. West	617 W. King St.	8ADQ
WASHINGTON			
N. Yakima	Albert Baker	Box 33, R. F. D. No. 2	VT
Seattle	Howard S. Pyle	3376 York Road	7NG
Seattle	Chas. E. Williams	8326 13th Ave. N. W.	7BW
WISCONSIN			
Sheboygan	Chas. T. Schrage	517 Wash. Ct.	9SS
Sheboygan	Palmer Leberman	Upper Falls Road	9LX
CANADA			
Moosomin, Sask.	John Wells	P. O. Box 488	JW

List of Abbreviations used by Amateurs

Abbreviation	Question	Answer or Notice
QRA.....	What ship or coast station is that?	This is
QRK.....	How do you receive me?	I am receiving well.
QRL.....	Are you receiving badly? Shall I send 20?	I am receiving badly. Please send 20.
QRM.....	Are you being interfered with?	I am being interfered with.
QRN.....	Are the atmospherics strong?	Atmospherics are very strong.
QRO.....	Shall I increase power?	Increase power.
QRP.....	Shall I decrease power?	Decrease power.
QRQ.....	Shall I send faster?	Send faster.
QRS.....	Shall I send slower?	Send slower.
QRT.....	Shall I stop sending?	Stop sending.
QRU.....	Have you anything for me?	I have nothing for you.
QRV.....	Are you ready?	I am ready. All right now.
QRW.....	Are you busy?	I am busy (or: I am busy with.....) Please do not interfere.
QRX.....	Shall I stand by?	Stand by. I will call you when required.
QRY.....	When will be my turn?	Your turn will be No.
QRZ.....	Are my signals weak?	Your signals are weak.
QSA.....	Are my signals strong?	Your signals are strong.
QSR.....	Is my tone bad?	The tone is bad.
QSC.....	Is my spacing bad?	Your spacing is bad.
QSD.....	What is your time?	My time is.....
QSP.....	Shall I inform.....that you are calling him?	Inform.....that I am calling him.
QSQ.....	Is.....calling me?	You are being called by
QSR.....	Will you forward the radiogram?	I will forward the radiogram.
QST.....	Have you received the general call?	General call to all stations.
QSU.....	Please call me when you have finished (or: at.....o'clock)?	Will call when I have finished.
QSZ.....	Send each word twice. I have difficulty in receiving you.
QTA.....	Repeat the last radiogram.

When an abbreviation is followed by a mark of interrogation, it refers to the question indicated for that interrogation.



Detail of Roy C. Burr's Sending Set

APPLICATION BLANK

American Radio Relay League Incorporated Hartford, Connecticut

Your Name Address
(Street, City and State.)

Your Age Your Station Call Letters

Are you a member of any Radio or Wireless Club, and if so give its name and address:

.....

Length of your Aerial Height above ground

Number of wires in Aerial and space between

SENDING EQUIPMENT

Do you obtain your power from Batteries or City Current?

Do you use a Spark Coil or a Transformer?

What is your Power Input?

Is your Spark Gap Rotary, Fixed or Quenched?

What Tone has your Spark? Approximate Wave Length

Give names and addresses of the FIVE most distant stations you communicate with:

State distance in miles

.....

.....

.....

.....

(OVER)

RECEIVING EQUIPMENT

Describe your Receiving Set

Do you use an Audion Detector?

What is your approximate receiving range in miles?

Are you troubled by interference?

What are your usual listening hours and how many evenings a week do you average at your instrument?

Have you telephone connection in your house, or convenient?

Do you keep your station practically constantly in running order?

Can you copy Press News?

About how many words per minute can you receive with certainty?

What is the nearest Commercial or Government Station to you?

Have you a Government license, and if so what Grade and No.

Please make any remarks or comments which you think will be of help in perfecting a chain of Amateur Radio Relay Stations throughout the country. The object of the League is strictly confined to facilitating the relaying of radio messages among amateurs.

I HEREBY OFFER TO RELAY OR DELIVER ANY AMATEUR RADIO MESSAGES THAT ARE SENT TO ME

Signature *Date*



Try This Head Set for Ten Days

and see for yourself how clearly you can get stations that are barely audible with your present head set. If it does not prove to be all that we claim for it, we'll gladly refund your money. The .

Stromberg-Carlson Radio Head Set

is noted for its extreme sensitiveness. The tone is soft and beautifully distinct, which greatly reduces static interferences but brings in weak signals clear and strong.

Furnished with concealed cord connections, universal ball joint adjustment, six foot waterproof cord, laminated pole pieces, etc.

Standard A-9723 Radio Head Set wound to 2000 ohms sent for \$8.25. **Privilege of return in 10 days if receiving efficiency is not increased.**

Bulletin No. 1006 which describes the general construction and "What Some of the Users Say" is free for the asking.

**Stromberg-Carlson
Telephone Mfg. Company**

Rochester, N. Y.

Chicago, Ill.

Toronto, Can.

Arlington Notes.

Shortly after the 10:00 p. m. time signals, NAA sends weather bulletins in code letters and figures to express weather conditions along the eastern coast of the United States and the Great Lakes.

In case you have lost the key letters used they are given below:—

U. S. W. B.	United States Weather Bureau
S	Sydney
T	Nantucket
DB	Delaware Breakwater
H	Hatteras
C	Charleston
K	Key West
P	Pensacola
B	Bermuda
Du	Duluth
M	Marquette
U	Sault Ste. Marie
G	Green Bay
Ch	Chicago
L	Alpena
D	Detroit
V	Cleveland
F	Buffalo

The first three figures denote the barometric pressure in inches as (001—30.01) or 959—29.59). The fourth figure represents the direction of the wind:

1	North	5	South
2	Northeast	6	Southwest
3	East	7	West
4	Southeast	8	Northwest
		0	Calm.

The last figure gives the force of the wind on the Beaufort Scale.

Beaufort Scale of Wind Force.

Number and designation.	Miles per hour.
0 Calm	0—3
1 Light air	8
2 Light breeze	13
3 Gentle breeze	18

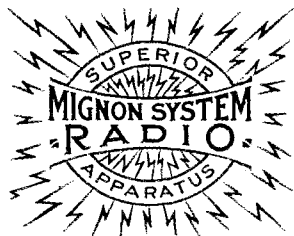
Examples of Code:—

U. S. W. B. S 00355 T 93472 United States Weather Bureau Sydney, 30.03, south, fresh breeze, 28 miles per hour; Nantucket, 29.34, west, light breeze, 13 miles per hour.

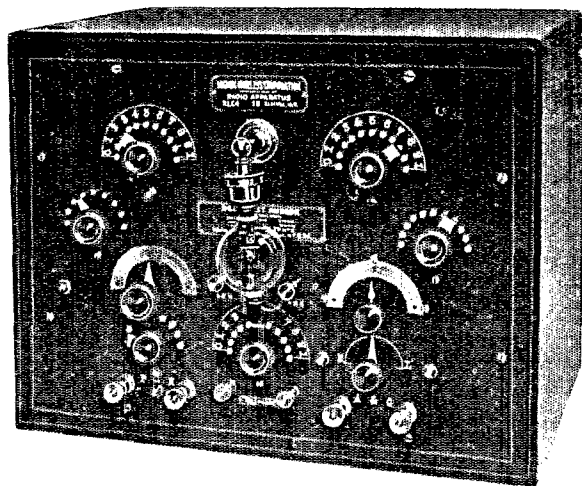
4	Moderate breeze	23
5	Fresh breeze	28
6	Strong breeze	34
7	Moderate gale	40
8	Fresh gale	48
9	Strong gale	56
10	Whole gale	65
11	Storm	75
12	Hurricane	90 and over

Wind force greater than 9 is given by a word instead of figures.

"Mignon System"

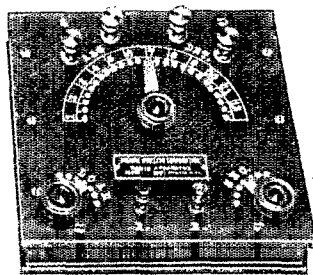
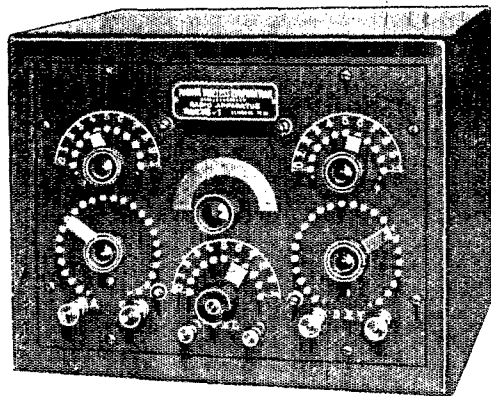


**The Last Word in
Radio Apparatus**

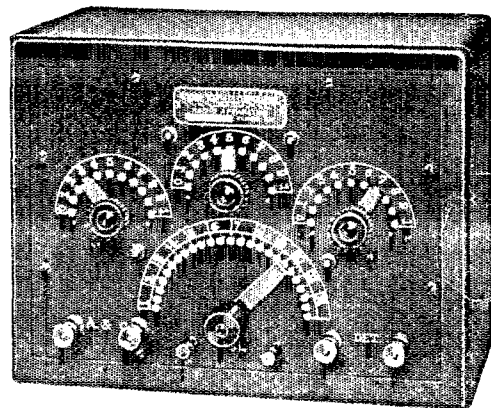


ATTENTION! The "MIGNON" apparatus are of absolutely original design and construction, the only kind of its type on the market, manufactured exclusively by us. Many of our satisfied patrons are delighted in being able to hear Sayville and Tuckerton over their "MIGNON" apparatus.

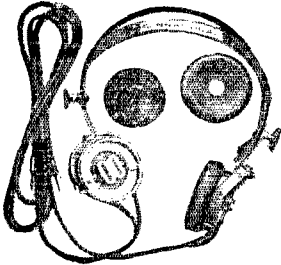
The "MARVEL" in sensitiveness
Selectivity and efficiency.



Write for Literature
Mignon Wireless Corp.
Elmira, N. Y.



Brandes Radio Headsets



Superior Type, \$5.00

The Great Favorite
with both
Professionals and Amateurs

Send Stamp for Our Catalogue F

C. BRANDES, INC.

Room 821, 32 Union Square

NEW YORK

?

Have you used the subscrip-
tion blank on page 10? If
you have not, turn back
now; it is never too
late to mend

?

No. 5 Model

Loose Coupler

This instrument is made of the best material obtainable, is very handsome and accurately made. Will tune up to 3,500 meters on a fair size Antenna. - Price, \$15.00

I also stock the finest line of Switch Points, Knobs, Cabinets and Accessories on the market.

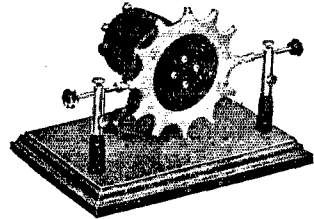
Send 2c for complete literature.

J. F. ARNOLD

135 East 119th Street

New York City

Chambers Rotary Spark Gaps



\$12.50, Mahogany Base; \$13.50, Marble Base, runs perfectly steady. Gives a tone similar to a Flute, on 60 Cycles. Runs on 110 D.C., or A.C., and is suitable for $\frac{1}{4}$ to 1 K.W. Motors, have $\frac{1}{4}$ " Shaft. Runs about 6,400 R. P. M. with load on.

Have slower Motor, at \$11.50 on mahogany base, and \$12.50 on Marble.

5c. in Stamps brings our new illustrated Catalogue. Positively none sent otherwise.

F. B. CHAMBERS & CO.

2046 Arch Street

Philadelphia, Pa.

YOU WILL FIND

the audion detector in the best amateur wireless stations.

A combination audion detector and amplifier set will assure you of results which are impossible with any other detector. Its superiority over anything else to be had is easily proven to your own satisfaction, and its extreme sensitiveness will delight you. There is great satisfaction in knowing that each time you are through transmitting you will hear the distant station with the same intensity—by merely moving a switch.

We have a booklet which explains the audion amplifiers which we would like to send you. If you will send us your name and address we will forward a copy to you at once.

We carry in stock at all times a complete line of audion detectors, renewal bulbs, etc., and can usually make shipments the same day your order is received.

We manufacture many other good instruments, and full information and literature will be sent anyone upon request.

The Wireless Mfg. Company, Canton, Ohio

Duck's New BIG NO. 9 312 Page Electrical and Wireless Catalog

More than ever justifies your verdict
that it is the one catalog worth while

Everything Electrical

For the Boy, Home or Store

Only 8c

in stamps will bring this unrivalled catalog to your home. The great cost of catalog and the exceptionally low prices (oftentimes fully 25% below usual retail price) prohibits its distribution otherwise.

You may deduct the 8c on first dollar purchase.

Our records show that 70% of our catalogs produce us patrons. Many of our competitors admit the waste of 90% of their catalogs. Who pays for them? This is the big, controlling reason why you should have our catalog, backed by a great selling and purchasing power, before even thinking of buying elsewhere.

Only 4c

in stamps will bring to you our complete wireless catalog of 128 pages.

Over 40 New Pages of Wireless Instruments

and substantial reductions on many popular wireless instruments and standard electrical supplies.

A FEW OF THE ARTICLES IN OUR CATALOG:

129 pp. Wireless Instruments (129 pages) magnet wire of all kinds, raw material, storage batteries, telegraph instruments, battery motors, commercial motors and generators, sewing machine motors, telephones, step-down transformers, massage vibrators, bells, push buttons, auto accessories, flash lights, hand lanterns, auto and miniature lamps, Xmas tree outfits, voltmeters, ammeters, lighting plants, Victrolas, air rifles, electric aeroplanes, model builders, electric railways, electrical and mechanical books and general electrical supplies.

The William B. Duck Co., 229-231 Superior St., Toledo, Ohio

Multi-Audi-Phone

New wonder in the wireless world. Increases the audibility 1,500 times

Are You from Missouri? Then Read These Letters

F. B. Chambers & Co., Wireless Engineers, 2046 Arch St., Philadelphia, Pa., write: "On Tuesday evening we gave a demonstration of the Multi-Audi-Phone, to about 300 men: Technical and experimenters.

The hall in which the demonstration was held is about 75 by 150 feet, and the signals from all stations—working at the time, could be heard all over the hall; and the louder ones could be heard in another room—back of the main hall. Even the Amateurs came in "howling," and the aerial used was only 3 wires, and about 40 feet high.

Everyone was more than surprised at the results, and before us when we say—that it surely was some amplifying: and there is nothing that can anywhere near touch the Multi-Audi-Phone."

Jeffries-Young Antenna Co., of Atlantic City, N. J., write: "The Amplifier and Multum in Parvo Set received from you are giving wonderful results, and come to the mark on every claim made. The Arlington Signals before audible with the Phones 12 inches away, can now be copied in nearly every room in our house, on St. Charles Place, where our winter station is located."

W. O. Horner, of Cleveland, Tennessee, says: "I have been trying your Multi-Audi-Phone out as an Amplifier. . . . I was more than surprised at its sensitiveness. . . . It is certainly wonderful."

Again he writes: "Yours of the 28th at hand. I use a Triple Valve Station of highest class and thought I had the best on the market, but when I hooked your Multi-Audi-Phone to the third Audion I was astonished at its Amplification.

"I laid your Phones on the table and walked one hundred and twenty-five feet to the rear of my store and copied Arlington and Key West at 9:30 P. M. Many 600 Meter stations I also copied at this same distance. I also hooked your Multi-Audi-Phone to a single Audion and signals were much louder than all three of my Amplifiers."

S. Kruse, of Halstead, Kansas, writes: "Multum in Parvo is a wonder."

M. B. Schwartz, of Brooklyn, N. Y., writes: "With regard to results obtained on connecting the Multi-Audi-Phone in my Radio receiving set as an Amplifier, I am glad to say that I was astonished by the roaring and whistling of myriads of stations, near and far, many of which I never heard before; the small amateur stations coming in so loud that they were heard all over the room—it was like opening up a new region, fertile with activity and life, heretofore unknown. It may also probably be of interest to you to know that I heard the SS Brazos every evening from the time she left San Juan, P. R., Oct. 20th, until she reached N. Y., during the run she came in with remarkable audibility.

"The above is precisely what happened after including the Multi-Audi-Phone. Signals were heard all over the house for a distance of from 50 to 100 feet from Phones."

F. S. Hammond, of St. Marys, Pa., writes: "With Amplifier, my Tuner Galena and small horn attached to one of your Phones, Arlington can exactly be read in any part of room. Substituting Audion for Galena nearly doubles strength of signals, making them readable in hall downstairs."

Glenn Sabin & Co., Wireless Engineers, of Northampton, Mass., write: "We have demonstrated your Multi-Audi-Phone, to a number of experimenters and the results were surprisingly satisfactory.

"We have picked up stations with a single Multi-Audi-Phone, coupled to a single Audion, which we have been unable to get with a double Audion."

"For getting Arlington time there is nothing that can touch it.

"On our aerial we can pick up fellows fifty and sixty miles away operating on half and three-quarter inch spark coils, which is excellent work to say the least and proves without a doubt that the Multi-Audi-Phone is an Amplifier that cannot be beaten."

We guarantee the Multi-Audi-Phone for three years. With fair treatment it ought to last one hundred years

REMEMBER THESE FACTS: That the Multi-Audi-Phone works equally well with damped and undamped circuits and will work equally well with any Detector or Receiving Set, and that it will cost you more for batteries than TEN CENTS A MONTH

Our regular orders have already increased to such an extent that we are now compelled to withdraw our ten-day trial offer. Everybody will EVENTUALLY buy a Multi-Audi-Phone. Why don't you buy yours now and GET THE PLEASURE OUT OF IT?

Multum in Parvo Receiver, including Crystalol Detector and Buzzer \$20.00
If you prefer to use your own Detector and not buy the Crystalol and Buzzer 15.00
Multi-Audi-Phone, including our specially wound Head Set 30.00
OUR COMPLETE WIRELESS SET \$45.00 or \$50.00

The Christmas present of ALL Christmas presents, our complete Wireless Set, \$45.00 or \$50.00

Send for circular today. Ask your dealer tomorrow

Multi-Audi-Phone

275 Morris Avenue

Elizabeth, N. J.

The Next Issue

The next issue of "QST" will be a wonder. There will be an article on the Oscillating Audion, and it will be written in language which no one can misunderstand. Construction, operation, what stations can be heard with one, and theory will be covered in a brief and crisp manner. The amateur will understand this newest radio development when he reads this article. Nauen and Hanover, Germany, are read easily here on a fifty-foot high aerial, using an oscillating audion.

Another feature of the next issue worth watching for will be on the matter of a Volunteer Radio Corps. It is being suggested by the officers of the League and the chances are that the better amateur radio stations of the country will be recognized by the Government. Big things are certainly coming for the up-to-date amateur. Be sure and arrange so that you will not overlook the next issue.

A system of testing among amateurs, will be described also in the next number. We all know how difficult it is sometimes to pick up a distant amateur station which we really should be able to easily work. In the next issue a plan is suggested which will help us all.

Miscellaneous

Everybody please note that we are always glad to welcome contributions from any amateur on a wireless subject. Send us your ideas or photographs or long distance record or anything in the freak line you have noticed. Never mind if you cannot express yourself to your satisfaction. Write it out any old way, and we will do the dressing up if it should need any.

Remember, everybody, that we will print free of charge for sale and want ads. for second hand apparatus up to any reasonable number of words. Practically the entire amateur wireless contingent of the country will see QST and there is always some one who wants what you have to sell or exchange.

AGENTS FOR QST SUBSCRIPTIONS. We will have a lot of people who want to buy QST but who have not the necessary personal snap to arrange for a regular subscription unless some one makes it easy for them. The agent has a good opportunity here. We will send one extra copy whenever an agent sends in subscription for four. If an agent sells eight, he receives ten from us. He can sell these and get his commission.

The Secretary of the American Radio Relay League Offers a Reward!

He wants an Answer to One of the Many Curious Letters He has Received

The American Radio Relay League has grown very famous and, as this fame has extended all over the wireless world, it is not unusual that many curious letters are received by the Secretary. The following letter is so interesting that it seems certain the readers of Q S T would

like to read it and suggest an answer. The Secretary has decided to pay \$5.00 for the best answer. The answers must be received by Dec. 30th, and will be judged from either their funny side or technical value.

Hynacus, Japan

To Honorable Mr. Radio Secretary Tuska,
Honorable Relay League, America

I ask to know. When condenser made separators of glass we know dielectrics much pressed by electricity. This much sure, why, tests made show it. Honorable writers of English make tests and demonstration that metal can be vanished and all the same when new metal comes to condenser, yet discharge comes too the same. Why thus we see plain that dielectric heart of condenser.

Then now. I ask to know if air I use no glass for important dielectric does it obtain pressed? Like glass? Honorable American teachers tell me yes. Air—glass—mica all same without difference among them.

Then now again how? Suppose I have air variable condenser and I the air vanish blowing by breath. Goes away quickly the air. How goes my electricity charge? Goes it too? I think me not. Then how charge gets back?

Explanation me Honorable Radio Secretary for which accept my assurances most distinguished consideration.

KATHIS KATHKAN,

Japanese Radio Student,

P. O. Box 1155, Hynacus, Japan

S. P. Why this write typewriter, you Japanese write mostly not know. K. K.

Notice to All League Relay Stations

Headquarters, Hartford,
Oct. 20, 1915

At a meeting of the Directors of the American Radio Relay League held at Headquarters, Oct. 20, it was voted to supply for the remainder of the year the List of Stations Book, one pad of Message Blanks and 1915 Station Appointment Certificate to all Relay Stations in good standing who send in their station dues of 50 cents before Dec. 6.

Members who have not yet secured their List of Stations book, message blanks and station appointment certificate should take advantage of this opportunity and get their orders in immediately.

Clarence D. Tuska, Secretary

The List of Stations Book

COMPLETE LIST OF RELAY STATIONS OF THE AMERICAN RADIO RELAY LEAGUE INC.

**Shows what Relay Stations are within
your Range**

**Gives name of owner. Complete address. Call
letters. Sending power. Kind of gap used.
Number of words can receive per minute. Lis-
tening in hours. What license is held. Tele-
phone connection or not.**

**Best list of Amateur Radio Stations
in existence**

**Indispensable to every amateur whether in
Relay League or not**

**Sent postpaid to anyone upon receipt of 35 cents
in stamps, currency, check or post
office money order**

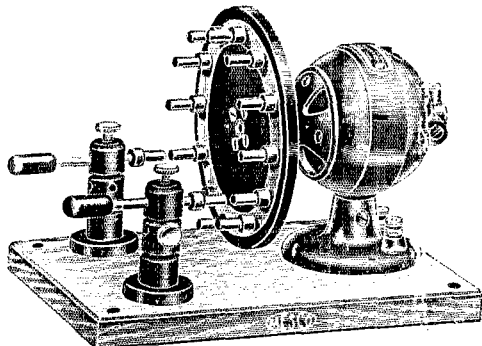
THE AMERICAN RADIO RELAY LEAGUE

**Incorporated
HARTFORD, CONN.**

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 4500 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 Stations Electrodes, 1 3/16 in. shaft	5.00

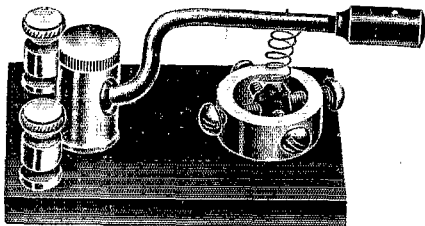
UNIVERSAL DETECTOR STAND

This Stand has a heavy brass cup, with four binding screws, capable of holding crystals up to and including 3/4 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 2 1/4 x 4 1/4 x 3/4 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.	248 Universal Detector Stand	Price
		\$3.00

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