

Radio Digest

EVERY
WEEK

Illustrated

TEN
CENTS

TRADE-MARK

Vol. II

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CHICAGO, ILL., SATURDAY, SEPTEMBER 9, 1922

No. 9

SET NEEDS NO AERIAL

"B" STATIONS TO GET 400-METER WAVES

SPECIAL LENGTH WILL BE
HARD TO ACQUIRE

Only Super Plants Eligible—New Gov-
ernment Ruling Aimed at
Local Interference

(Special to RADIO DIGEST)

WASHINGTON.—The licensing of Class B Radiotelephone broadcasting stations by the Department of Commerce under new regulations will enable those fans who desire to "listen in" to the best stations on a special 400 meter wave without interference from some of the lesser lights in Radio broadcasting.

But what stations will be selected? As the new regulations require a minimum of 500 and a maximum of 1,000 watts in the antenna, no harmonics, special modulation, a studio and a supervised program, using "canned" music only in an emergency or during intermission, it is not believed many of the 487 broadcasting stations can now meet the requirements. This will insure only the best and most dependable entertainment on this special wave length, the bulk of stations continuing on 360 meters. Of course the object is just that—an effort on the part of the Department to permit "A-1" or super broadcasting stations to send without interference from the many stations using 360 meters, so that those fans who desire can receive high-class entertainment.

Will Have One "B" Station per City

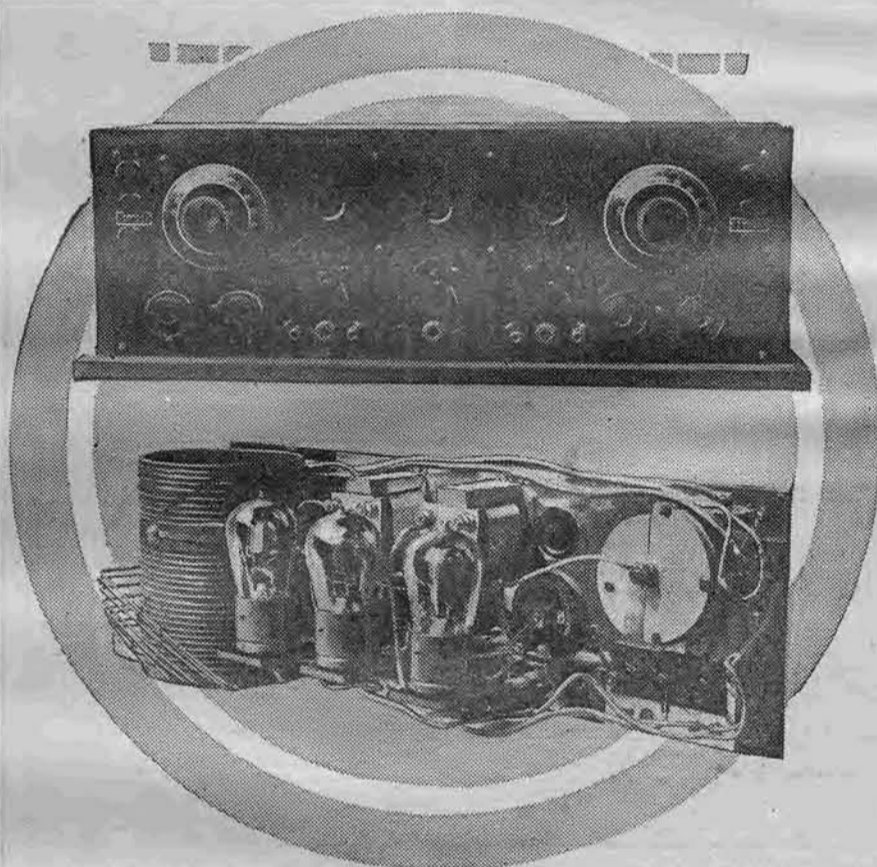
Upon application through the nine district inspectors the Department will license "B" stations as fast as they qualify, but probably not more than one in each city or section at first. In the event two or more stations qualify in a single district or neighborhood where interference would occur, a schedule will be arranged dividing the time between them.

The "B" stations will have to toe the mark in station efficiency and keep up to scratch on programs, the Chief Radio Inspector states, or they will lose their special wave length and revert to 360 meters with the general broadcasting stations.

Public opinion will undoubtedly soon come to the aid of the inspectors and the Department in case large numbers of broadcasters desire Class B stations, and public opinion will be the last court, basing its recommendations on the most interesting and instructive programs. Under the present law any station can qualify, but when they get too thick both in the general and Class B field, the Radio fans who listen in may have to aid officials in making selections.

GOVERNMENT ISSUES "AGRIGRAMS" TO FANS

THE GOVERNMENT has started a news service for Radio stations which will be sent from the United States department of agriculture and will be called "Agrigrams." The department of agriculture has planned to give news that will interest every Radio fan. Several stations are already using the service.



W. O. Arzinger of Birmingham, Ala., is the inventor of the set shown above, which employs no aerial. The panel front is shown at top and interior of set at bottom. Mr. Arzinger uses only a good ground and a special circuit for connecting the various instruments

USE RADIO TO MAKE CAMPAIGN SPEECHES

Aids Backers of Change in Ala-
bama's Constitution

BIRMINGHAM, ALA.—Which has the biggest influence, the newspaper or Radio? Backers of the proposed port amendment to the Alabama constitution which will permit state aid in erection of terminals at Mobile asked themselves that question. There are five broadcasting stations in the state and five leading daily newspapers. However, as the leaders have only a short time in which to put over the campaign they have decided to use both.

A series of Radio talk are now being made by leading officials of the state in behalf of the amendment. The latest one was by H. Key Milner, president of the state harbor commission, who is estimated to have addressed about 50,000 persons a few nights ago through the medium of station WSY here. The largest newspaper in the state has only 65,000 circulation.

Philly's Show Opens September 27

PHILADELPHIA, PA.—The first Philadelphia Radio show which was postponed from June until this fall, will be held in the Industrial Exposition building here, September 27 to 30 inclusive.

A general invitation to dealers is being sent out by the managers of the show, who plan to make it a mart for buying fall and winter supplies. Special days will be reserved for visiting dealers.

BIBLE INSTITUTE WILL RIG 1 KILOWATT PLANT

Station to Be One of Strongest on
Pacific Coast

LOS ANGELES, CALIF.—Announcement of plans that have recently been completed in regard to the building of a powerful one kilowatt transmitter have just been made by the Bible Institute of this city. The increase in power will make it one of the leading stations on the coast.

The announcement came from Dr. T. P. Horton of the Bible Institute. "The new equipment of our station," said Dr. Horton, "will include a 1,000-watt set, having four 250-watt oscillating tubes, and in addition a fifty-watt speech amplifier.

"Our board of directors have authorized the installation of this set. If it is necessary to have power to get high rating among local stations, we are going to have it," according to Dr. Horton. It is expected that the new transmitting set, which will be among the leaders of the coast, will be in operation by October 1st.

To Describe Tube Detector

WASHINGTON.—A circular describing how to make an electron tube detector unit, which may be used with apparatus previously described by the Bureau of Standards, is now being prepared for issuance. The estimated cost of the complete set is between \$23 and \$37, including the cost of batteries. Eventually the description will be available to the public through the Government Printing Office.

WIZARD SAYS GOOD GROUND IS ESSENTIAL

W. O. Arzinger, Birmingham,
Ala., Receives Far With-
out Antenna

Disproves Ether Theory

Says Basis of Transmitting Range
is Hydrogen Concentration
in Atmosphere

(By G. W. Watson, Staff Correspondent)

BIRMINGHAM, ALA.—Birmingham has a Radio wizard who has demonstrated that aerials are no longer necessary for receiving sets. He is W. O. Arzinger, manager of the research laboratory here of the Flotation Company of Arizona, post office box 1447. He is the owner of a flotation patent and is now seeking a patent on his Radio invention.

Arzinger has proven conclusively to a number of leading Radio engineers who have been invited to his laboratory that an antenna is useless. Without it he has picked up concerts sent out by Station WWZ in New York, KQV in Pittsburgh and WSB in Atlanta, together with local stations. No difference in the sound is detected whatsoever when his set is connected with an aerial. Dr. Charles P. Steinmetz is right in reference to ether waves according to Mr. Arzinger, who says:

"I am positive that those interested in Radio are all wrong with reference to ether waves. I have been interested in Radio for many years and was with the DeForest company over 15 years ago. Afterwards I became interested in flotation systems such as are used in the graphite business to float the minerals or positive elements on top of the water and allow the negative elements to sink.

Realizes Good Ground Essential

"Now it may seem strange, but it was while experimenting with this flotation work that I first came to realize that the one important thing in Radio was a good ground. I found this to be true in connection with the flotation experiments. We must get away from the ether wave

(Continued on page 2)

BAN PRIVATE PLANTS' WORK IN CANAL ZONE

COLON, C. Z.—Government officials have vetoed broadcasting by private outfits in the Canal Zone and Panama, the latter having granted all rights of Radio communication to the United States. Thousands of progressive citizens of both places have protested and offered to pay all expenses involved, but without results.

SET NEEDS NO AERIAL

(Continued from page 1)

fallacy. What we do constantly get in through the air, are hydrogen ions.

"They bring the messages to us and the reason we have more trouble in the warm season than during cool weather is on account of the fact that these elements gradually decrease, until when the thermometer stands at about 95 degrees Fahrenheit they are decreased to about one-third of their concentration as compared with a temperature around 50 degrees. Conditions for receiving are splendid when the thermometer is about 50 degrees, while at 32 degrees or the freezing point, conditions are superfine. Then as the temperature goes down, the conditions improve with each downward step for the hydrogen ions, or positive elements are in the air.

Hears Station WSY Without Aerial

"Last night I sat on my front porch with the set in my lap and with no aerial I heard the WSY program perfectly. The only thing necessary is a good ground."

Although Mr. Arzinger preaches the advantage of a good ground he admits that the secret of his machine lies in the circuit connections which he refuses to reveal before he obtains a patent. However, he says of his hook-up in general:

"Coils are wound now, supposedly to take care of certain wave lengths. In reality they do not serve this purpose for the reason that they act only as resistance for a certain range. My hook-up is an entirely new circuit without any apparent weakness. Rest assured of one thing, aerials are unnecessary and in a short time they will be obsolete for receiving."

Description of Set

Mr. Arzinger has used two stages of audio frequency amplification in his set. Loading coils are cut in or out and the set is shielded with aluminum. He employs special tube sockets and no grid leak or condenser. Both long and short waves are received. His outfit apparently is the same as any other. Several Radio experts have looked over his set without detecting his secret of doing without any form of aerial. The set is shown in the accompanying pictures.

As soon as a patent is obtained on his improvement, Mr. Arzinger expects to establish a manufacturing plant here for the non-aerial set using his special hook-up. He claims that his receiving set can be sold at much less money than the sets with aerials.

CONTROL LOOM FROM FAR BY ETHER SIGNAL

Cotton Goods Machine Worked at Eastern Fashion Show

BALTIMORE, MD.—Radio has been used for the control of ships at sea and even for automobiles on land, but the first control of commercial machinery has just been successfully completed at the recent fashion show here, where there was exhibited by the Cohn, Hall, Marx Co., a cotton goods loom controlled by ether waves.

The idea was conceived and developed by M. R. Haskel of the Cohn, Hall, Marx Co., and Mr. J. C. Huffman, of the Manhattan Radio Corporation. Although no commercial application has been made to control machinery by Radio signals it is an important forward step in the possible development of commercial uses of such control.

When the first experiments were made, the controlling apparatus was located in the Fifth Regiment Armory in Baltimore, and the receiving apparatus on the loom was located in the Richmond Market Armory, Baltimore.

The loom itself is an ordinary automatic loom such as is sold for general use, the control devices having been worked out entirely independent of the original loom itself.

WORLD'S LARGEST LOUD SPEAKER IS 35 FEET LONG

Broadcasts Airphone Tunes Over 29-Mile Area

SAN FRANCISCO, CAL.—A length of 35 feet and an opening 12 feet square are the measurements of the world's largest horn for broadcasting music received by Radio. This giant horn is in successful daily operation at Idora Park, a public amusement resort in this state. The broadcasting capacity of the huge instrument is sufficient to carry Radio music throughout an area of approximately twenty-nine square miles.

In addition to the general interest in its sheer size and amplifying range, it is of absorbing importance to the Radio expert because of the fact that, through the use of its electro-dynamic reproducer, such true tones have been produced as to have practically no distortion.

One thousand feet of clear airplane spruce lumber were used in the construction of the horn. The engineers who built it were confronted with difficulties of design and erection, owing to its giant size. It is equipped with a Magnavox Radio reproducer and also a Magnavox power amplifier.

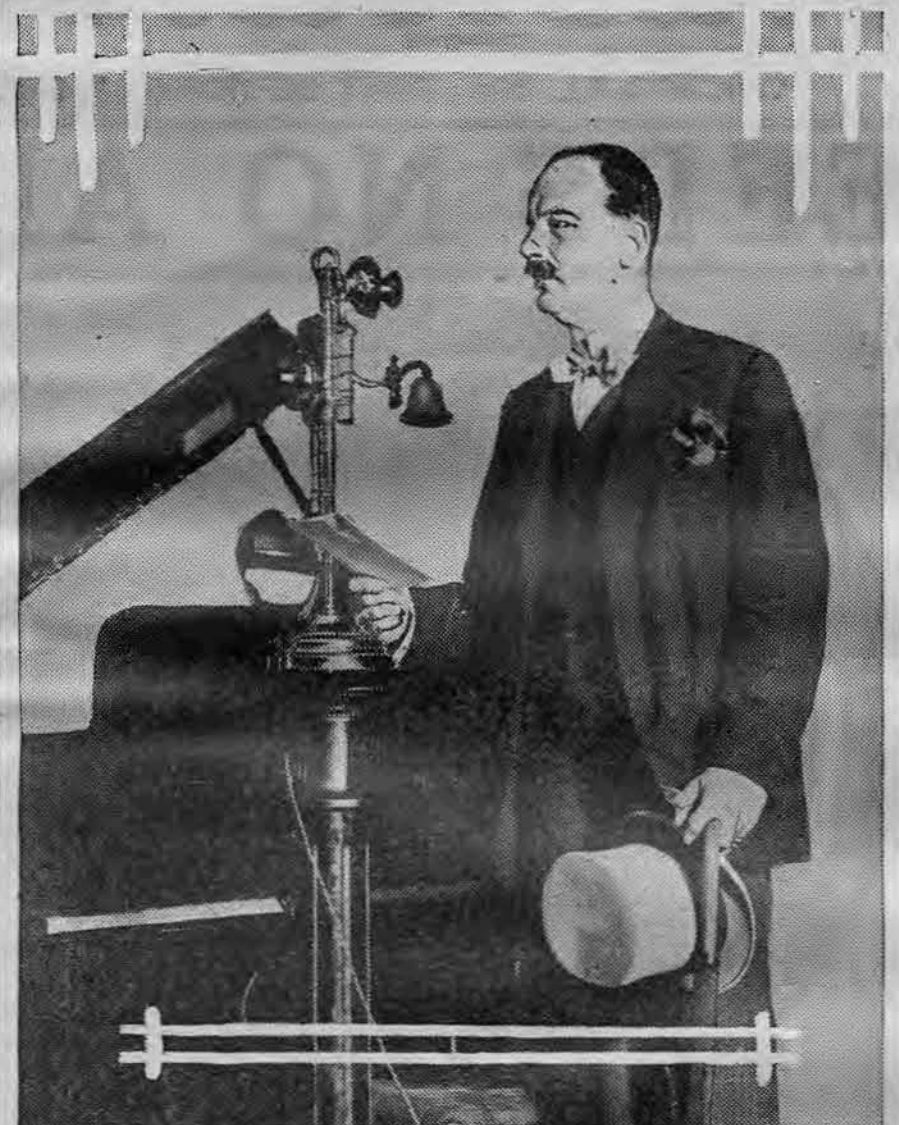
Ether Waves Assist Government in Making Survey of World's Weather

Naval Station at Bar Harbor Receives Daily Composite Report from Lyons, France—Service Gives Advance Warning of Elements' Actions

WASHINGTON.—There came recently to the United States Weather Bureau a Radio message composed of curious code words and figures, which would mean nothing to the average fan but which mean much to the forecasters of the weather. It was the first daily European meteorological report from France, forwarded in

of the newly arranged Radio exchange, France collects the information from 22 European stations and send a composite report from the Lyons station to our Naval station at Bar Harbor. The United States Government collects its local data and transmits a general survey every evening from Arlington to Bordeaux.

BRITON ASKS HOSPITAL AID



Lord Hambleton, chairman of the London Hospitals, makes appeal for institutions during program broadcast from Marconi House station in London

exchange for a report on conditions in North America sent daily by the U. S. Weather Bureau since June 15th.

Radio has taken a vital part in gathering and disseminating meteorological data for some time, especially in the United States, where the science is farther advanced and the speed of transmission higher than in any other country. Now Radio has begun to serve the Old World with news from the new. Early in June arrangements were made between Captain Wehrle of the French Meteorological Service and American Weather Bureau officials for the exchange of meteorological observations from about thirty main stations in the United States and Canada, and a similar report from twenty-two European stations—the exchange to be made daily by Radio. Beginning on August 15th, the U. S. Weather Bureau incorporated the French report in its daily statements which are broadcasted from some 80 stations throughout this country.

Weather Affects All Countries

In France a daily broadcast from the Eiffel Tower now carries the American weather report to all Radio stations within its range in Western Europe. Weather reports from the west are especially valuable to Europe, where meteorology is international, the weather in one country materially affecting that in another. As the course of most storms, as well as what are termed "high" and "low" of barometric pressure, is generally from west toward the east, European countries are vitally interested in the weather in North America today, since it will affect their country within a few days; storms and cyclones on our two coasts eventually reaching northern Europe. By means

WDAP SOON TO LEAVE WRIGLEY TOWER HOME

Chicago Station's Power Will Be Increased With Move

CHICAGO.—Station WDAP, famous broadcaster of this city formerly bearing the call letters 9CT, is soon to move from the Wrigley Tower Building to the Drake Hotel at Lake Shore Drive and Walton Place. The move will be accompanied by the installation of an increased power transmitter. The new outfit will have a range and power equal to any of the present Chicago stations, including KYW, state officials of Midwest Radio Central, Inc., owners of the plant.

The old transmitter will serve only as a modulator for the new equipment. A spacious studio, musical director, and every adjunct to a modern station will be features of the new WDAP. The location has been given by courtesy of the Drake Hotel.

Ether Sermon Crowds Church

LONDON, ENGLAND.—A temporary Radio antenna constructed by means of clothes-props on the roof of a London church last evening received a broadcast sermon. The Peckham Christian Union organized the experiment, and the sermon of the president of the union, Dr. J. Boon, spoken into a microphone at the Burdette Aerial Works at Blackheath, was received at Christ Church, McDermott road, Peckham. The church was crowded.

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Looking Ahead

Everyday Analogies for Radio. A continuation of the series by Letson Balliet is soon to start.

The second of the series by H. M. Towne will appear next week. Mr. Towne for a number of years has been employed in the laboratories of the General Electric Company.

Panel Units for Your Receiving Sets. Details of panel construction will soon begin. This popular feature has been requested by many readers.

Broadcasting Directory. Gets better and larger each week. The only convenient reference to aid you in finding a station heard.

"How to Make Department." Many kinks every week are interchanged here.

Radio Illustrated. The picture page is the best of its kind.

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HETTY GREEN'S SON CONVERTED TO BUG

TO HAVE MOST COMPLETE
PLANT IN COUNTRY

Col. H. R. Green's Ether Wave Truck
Tours Rural Districts Entertaining Farmers

NEW BEDFORD, MASS.—Round Hills, the country home of Col. Edward H. R. Green, son of the late Hetty Green, sounds like a haunted estate since its owner has been bitten by the Radio bug. In the sun room of the house, stock quotations, weather reports, music and speeches flow all day. In the boat house come the booming tones of the amplifier with which Colonel Green expects to entertain the crowds at the coming boat races. And touring the countryside is the Colonel's Radio truck with its receiving apparatus.

That's all there is now, but Colonel Green hasn't finished. Within a few days his new six-room studio, housing the most complete broadcasting station in the country, will be completed.

Entertains Farmers

Colonel Green is not alone in enjoying his Radio pleasures. The first tryout of his truck was made recently and it went rolling about the neighborhood reeling off concerts and talk from Newark to Schenectady before many delighted farmers.

The large amplifier horn is the Colonel's pet. This is similar to that used to make President Harding's inaugural address audible to the 125,000 gathered about the capitol. At Round Hills the sound can be plainly heard over a radius of five miles. Colonel Green will place his apparatus at the disposal of the Commodore to issue instructions and announcements at the boat races. He will also entertain the crowds with concerts.

"Anybody who has a set of two good ears has all the required receiving apparatus," the Colonel says. "I'm so interested in this thing that I haven't time for anything else. I'm like a child with a new toy, who can't be induced to put it down."

British Makers Work on Automatic Phones

Hope for Equipment Requiring No
Operator

LONDON, ENGLAND.—Radio engineers of Great Britain are concentrating upon the production of an automatic transmitter and receiver which will send out and receive distress signals from ships at sea in such manner that attention will be attracted even though the Radio operator should not happen to be at his station.

The problem is a very important one to the owners of small steamships, who cannot afford to fully comply with every regulation of the International Radio convention regarding Radio operators.

The device being developed by the engineers will respond to a succession of letter groups, such as the SOS group, and does not require automatic transmission from the ship which is in distress. This device is arranged to fit in with the present regulations of the International Radio convention, SOS being the universal distress call on the high seas.

Broadcast Luncheon Speeches

WASHINGTON.—A novel feature has just been developed by the City Club of Washington in connection with the weekly forum luncheons which are held there. Addresses made by prominent men at these luncheons will be broadcast by Radio each week. This is said to be something new in connection with such luncheons.

STRONG PLANT WINS TOWN NEW RESIDENT

BIRMINGHAM, ALA.—A. E. Ausman, secretary of the Bessemer, Ala. Chamber of Commerce, recently made a talk from station WSY, describing the many advantages of Bessemer. Three days later he received a letter from A. E. Ausman, of Hayfield, Minn., asking more about Bessemer, stating that the Radio talk had about convinced him that he should remove to the town.

APPARATUS EXPORTS JUMP TO HIGH TOTAL

WASHINGTON.—According to an announcement which has just been made by the Department of Commerce, exports of domestic made Radio apparatus for the month of June was 901,982 pounds valued at \$547,364. By far the largest quantity of this material went to Poland and Danzing, the exports to these two countries being 758,288 pounds. The exports for May were only one-third the June total.

WIRE NET ANTENNA PROVES A SUCCESS

MAY REPLACE USUAL TYPE
OF OUTDOOR AERIAL

Tests by Bureau of Standards Show
Efficiency of "Condenser
Antenna"

WASHINGTON.—Tests conducted by the bureau of standards relative to the substitution of wire netting for the ordinary aerial wire, have proved extremely successful. Two strips of netting from six to fifteen feet long and from eighteen to thirty-six inches wide suspended a few feet above the earth and a few feet apart were used.

The effect produced relatively large capacity. The strip arrangement is spoken of as a condenser antenna. The efficiency was found to be greatly reduced when the strips were hung vertically instead of horizontally.

J. C. Warner, assistant physicist in the bureau of standards Radio laboratory, reporting these tests, said:

Small Antenna Is Success

"Experimental results show that a condenser antenna of small dimensions gives excellent results when used at wave lengths below 400 meters. At longer wave lengths it suffers by comparison with the coil antenna when the dimensions are kept small enough for portability.

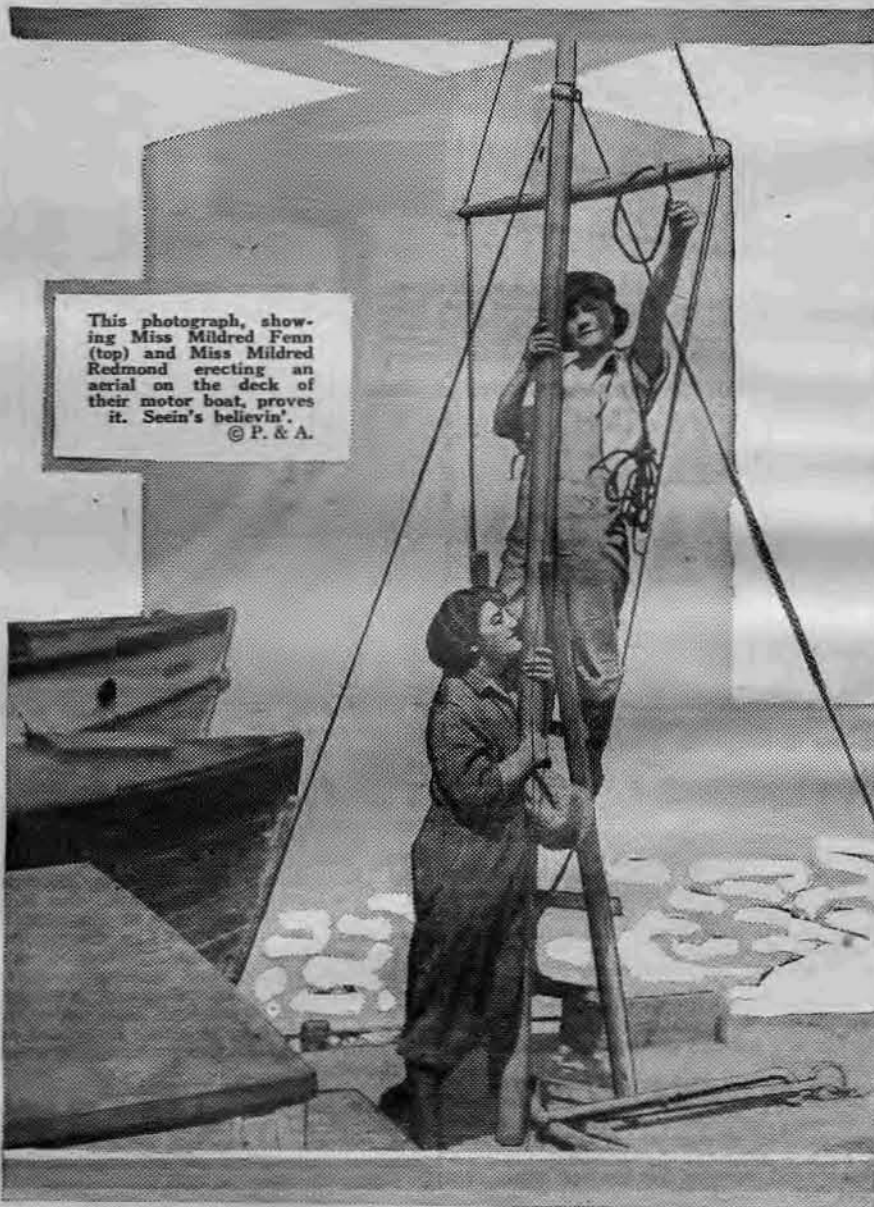
"It is useless for directional work unless used in conjunction with a coil antenna, but may be used in places where the sharp directional characteristics are objectionable. By proper design and by taking precautions to keep dielectric losses low the effective resistance may be reduced to a value lower than can be obtained either with the coil antenna or the ordinary elevated antenna.

Valuable for Portable Sets

"On account of this low resistance and ease of construction this form of antenna should be of great value in portable short wave Radio stations, such as are used for military purposes and on airplanes, although in the latter case some difficulty may be experienced in keeping down dielectric losses.

"It is evident that the study of this interesting form of antenna is by no means complete. Its use as a transmitting antenna offers a wide field for investigation, and a large amount of work remains to be done in following up the investigations which have only been started in this study."

OF COURSE THERE ARE LADY "BUGS"!



This photograph, showing Miss Mildred Fenn (top) and Miss Mildred Redmond erecting an aerial on the deck of their motor boat, proves it. Seein's believin'.
© P. & A.

WHAS HAS RADIO CLASSES

Louisville Plant Teaches Science to
Kids as Well as Adults

LOUISVILLE, KY.—Station WHAS here now has a free Radio school with four classes a week. One class is for children and the other for adults. Radio supply houses are co-operating by sending their experts to give instructions. It is the purpose of these classes to only touch lightly on the theoretical and to center effort on the more practical points involved in the installation and operation of receiving sets.

SET HEARS 'PHONE TALK

Toronto Amateur Interrupted by Conversation from Telephone Wires

TORONTO, ONT., CAN.—Be careful when talking on the telephone. Radio knows all kinds of tricks. One of these is to induce a conversation from the telephone line into a Radio receiving set.

Bradford Wickett, 35 Deer Park crescent, Toronto, while listening in recently, had his entertainment interrupted by two persons who were carrying on a confab over the wires. Mr. Wickett found that neither party resided anywhere near.

Aviator Tells How It Feels 40,800 Feet Up

Holder of World's Altitude Record
Talks by Airphone

LOS ANGELES, CALIF.—Radioland had the opportunity on a recent evening of hearing of some of the thrills that fall to the person who is engaged in aviation work. From the lips of the holder of the world's altitude record, First Lieut. John A. Macready, came the story of just how it feels to be 40,800 feet up in the air, or at a distance of nearly eight miles from Mother Earth.

Station KHJ conducted by the Los Angeles Times, presented Lieut. Macready, of the Air Service, in a broadcast address in which he told the listeners-in of the flight he made in establishing the record. His talk was of so convincing a nature that many hearers expressed themselves as almost feeling like trying to emulate him.

Lieut. Macready declared in his address that it is a most peculiar sensation, to say the least, when you find yourself up in what he called "the ceiling" over the earth. Lieut. Macready is well-known in aviation circles of the United States. He is best known on account of his work at McCook Aviation Field, near Dayton, Ohio.

THE ANTENNA BROTHERS

Spir L. and Lew P.

Where There's Music, There Is Radio



WBAY PLANT OPENS TO PUBLIC HIRE

In the studio of WBAY every effort has been made to exclude echo in any form. Felt padding about the walls, and carefully planned arrangement get voice and music into the microphone with a minimum of distortion



Already a landmark in the Walker Street section of New York City, the Telephone Building (at right) has taken on new skyline interest since the installation of its aerial for WBAY, the new toll broadcasting station of the American Telephone & Telegraph Company.



GOTHAM HAS FIRST U. S. TOLL STATION

Fans from Far and Near Praise Plant's Service After Opening

NEW YORK.—On Thursday evening August 3, over a month ago, in a little room on the top floor of 24 Walker street, New York, eight men stood in breathless silence, listening to the bed-time discourse of "Uncle Wiggly" that issued from the loud speaker hung from the ceiling. All of the men were watching the big clock on the wall. Seven-twenty-nine, it registered, daylight saving time.

And then, as Uncle Wiggly's station signed off and thousands of listening youngsters theoretically lapsed into wrapt slumbers, a man standing in front of a switchboard pushed a button. In the studio room, two doors down the hall, a buzzer spoke, and G. W. Peck began his talk that marked the official opening of WBAY, the toll broadcasting station of the American Telephone and Telegraph Company, in New York.

Entertainment Follows

In the entertainment that followed, musical selections were rendered by Miss Graves, Mrs. Swayze, Miss Mills, Miss Hermann, Mr. Joseph Koznick, Mr. Harry Armstrong and Mr. F. R. Marion. Frank Graham who keeps baseball fans supplied with the latest diamond chatter with his stories in the New York Sun, talked to the Radio fans about the pennant chances of the New York teams and threw in some personal sidelights on many headlines.

Just outside the Radio operating room stood a long table, on which rested half a dozen telephone instruments. Two minutes after WBAY began operating, these phones began ringing. Amateurs everywhere had been invited to call the station and say how they were getting the newcomer in the field of aerial entertainment.

Phone Calls Come in from Far

From Coney Island, Princeton, Montclair, Yonkers, Union Hill, River Edge, Larchmont, Patterson, and dozens of other towns the calls came in. Men with crystal sets expressed their pleasure at getting piano music so clearly. An operator in South Jersey with a two-bulb set complained of a crackling noise, but thought a local thunder shower might have had something to do with it. And from thirty miles out on Long Island came the report of a fan with a loop set mounted in his car. He was traveling around, he said, and picking up WBAY every time he stopped.

One of the Company's telephone men in Princeton, N. J., called up and said if the boys wanted to see how he was getting them over his own set they could listen on his wire. They did listen, and heard in the receiver the voice of the soloist two doors down the hall in the studio room—a voice carried through the transmitting apparatus to the ether, converted at Princeton from electric waves to sound, and then relayed back as infinitesimal currents over the telephone.

Why the Station was Established

Back in the days when Radio was beginning to grip the heart of the public with its fascination, mystery and novelty, requests began to come in to the American

Telephone and Telegraph Company for apparatus suitable for broadcasting. Theatres wanted to broadcast. All sorts of individuals and groups and organizations with a message to deliver to the public wrote in to ask for prices on equipment that would enable them to put their stories into the air.

There were two main factors in the situation which these potential broadcasters did not realize at the time: First, that there is such a thing as interference when dozens of different stations attempt to use the ether at the same time. And, second, that the cost of installing, maintaining and operating a thoroughly up-to-date station is too high to justify its exclusive use by the average individual or organization.

Toll Station Demand Recognized

More and more it became evident that a demand had been created for a toll broadcasting service which might be used at stated intervals by organizations desiring such service for limited time. To meet this demand, the American Telephone and Telegraph Company set about the erection of one of the most modern and best equipped stations that the present state of the art permits. WBAY is the result.

From time to time the opinion has found expression that a station operating for hire like WBAY might work to the detriment of the broadcasting art. It was feared that a commercialization of Radio broadcasting might result which would tend to reduce the high quality and general interest of broadcasting programs. Such a result would be much regretted by all. To offset this evil all precautions are being taken to insure that the programs of WBAY will meet with popular approval. They will consist of only such entertainment and other material as will have a general appeal. For it is a foregone conclusion that no one will wish to jeopardize his reputation by broadcasting what the Radio audience generally does not care to listen to. Whether the motive behind the broadcasting is to advertise merchandise or a public movement, or a candidate for public office, the fundamental requirement for the material will be wide popular interest.

Features of the Station

Taking up the equipment in the order in which the sound waves pass through on their way etherward, let's step into the studio first. As you enter the room you notice at once that something about it is different. Your voice sounds unnatural to you. And the voices of your companions come to you more clearly enunciated than they did a moment before before in the hallway. The room is echoless. This has been accomplished through the use of felt padding on the walls and parts of the ceiling, and by giving special attention to the arrangement of the room.

Like all the rest of the electrical equipment used in the station, the microphone was designed and manufactured by the Western Electric Company. With the type

of microphone employed at WBAY it is not necessary for the speaker or singer to stand close to the instrument. This condition adds materially to the ease of performance on the part of the artist. As one of the illustrations shows he, or they, may stand several feet away.

How the Microphone Works

Two buttons, or carbon granule chambers characterize the Western Electric microphone used in this station. One button is located on each side of the vibrating diaphragm, so that at any given point in the vibration of the diaphragm, one button is compressing carbon granules while the other is releasing pressure. This means that current flow, affecting voice transmission, is being increased on one side of the diaphragm and decreased on the other.

Distortion Eliminated

Every fan who has studied the action of the single button microphone knows that its results are not exactly propor-

tional to the amplitude of the sound waves producing them. Some distortion takes place. With the two-button device this distortion is cut down tremendously. From the wiring diagram it will be noted that the two buttons of the microphone are connected with one side of the transformer—or in telephone language, the repeating coil—in such a way that the resulting currents are both in the same direction and their combined effect is the production of waves that are quite free from distortion.

Special Prices on Westinghouse R. C. Sets as long as they last



Guaranteed new sets \$110 which sell for \$132.50 at my price

ORDER BY MAIL with money order

also Baldwin phones and loud speaker horns

I have only a limited number of these outfits. You can save \$22.50 by buying now. Enough to buy tubes and dry batteries. Get ready for Fall—"hear 'em all" during the long winter evenings. Radio brings entertainment into your home for the whole family. You can use the R. C. with headphones or loud speaker horns.

WALTER SWEITZER
815 Ashland Ave.
South Bend Indiana

De FOREST RECEIVERS

Special Price on MR-6 Tuner and two stage amplifier outfits. \$87.50 including 360 Meter coils.

Murdock Variable Condensers, 43 Plate. Special \$3.00.

Get Our Prices on Standard Equipment

SOUTHWESTERN RADIO CO.
McCOOK, NEBRASKA

For Efficiency, Quality, Tone BUY

ESTRU LATTICE



VARIOMETERS — VARIOCOUP- LERS — INDUCTANCE COILS — RADII TUNERS

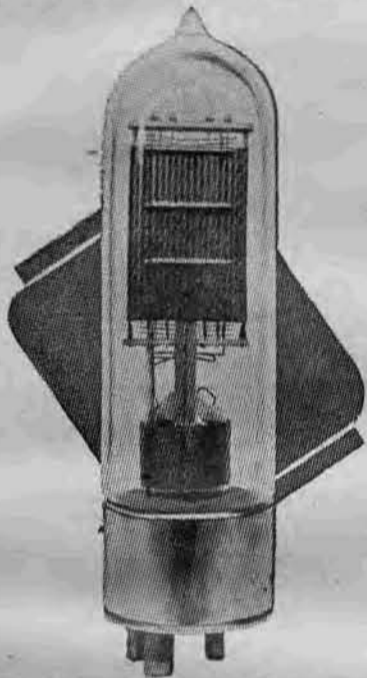
For Sale at All Responsible Dealers. If Not, Write Giving Your Dealer's Name DALTON, WHITTIER, TRUE CO. 2905 W. Madison St. Chicago

Another interesting feature of this microphone is the method of damping the vibration of the diaphragm by means of air holes, through the framework. These air holes give access to a cushion of air that is only about 1/1000 of an inch thick between the diaphragm and the body of the transmitter. As the diaphragm vibrates, air is rapidly pumped in and out of this cushion. Ordinarily one does not think of air as a viscous fluid. At high vibration periods however the diaphragm finds the air of considerable viscosity and the pumping effect which results from this "air pump" action renders the instrument almost equally responsive to all vibration periods over the whole range of speech and music.

Use Condenser "Microphone" Also

The electrical equipment is so arranged that another type of transmitter may be used when desired. It is not a "microphone" at all but what is generally known as a condenser transmitter. It contains no little cups of carbon granules which characterize the microphone although it has a vibrating steel diaphragm and makes use of air damping. It requires considerably more preliminary amplification than the microphone but it has certain characteristics which at times make its use desirable.

A glance at the circuit diagram will show how the electric waves generated in the microphone by the sound waves are led, first to the input amplifier and thence to the Radio transmitter. The input amplifier contains three small tubes and one 50-watt tube and the transmitter uses two 250-watt tubes as oscillators and two



A 250-watt Western Electric tube, two of which are used at WBAY as oscillators and two as modulators, operating at 1,600 volts

others as modulators. All of these tubes employ the oxide coated filament which gives a very copious electron emission at a dull red heat. The system of modulation is of the Heising type and the general circuit arrangements are given in one of our accompanying illustrations, O representing the oscillators and M the modulators.

Lead in Has 84 Strands

The lead-in to the antenna consists of 84 strands of No. 22 copper wire wound on a hemp core. This design secures a surface with low resistance to high frequency currents.

Supported on two steel towers extending 100 feet, or eight stories, above the

UNCLE SAM ACTS TO SPEED EXPORT DATA

SEEKS TO IMPROVE SERVICE OF TRADE NEWS

Congress May Oppose Proposed Expenditures for Establishing Relay

WASHINGTON.—Since the recent decision of the Department of Commerce to have foreign commercial data broadcast from Radio stations in the neighborhood of its 34 district offices, schemes for the improvement of this service, particularly in the saving of time, have been received from several sources. One of the recent suggestions is that Radio receiving sets be installed at all the branch offices of the Department so that commercial data broadcast from Government stations in Washington and other important centers may be received without delay and re-broadcast locally.

The plan is now being considered by the Bureau of Foreign and Domestic Commerce, and if a favorable report is made, the Department may be in the market for thirty-four type A-L receiving sets.

Congress Watching Funds

It is readily admitted by officials that much time would be saved in relaying the information from the Washington headquarters and getting a wide broadcast for the whole country, but fears are entertained that an appropriation for purchasing the receiving sets might not meet with the approval of an economically inclined Congress.

A great mass of foreign trade information is received by the Department daily and released to the press, but much of it fails to reach all interested parties. For this reason, a scheme of forwarding it by wire to the thirty-four central and cooperative offices in different sections of the country for broadcasting has been undertaken, and it is to improve this service that the use of Radio for transmitting the data and news is suggested.

Norfolk Inspector to Give Exams for Radio Operators

NORFOLK, VA.—Examinations for commercial and amateur Radio operator licenses will be conducted by a Radio inspector from the Norfolk office at the following points in the Fourth Radio District on the dates indicated:

Florida: Miami, Sept. 22; Key West, Sept. 25; Tampa, Sept. 29; Sanford, Oct. 2; Jacksonville, Oct. 4.

Georgia: Savannah, Oct. 9; Macon, Oct. 12; Atlanta, Oct. 14 (amateur only); Atlanta, Oct. 16 (commercial only).

South Carolina: Greenville, Oct. 21; Columbia, Oct. 24; Charleston, Oct. 27.

North Carolina: Wilmington, Oct. 31; Raleigh, Nov. 2.

on "S" hooks which will part and relieve the towers of strain by dropping the antenna on the roof when the load reaches 3,400 pounds. This is the estimated load to which the wires would be subjected with a wind velocity of 100 miles an hour and a one inch coating of sleet.

One of the most interesting features of the station is a remote control circuit which provides an "on" and "off" button in the studio, making it possible to disconnect the Radio transmitter from the antenna during the interval between an announcement and the starting of a num-



Here is Robert Fennimore checking up on his handiwork. He has worked tirelessly for weeks to get WBAY into the pink of operating condition. By watching the ammeter at the upper right of the panel just in front of Mr. Fennimore, it is possible to trace the modulation of the voice of a speaker when the station is sending. The power panel is on the right and transmitter on the left

CANADIAN BROADCAST STATION TO DO RELAY

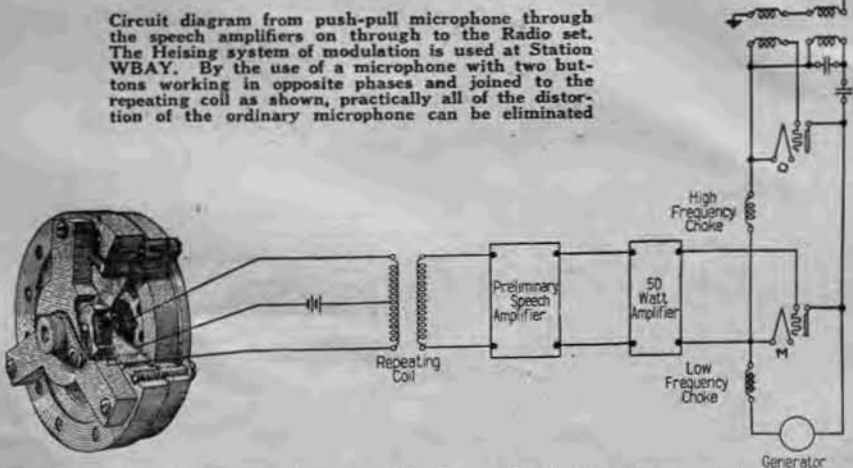
CFCN Connects Chain of American League's Stations

CALGARY, ALTA., CAN.—Station CFCN, the broadcaster of the W. W. Grant Radio Limited, has volunteered to handle American Radio Relay League messages throughout Alberta, thus opening up another territory previously discon-

nected from the League's chain of stations owing to the lack of sufficiently high-powered stations. As CFCN has a range of 1,500 miles, no difficulty is anticipated in working across the Rocky Mountains to Vancouver, the district headquarters of the Relay League.

It is expected that this new link in the relay chain will bring many of the previously isolated fur-trading posts in Northern Alberta into communication with the outside world, and messages of a purely personal nature addressed to these points will be accepted and transmitted free of charge.

Circuit diagram from push-pull microphone through the speech amplifiers on through to the Radio set. The Heising system of modulation is used at Station WBAY. By the use of a microphone with two buttons working in opposite phases and joined to the repeating coil as shown, practically all of the distortion of the ordinary microphone can be eliminated



roof, the T-shaped antenna has an altitude of 488 feet above the street. Each tower is provided with a platform 7 feet by 20 feet to enable the men to work aloft with ease and safety.

A four-wire antenna is used, each section being made up of seven strands of No. 14 copper wire. The towers have been designed to withstand a wind load of 5,000 pounds. The antenna wires are mounted

ber. The button is operated by the announcer.

In accordance with the time schedule at present assigned by the Department of Commerce, WBAY will operate daily from 11 to 12 in the morning and from 4:30 to 5:30 in the afternoon. The station will also broadcast every Thursday evening, starting at 7:30 daylight saving time, Eastern Standard.



Federal INSTRUMENTS - ARE SUPERIOR -

The Federal CRYSTAL RECEIVER

is a highly efficient instrument for the reception of RADIO Programs in a clear, soft, pleasant tone—when used within a radius of 30 MILES of a broadcasting station.

WITH THE ADDITION OF THE **Federal JUNIOR AMPLIFIER No. 20** The receiving range is increased to **100 MILES**



THE **Federal JUNIOR AMPLIFIER No. 20** is equipped with Two of the famous **No. 226-W Voice Frequency Amplifying Transformers**

THESE INSTRUMENTS are exceedingly simple to operate—No knobs and Dials—merely operate control arms until reception is loudest. THIS TRANSFORMER was used in ARMY and NAVY radio equipment throughout the war and has been used continuously in commercial equipment.

Federal Telephone & Telegraph Company
BUFFALO, N. Y.
CHICAGO BRANCH OFFICE: 805 STEGER BUILDING, CHICAGO, ILL.

COMMERICAL RADIO TRAFFIC HAS BOOM

IS HEAVIER NOW THAN ANY TIME BEFORE WAR

Communication Companies Construct New Facilities for Taking Care of Increase

(Special to RADIO DIGEST)
 WASHINGTON.—Communication systems throughout the world were so generally affected by the war that the traffic handled on every route in operation after the armistice was greatly in excess of any previous record, says P. E. Nagle, communication expert of the Department of Commerce. This increased traffic he maintains was partly due to the suspension of service on such important communication routes as the Indo-European Telegraph Company, The Great Northern Telegraph Company, and the various German and German-Dutch cables. The officials of American companies were for a time generally of the opinion that with the restoration of service on the routes mentioned there would be a noticeable falling off in the volume of messages handled by American companies. Events, according to Mr. Nagle, did not bear out this view, however, and at the present date American cable and radio companies are handling more traffic than they ever did except during the war and the two years immediately following the armistice.

Growth Keeps Up Interest

"The result of this steady growth in traffic has been to keep up the interest in plans for new cables and new radio stations, and every American communication company is now actively engaged in the construction of additional facilities and in plans for new routes and methods for the improvement of operating conditions.

"In the field of radio telegraphy, the provision of American facilities for communication with foreign countries is dependent to a large extent on the erection of the corresponding stations abroad. Since, with the possible exception of Latin America, radio telegraphy is a government monopoly in foreign countries, the development of the art in foreign countries and the provision of the requisite funds is a preliminary to any progress in the United States.

"Most of the Latin American republics permit the erection in their territory of foreign-owned radio stations for intercontinental work, at the present date construction work is in progress at Buenos Aires on a high power transmitting station and its corresponding receiving station, and on corresponding units at Rio de Janeiro. It is said that the Buenos Aires stations will be completed within the next year and the one at Rio de Janeiro within two years from this date.

Atlantic Coast System Progressing

"The consolidation and co-ordination of the system of high power radio stations on our Atlantic Coast is going steadily on, and is keeping pace with the development abroad. Regular radio service from the United States is now maintained by commercial companies with the Hawaiian Islands, Japan, Norway, the United Kingdom, Germany, and France, and by land wire distribution from many of these countries to points beyond. In addition the United States Naval Communication service is handling commercial traffic to the Philippine Islands, China, Siberia, Siam, Dutch East Indies, portions of Australasia, and to Italy, and Belgium. Many of these foreign centers receive radio messages from the Navy and distribute to points beyond. The Belgian circuit, it should be noted, is a one-way route only, as Belgium has not yet a high power station capable of trans-Atlantic communication.

"American radio companies are also developing systems of communication with Central America, with New Orleans as the main center for American reception and transmission.

"A new high power station is in course of construction in Poland. Another is nearing completion near Christiania, and various other are projected in the smaller European countries. A new high power station has just been completed at St. Assise, Department of Seine et Marne, France, which is designed to communicate chiefly with the United States, replacing the Lafayette station at Bordeaux. With this station and with those at Christiania and Warsaw, communication will be direct with the United States."

District of Columbia Jail to Have Set for Prisoners

WASHINGTON.—Radio connection with the outside world soon is to be enjoyed by prisoners in the District of Columbia jail. It was planned to install instruments in time to have prisoners and attendants listen to a concert last Wednesday night. Much of the \$500 the Radio will cost, has been subscribed already by two hundred or more prisoners as a testimonial to Captain W. L. Peak, assistant superintendent of the prison.

Book Reviews

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" Price, \$1.00.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, \$2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, \$1.50.

Radio Communication. By John Mills. The fundamental principles and methods upon which recent developments are based are emphasized. The vacuum tube is treated in a simple, fundamental and up-to-date manner. Present methods and tendencies of the art are explained in a chapter which is non-mathematical. Price \$2.00.

Wireless Telegraph and Telephony. By A. P. Morgan. In this book the author has endeavored to furnish a comprehensive explanation in simple language and without making any real attempt to enter into any engineering or constructive details of the theory and practice of Radio telegraphy and telephony. Price, \$1.50.

The A B C of Vacuum Tubes. By E. H. Lewis. Is a book for beginners who have no knowledge of either Radio or electricity and sets forth the elementary principles of theory and operation of the vacuum tube. No attempt has been made in this book to describe all the possible circuit arrangements, but those shown may serve as suggestions to experimenters who desire to evolve their own circuits. Price, \$1.00.

Experimental Wireless Stations. By S. E. Edelman. This book assumes that the reader has some knowledge of fundamental electricity and mathematics and is a readily understandable text for beginners in the art of Radio communication who desire to start with the elements. Earlier editions of this book were published during the war. The 1922 edition has been revised and enlarged so as to cover the progress made in the last few years. Price, \$3.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payments for books not accepted. Send money order or check. Book Department, Radio Digest Illustrated, 123 W. Madison St., Chicago, Ill.

Canadian Relays Broadcast

HIGH RIVER, ALTA., CAN.—Radio-telephone listeners in the vicinity of High River were recently astounded by hearing on simple crystal receivers a program from Seattle, over five hundred miles distant, as loud and as clear as a local station. At the end of the performance, the truth came out when the announcer informed his invisible audience that the concert had been picked up on a specially designed directional aerial and retransmitted on a different wave length by the station of the High River forest patrol.

Lieut. William Grant, the engineer in charge of the station, is believed to have the honor of being the first man in Canada to accomplish the feat of Radiophone relay transmission.

★ Radio Bugs! ★

Try This on Your Cat's Whisker

To the tune of Yankee Doodle



\$10 Price

Gregg's Listen In set, is a marvel, you bet, Through which the waves come abuzzin'. Attach to the phone You now use alone, And the program is heard by a dozen.

Yes, a dozen hear the news, A dozen hear it dandy, Everyone should have Gregg's Set, Because it is so handy.

The family should get Gregg's Listen In set, Does for all, even uncle and cousin, No more all alone, Does one use the phone, The set sends it out to a dozen.

Write for Catalogue

Gregg Company
 Room 505, 35 South Dearborn Street
 CHICAGO

GOVERNMENT BOATS ON MISSISSIPPI HAVE SETS

Eight Barges Communicate with Memphis Station

ST. LOUIS, MO.—The Federal Barge Line, a government owned and operated institution, has at present eight boats on the Mississippi river equipped with Radio, and a land station at Memphis, Tenn., with which reliable communication is maintained by these boats all the way down the river from St. Louis, Mo., to New Orleans, La.

The apparatus used is a modern regenerative receiver, with a receiving range of from 250 meters to 8,000 meters, and a two-step audio frequency amplifier. For transmission the boats have a standard 2 KW 500-cycle spark transmitter, with both quenced and synchronous rotary gap and four wave length changes that can be made instantaneously. The land station uses a 5 KW transmitter of the same general characteristics. A wave length of 1,100 meters is used by the boats, and 1,200 meters by the land station.

Operator Has Multifold Duties

The operator carried by each boat, in addition to the Radio duties, keeps the accounts and other "office work," and as some of the boats tow as many as eight barges, has something to keep him occupied most of the time.

A report is made to Memphis every three hours, from 6:00 A. M. till 9:00 P. M., telling at what light the boat is. Thus an accurate record of the progress of each boat is always available.

The general use of Radio on these boats is similar in many ways to the telegraph system of a railroad. Reports are made when a boat leaves a terminal, telling what barges are in tow and any other information that may be desired. Changes of barges from one boat to another, transfer of pilots from one boat to another and modification of orders are all arranged by Radio, making the system a useful and practically indispensable adjunct to the operation of the service.

Toronto Theaters Catch Music

TORONTO, CAN.—The Canadian public is evidently looking to Radio for much of its entertainment. Several theaters in Toronto and throughout the province have installed receiving sets in their buildings for the purpose of giving Radio concerts every evening.

16 Stations Licensed in Week of August 19 to 26

(Special to RADIO DIGEST)

CHICAGO, ILL.—Sixteen limited commercial licenses were issued to public service broadcasting stations during the week August 19 to 26. The licensees are:

WLAD, Arvanette Radio Supply Co., Hastings, Neb.; KFBN, Borch Radio Corp., Oakland, Cal.; WLAF, Johnson Radio Co., Lincoln, Neb.; WKAM, Adam Breede, Hastings Daily Tribune, Hastings, Neb.; WKAL, Gray & Gray, Orange, Tex.; WKAR, Michigan Agricultural College, East Lansing, Mich.; WKAK, Okfuskee County News, Okemah, Okla.; WMAM, Beaumont Radio Equipment Co., Beaumont, Tex.; WKAT, Frankfort Morning Times, Frankfort, Ind.; WMAH, General Supply Co., Lincoln, Neb.; WLAB, George F. Grossman, Carrollton, Mo.; WKAV, Laconia Radio Club, Laconia, N. H.; WKAS, L. E. Lines Music Co., Springfield, Mo.; KFDB, John D. McKee, Lombard & Kearney, San Francisco, Cal.; WNAL, R. J. Rockwell, Omaha, Neb.; WKAU, Turner Cycle Co., Beloit, Wis.

Radio is rapidly being introduced into the Chautauqua sessions. It will soon be used as a medium of supplying educational material to the Chautauqua circles.

RADIO SUPPLIES — MARKED SAVINGS
 Okay 23 plate variable with dial \$3.50, 43 plate with dial \$4.00. C300 Detector Tubes \$4.50. C301 Tubes \$5.00. Switch Levers, 1 1/2" Radius, 35c. Nickel plated Binding Posts 7c. The Okay V. T. Receiver receives even to the Mahogany cabinet. The receiver you want, \$26.50. Dealers, Agents, get our proposition.
 OKAY RADIO APPARATUS CO., Brazil, Indiana

Carter Radio Co.
 7209 S. STATE STREET
 CHICAGO

CARTER TU-WAY PLUG takes TWO head sets at same time; takes ALL types of cord tip terminals. Price \$1.50 each.
 If Your Jobber Is Unable to Supply, Write Us

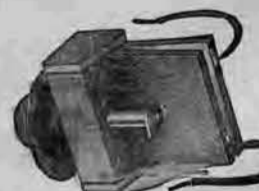
RADIO MAILING LISTS

6900 Retail Radio Dealers covering the United States, by station, price per thousand	\$ 7.50
838 Radio Manufacturers	per list 10.00
1022 Radio Supply Jobbers	per list 10.00
260 Owners of Radio Stations	per list 4.00
14000 Radio Amateurs and Managers of Radio Stations	per M. 7.50

These are mostly approximations and results do not depend on amount of remittance covering the amount. Guaranteed 95% correct. Trade Circula Addressing Co., 156 W. Adams St., Chicago, Ill

For Those Who Contemplate Making Their Own Outfit

We Recommend **CROSLEY** Radio Parts
 Better—Cost Less



The following are the CROSLEY parts necessary for a combination tuner and audion detector set. These parts are of the highest quality and at these prices you cannot afford to be without one.

- 1 CROSLEY Vario-coupler with knob and dial.....\$ 3.00
- 1 CROSLEY Model "A" Variable Condenser with knob and dial..... 1.65
- 1 CROSLEY V-T Socket..... .50
- 1 CROSLEY Tap Switch..... .30
- 1 CROSLEY Rheostat..... .60
- 6 CROSLEY Binding Posts..... .30
- 1 CROSLEY Cabinet 5 1/2" x 13 1/2" x 7" 3.30
- 1 CROSLEY Formica panel 6" x 14" 2.10

Total\$11.75

In addition to the above, all you will need is a small amount of wire and grid leak condenser which may be had for about 75 cents.

This Combination can be made into a very efficient outfit with a range of several miles and will receive wave lengths from 200 to 600 meters. Any dealer can show you how to hook up the various parts.

NEXT WEEK we will publish in this space the parts necessary for a two-stage audio frequency amplifier unit.

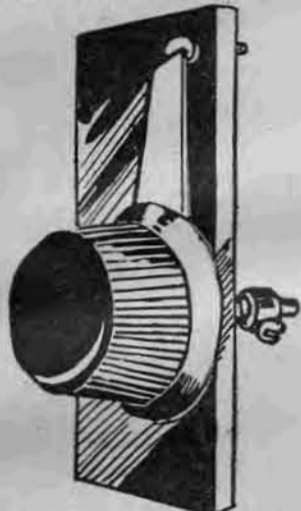
Send for catalog and wiring diagrams

CROSLEY MANUFACTURING COMPANY
 DEPT. RDI 7 CINCINNATI, OHIO



The Radiophonist's Mart

A TAP switch, if properly mounted, will always improve the appearance of any panel. Poor and careless mounting will do much toward detracting from the appearance of the set. In addition to the uniformity of mounting there are a few other points that must be taken into consideration. The switch must make positive connection with the contacts, and its construction must be such that the parts will not loosen up under wear. The bearing should not be supplied by the panel itself, but rather by a bushing or collar fastened to the panel. The knob should be neat in appearance and have proper insulating qualities so that leakage is not experienced.



Well Constructed Tap Switch

The type of tap switch illustrated is manufactured by the Radio Electric Co., of Pittsburgh, Pa. Its construction offers many advantages. The wiper or arm is rigidly mounted to the knob and is pinned to prevent loosening or turning. A bushing is mounted through the panel which supports the knob shaft. The arm contact pressure is adjusted by a studed collar in the rear.

What to Do with "Third" Tip

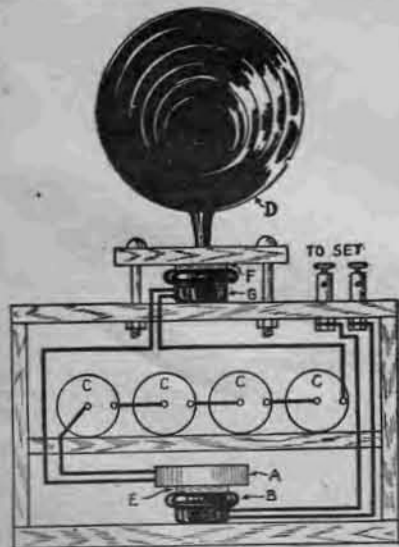
Telephone headsets, at the terminal wires have an extra piece of woven fabric which is often a puzzle to fans. It has an important part to play, however. It should be fastened to the binding post in such a manner that when the receiver terminals are pulled the tension will be on the short end of the cord and not on the wire. This prevents the tips from pulling off, something that happens frequently when the terminals are given a sudden jerk.

Knowledge of the Code

A knowledge of the code is necessary in order to be able to tell who that is buzzing away so loudly while you are trying to receive a distant concert. It may not be that amateur on the next block whom you have been blaming for all your troubles.

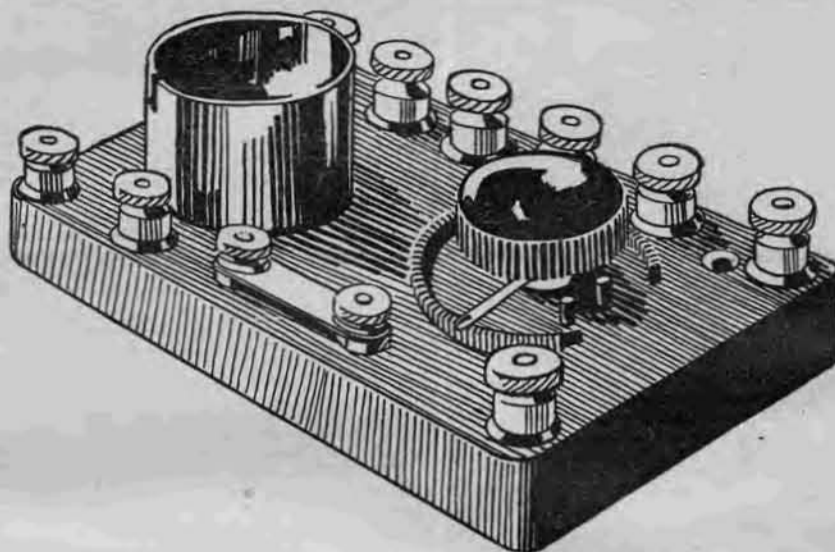
An Efficient Loud Speaker

The amateur who does considerable experimenting will, at some time or another, tackle the making of a loud speaker. The illustration shows a very simple way to construct a loud speaker that is both neat and efficient. All parts are placed within a box except the horn and one receiver. In the illustration, A represents the microphone; B a 1,000 or 2,000 ohm receiver; C, three or four dry cells; D, a loud speak-



er horn (wood, paper, or metal); E and F, pieces of felt to cover receiver; G, a four-ohm receiver. All connections are made as shown in the illustration.—H Bank, Philadelphia, Pa.

Compact Vacuum Tube Control Unit



INDIVIDUAL detector units without the tuning panel are not new on the market, but at the same time they possess certain advantages and features which are distinctly desirable to the amateur interested in the construction of his own set. The tuning panel is easily constructed at home but the vacuum tube, socket and rheostat are instruments usually purchased. For this reason any apparatus combining these parts in a compact and reasonably priced unit is of interest to the amateur.

The Paragon VT control is manufactured by the Adams-Morgan Company of Upper Montclair, N. J. It may be used with any tuner or receiver as a detector or oscillator unit, or together with a suitable transformer as an amplifier to be used in connection with a crystal detector or another vacuum tube.

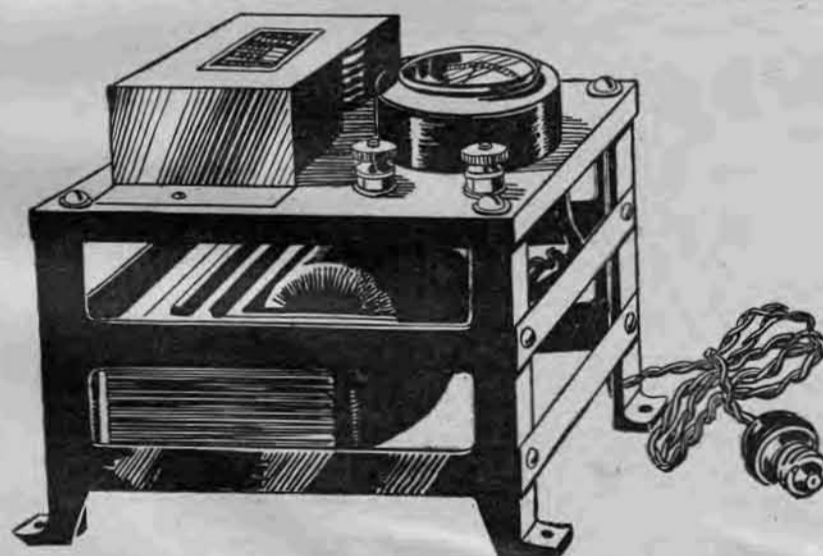
The control comprises a socket, mica grid condenser, grid leak, rheostat and nine terminal posts, all molded in to a panel unit of black condensite. The socket is designed for the standard four-prong tube. The shell is of nicked brass and

projects through the base. The two contact springs in the rear of the socket are phosphor bronze. The grid condenser has brass plates and mica dielectric.

The resistance unit of the rheostat consists of a special wire on an insulating core so wound that it cannot become short-circuited. Neither will the turns loosen with use. The spring leader in contact with the resistance is exceptionally smooth running. The current carrying capacity is 1.5 amperes and the resistance six ohms.

The grid leak is of the pencil mark type and can be easily varied to suit the characteristics of the tube, it being necessary to provide a resistance of sufficiently low value to enable excessive grid charges to leak off and thereby prevent paralyzation of the tube. Two binding posts are for the telephone receivers, two for the A battery, two for the B battery, and three for tuning. Arrangement is made so that connection to the grid can be established either directly or through the mica grid condenser. The unit may be used in a horizontal position on a table or mounted vertically as on a panel.

Fool-Proof Charger Is Automatic



THE AMATEUR who desires to charge his storage battery at home needs a charging device that is a perfect rectifier, fully automatic and fool-proof in every respect. In addition, it should be simple enough so as to be operated without unnecessary instructions. The Hom-charger is manufactured by the Automatic Electrical Devices Company of Cincinnati, O. When connected to any alternating current socket it will operate and recharge the usual form of A battery over night. It is self-polarizing. In other words, one need pay no attention to the posts to which the charging leads are connected. The charger automatically sends the current in the proper direction through the battery.

Another important feature is the fact that it automatically disconnects the battery when the power is interrupted, but starts charging again when connections are restored. It is automatically adjustable for any frequency, voltage and wave form. A distinct feature is a minimum of moving parts and wiring. These parts are replaceable at very low cost. A socket connection is furnished and in addition leads are furnished for snapping to the

battery terminals. The ammeter in the front indicates the charging rate. The vibrator parts are protected by a guard plate over the front. The instrument can be mounted over or on a panel, as desired.

Ground Antenna When Not Used

Always ground the antenna during the time it is not in use, especially during thunder storms. A switch should be provided outside the window for this purpose.

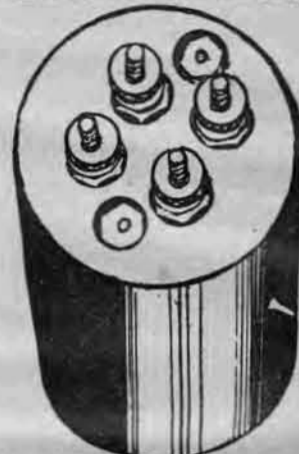
Slate Used for Panels

Slate has good insulating qualities, can be cut with a carpenter's saw, and is drilled as easily as iron. It may be secured to a cabinet containing Radio instruments in the same way as any of the other panel materials.

The common grade school slate that can be purchased cheaply may be used with good results. These slates can be purchased at any school supply store; therefore, those who desire to make their own sets should have no trouble in securing an efficient panel.—Milton Matthews, Omaha, Nebr.

THE ILLUSTRATION shows another one of the many new Radio frequency transformers that are now on the market. This type is manufactured by the American Radio and Research Corp., of Medford Hillside, Mass., and is known as the Radiformer.

Minimum distributed capacity in the windings of a Radio frequency amplifying transformer is of utmost importance to obtain satisfactory performance. This is attained to an unusual degree in this transformer by sandwiching special universal wound coils. In addition, highest efficiency is assured by the use of specially treated Radio frequency iron in the construction of the core. This feature en-



New Radio Frequency Transformer

ables it to amplify over a considerable band of wave lengths without any appreciable core loss.

As this band of wave lengths is necessarily limited, various Radiformers are available for different ranges of wave length. Each instrument is so built that it may be quickly inserted in any standard tube socket, and automatically connected. Or, if a socket is not available, the connecting wires may be clamped to the terminals of the instrument by means of four knurled thumb nuts supplied for the purpose. These nuts are removed when the instruments are used with tube sockets.

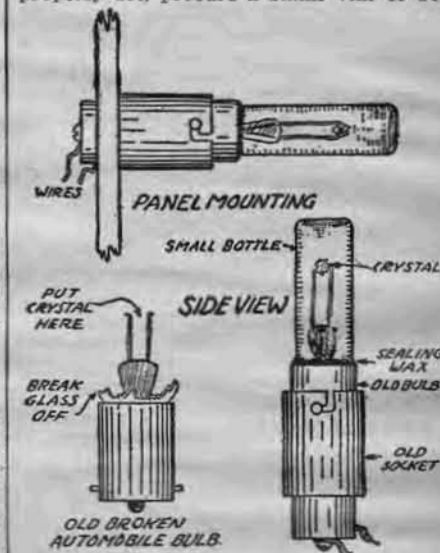
Where several stages of Radio frequency amplification are desired, the transformer used in the first stage differs from those in subsequent stages. At present there are two types available, No. 3057-1 and No. 3120. Both are intended for 360 meters reception, although amplification is obtained over a wave length range from 300 to 600 meters, which is the broadcasting wave band. In receiving 360 meter wave lengths, No. 3057-1 is used in the first stage of amplification, and No. 3120 in all subsequent stages. Other types will be available later for higher and lower wave length bands.

Fill Batteries Before Charging

If a rectifier is used for charging the storage battery, be sure to add the necessary distilled water before charging and not afterwards.

Crystal Detector Mounting

A neat mounting for a crystal may be made from an old broken electric bulb, used on an automobile. These may be procured from a garage or electric shop. All that is needed is the base of the bulb with the terminals on which the filament was mounted. The crystal is mounted between the terminals. Tests are made to find the sensitive spot. When properly set, procure a small vial or bot-



tle that will slip over the crystal and fit on the base of the bulb. The vial or bottle is held in place with sealing wax. The illustration clearly shows this construction.—Wesley Cowles, Memphis, Tenn.

WHAW, Tampa, Fla. 50 ml. Pierce Elec. Co. Daily, 12-1 pm, weather, music; 4-5 and 8-10, music, entertainment, Eastern.

WOC, Davenport, Ia. 485 also, 500 ml. Palmer School of Chiropractic, Daily ex Sun, 12-12:15 pm, markets, weather, concert; 3:30-4, lecture; 5:45-6 and 7-8, concert, Sat., 8-8:15, business review, Sun, 9-10 am and 5:30-6 pm, sacred concert, Central.

State, City, Call
Alabama: Birmingham, WIAG, WSY
Arizona: Phoenix, KDYW, KFAD
Arkansas: Fort Smith, WCAC, WGAR
California: Altadena, KGO

State, City, Call
Wichita, WAAP, WEAH, WEY, WHAN
Kentucky: Louisville, WHAS, WKAG, 9ARU
Louisiana: New Orleans, WAAB, WAAC, WBAM, WCAG, WGV, WIAF, WWL

RECEIVING RECORDS? SEND THEM IN—

The complete list of receiving record holders, appears only once each month. The next complete list will appear in the September 23 issue of RADIO DIGEST.

- Station, Miles Record and by Whom Heard
CFCA—350—E. A. Van Wart, Springfield, Mass.
CHBC—2,150—J. Kurtz, Brooklyn, N. Y.

WCAU—300—L. C. Hurd, Madison, Minn.
WCAU—570—Ray Whetsel, Noblesville, Ind.
WCAV—800—A. R. Higdon, Henderson, Ky.

Illinois: Chicago, KYW, WAAF, WBU, WDAF, WGAZ, WGU, WJAZ, WQX
Indiana: Anderson, WMA
Iowa: Ames, WOI

New Mexico: Roswell, KNJ
New York: Albany, WNJ
New Jersey: Atlantic City, WHAR
New Mexico: Roswell, KNJ
New York: Albany, WNJ

Triton Shell Makes Horn
A triton shell of porcelain which rests on the few existing mantel-pieces, when tried out with a loud speaker, has been found to produce a sounding horn effect.

The most northerly Radio station on the globe is probably at the village of Noorvik, just inside the Arctic Circle, with a population of 350 Eskimos.

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Value of the Radio Compass

Ships Are Easily Located with This Instrument

AT A point off the shores of Newfoundland, the Onataneda became a wreck and the Radio compass was the only instrument to find the location. A boat quickly reached the spot and saved the crew.

The compass makes it possible for a navigator to pick up a definite signal a hundred or more miles from the station from where it was sent. The Radio compass has proved so successful wherever it has been tried that installations are rapidly being made on all navigable waters.

Government Offers Radio Service

Both Telephone and Telegraph to Be Used

THERE ARE fifteen stations operated in connection with the air mail service by the post office department. Plans are now being considered for changing at least a few of these stations so as to provide Radio telephone as well as telegraph service.

The Washington station has had both Radio telegraph and telephone service for nine months. Besides maintaining an hour to hour record of progress of air mail the post office department Radio stations now send out other information. Complete weather reports go out daily. Also reports of grain, dairy, and live stock prices travel the ether waves to the farms and farming communities.

It's Good to Be an American

Foreign Countries Impose Licenses to Listen In

IF YOU are an amateur in this country and have some grievance, remember that you are much better off by being an American. If, for instance, you were in England you would be required to secure a license to receive Radio signals. There are about ten thousand licensed receivers in the British Isles today. In America there are hundreds of thousands of receiving sets and over fifteen thousand transmitting stations. At present there are only eight broadcasting stations in England and the amateur gets part of his amusement from listening to stations in Holland and France. The United States has over four hundred broadcasting stations and the list grows day by day.

Higher Priced Sets in Demand

Tendency Is Toward the Better Instruments

THERE NOW comes from the advertising fraternity is to follow similar lines in Radio as was followed by the phonograph and motion pictures. The higher priced and more efficient sets now predominate over the cheaper outfits.

Not so very many years ago there were numerous five cent theaters and the pictures were cheap, single reel melodrama—pictures that could scarcely be seen. Similarly the phonograph had to go through the same stages of construction to reach a point of efficiency. With both pictures and phonographs the cost was greatly increased.

There is no question but what Radio sets will go through the same procedure. The cost may be relatively large but it is hoped that a greater efficiency will be obtained.

Aid to Americanization Work

Foreign Speaking Citizens Learn English Language

WE HAVE many groups of foreign born citizens. They come from almost every place in the world. This country resembles a veritable Tower of Babel as far as language is concerned. The foreign born citizens settle down in one particular place when they come to this country. Those of the same nationality who follow almost always go to the same city and even to the same section of the city that has already been populated by their peoples.

One of our largest cities, New York, is an example of this segregation. In this great city there are entire sections of peoples of different nationalities, Russian, French, Spanish and many others, all of whom live apart. When they converse with one another they do so in their mother tongue. They read newspapers and books printed in the language of the country where they were born.

Officers of the Americanization work hail Radio as the best means to bring the English language and American ideals to these foreign speaking sections of our large cities. Radio will penetrate this almost impossible barrier. The voice speaking in English language and the voice propagating the American ideals and literature will go far into the homes of these foreign born citizens. They will be listening in to the Radio voice and benefiting by it, whether they want to or not.

Condensed

By DIELECTRIC

Seems as though crystal sets would be known and used in nearly every land on the globe, yet they're not. If you should go to the Canary Islands, you'd find them broadcasting the late news by whistling signals, which carry for some distance. It's true they can't transmit a song or jazz in that manner. No, they'll all have aeriels up some of these days, reserving the whistle to signal the reception of a long-distance Radio message.

Of course, I'm not going to comment, one way or the other, on the new broadcasting schedules applying to the vicinity of New York. It did seem a pity not to be able to hear but one powerful station every evening, until this agreement was reached. There they were, several stations, trying to entertain us and only one of 'em could be tuned in. A fan has the most fun in picking up distant stations. He also likes the variety of listening in on several local broadcasts. But I have no remarks to make on the subject.

Lots of men are annoyed when they visit a barber shop, by having waves of garlic directed at them from the talkative wielder of the razor. There's no selectivity about it; you have to receive them. In such a case a receiving set would be a fine thing to keep your annoyances busy listening (providing he wasn't a duplex). But beware the chap who keeps time to the music with his steel blade on your face. He's a likely transformer, shunting across your jugular and dissipating your life current.

What a pleasure to listen to a good program with sleeves rolled up seated in a big comfortable chair and pipe lit! I answered to that description the other evening while hearing an excellent concert from WOR. They have a woman announcer at that station whose voice just soothes you ordinarily. At the close of their program I could hardly believe my ears, when the announcement came in that we should all join in community singing. It is supposed that the idea had never been put into effect, prior to this. Think of the thousands following the lead of the artists at WOR in the singing of "My Old Kentucky Home," and other old favorites. Why not have the Radio audiences join in singing hymns at the chapel services on Sundays?

You remember those Edison phonographs using cylindrical records, on which you could do your own recording? Suppose one of these was used after the fashion of Dunmore's relay recorder, with which messages are received during the absence of the operator. All that would be necessary with the phonograph would be a station tuned in, the machine started—then leave it. When you returned to play the record, you should hear code; music and really beautiful static blending together. Or you might play a record notifying you of a bill long overdue! Its possibilities are many.

In case any reader (but who could it be) is of the opinion that Radio patents are no more numerous than any other breed, just hold to this wave length until you get the following: There have already been issued one thousand Radio patents, with nearly three thousand pending in the United States Patent office. Don't let this discourage you from working out something new, but keep your signals clear of interference in the nature of infringement proceedings.

Dr. DeForest is anything but pessimistic about the future of Radiotelephony. He recently made the statement that in his opinion there would be 20,000,000 receiving sets in operation by 1927! It's impossible to travel anywhere today and not find aeriels, from a few feet to over a hundred, strung above tiny cottages as well as large mansions. Spotting antennae will prove a poor criterion by which to judge the number of sets, though, for very soon many fans who will have no visible aeriels will be twirling the dials. Ultimately no one, except he be a deaf-mute, will admit without apology failure to own some kind of receiving set. Yes, I hope they'll be lower in price by that time.

The toe of one of my shoes needs repairing. I was listening recently to the excellent broadcasting of music by the Philharmonic Orchestra, of New York, made possible by WJZ. During the playing of a certain selection, some fellow in the audience at the Stadium (where the concerts were given) began coughing. I was so engrossed in the work of the woodwind instruments that such an incident annoyed me. Well, I started kicking at the offending one, without checking him in the least. When the music stopped and I came to, I found my Oxford had been damaged by kicking the leg of a perfectly innocent table. Moral: Music lovers should sit in their stocking feet when listening in. You might tune out the music, but never the cough.

Another marvel in Radio's rapidly growing list! We are becoming accustomed to the idea of hearing the human voice from great distances, however, the speed with which it travels is still awe-inspiring. When you realize that a message from the new station at Nauen, Germany, reaches Long Island one-twentieth of a second later—less time than is required to move a dial—it puts new meaning into that popular phrase, "I'll tell the world." Should a creditor of yours die in Germany, it would be possible to learn of it before the doctor had left the bedside.

Just between friends, I'd like to ask a question. Do you tune out Dielectric before he finishes broadcasting his gossip?

RADIO INDI-GEST

They Licked the Ether Clean

Jack Spratt likes jazz an' that—
His wife wants classic song;
He had to buy a coupla sets,
And now they get along.

Coiffure Notes for QSA Signals

"Listening in" with the Radio is bound to bring ears back into style.—Youngstown (O.) Telegram.

O. K. Garcon, Send Us Some!

A Frenchman has invented a system by which checks can be sent by Radio.

Plaint of a Radio-Oaf

By Edward Anthony

I've just been perusing "The Radio Book,"
And, oh, what annoyance it brings,
For mine is a dome that is hardly at home,
In the realm of mechanical things.



My neighbor, who boasts of a Radio set,
Insists that the volume is clear,
And doubtless it is, but if anyone'd quiz
Me I'd flunk rather badly, I fear.

For batteries, buzzers, condensers and loops
Look alive to my mite of a brain;
And as for vibrators and eke alternators,
They leave me a-writhing in pain.

And then there are spark coils, detectors and arcs
To give an additional pang,
And, oh, when I start on the broadcasting part
I go down for the count with a bang.

And then, if my memory serve, there are valves,
And since I'm no mental trapezian,
They puzzled me so that I got vertigo
And, I fear me, a valvular lesion!

That isn't enough to perplex, you remark?
Perhaps; but I also might add
There are violet rays to bewilder and daze
And drive a poor simpleton mad.

And filament rheostats, sliders and gears,
Rechargers and vacuum tubes
That await to destroy the composure and joy
Of mechanic'ly ignorant boobs.



Oh, Radiomaniaes, purchase the book
And read every sentence with glee;
But kindly don't quote from the same to this pote,
For Radio isn't for me!

—Toronto Star.

Oscillations Versus Osculations

"Kiss me by Radio?"

Oh, no! It isn't done
For the very simple reason
It would be no fun.

An Electronic Panegyric

What brings the sunshine to my room
Chasing far the shades of gloom
And makes the day pass all too soon
My Radio!

I hear the news from far-off shore
Of busy mart—the baseball score
And list to songs I sung of yore
By Radio!

With song and story I'm beguiled
And go to sleep like a happy child
To dream an Angel passed and smiled
On me and Radio!

Radio Telephony for Amateurs and Beginners

Part XII—Useful Information. Section III—Formulas

By Peter J. M. Clute

A LARGE majority of the Radio amateurs have an experimental and creative turn of mind and concern themselves with the arrangement, adjustment and manipulation of the component parts of their receiving units rather than with the sort of signals or messages coming in. The design and construction details of the receiving and sending apparatus together with information concerning the theoretical functioning of the various elements offer such a strong inducement to the average Radio enthusiast that he soon becomes imbued with the desire to make something himself.

Formulas are both useful and necessary in the design, construction and operation of any set, and for a thorough knowledge and understanding of the theory underlying Radio telephony communication they are indispensable. The relative values of the component parts and the correlation between them can only be determined by calculation, which operation pre-supposes a working knowledge of the formulas.

In the center of the page there is given a list of the abbreviations commonly encountered in Radio literature. It will prove quite useful to bear them in mind when studying the accompanying formulas.

No attempt will be made in the succeeding paragraphs to give the derivations of the various formulas given, since it is not within the scope or province of the present series of articles on the elements of Radio telephony. Wherever it has been deemed advisable, an explanatory statement accompanies the general formula.

Ohm's Law: A method of expressing the relationship existing between the electromotive force, current and resistance, and is practically the basis of most electrical computations:

$$I = \frac{E}{R}$$

wherein I is the current in amperes, E the electromotive force in volts and R the resistance of the circuit in ohms.

The above simple form of Ohm's Law applies only to D. C. circuit and to A. C. circuits having no inductance. For A. C. circuits,

$$I = \frac{E}{Z}$$

where I is the current in amperes, E the electromotive force in volts, and Z the impedance in ohms.

Impedance: That quantity which represents the combined resisting effects of the ohmic resistance and the reactance, or the opposition due to the counter E. M. F. self-induction and capacity. Since the effects of resistance and reactance differ in phase by 90 degrees, they cannot be added arithmetically. The following formula obtains:

$$Z = \sqrt{R^2 + X^2}$$

wherein Z is the impedance, R the resistance and X the reactance of the circuit, all in ohms.

Inductive Reactance: The opposition offered to the flow of alternating currents due to the counter E. M. F. of self-induction. The formula whereby the inductive reactance in any A. C. circuit may be computed is:

$$X_L = 6.28 f L$$

wherein X_L is the inductive reactance of the circuit in ohms, f the frequency in cycles per second, and L the inductance in circuit in henries.

Capacity Reactance: The opposition offered by capacity to the flow of alternating current. The equation for capacity reactance is:

$$X_C = \frac{1}{6.28 f C}$$

wherein X_C is the capacity reactance of the circuit in ohms, f the frequency in cycles per second, and C the electrostatic capacity of the circuit in farads.

Power: Power in D. C. circuits is equal to the product of volts and amperes. Expressing this rule as a formula:

$$P = E I \text{ (watts)}$$

Also, since from Ohm's law, $E = IR$, then, $P = IR^2$ (watts).

These formulas may be applied to A. C. circuits which are non-inductive. For A. C. circuits:

$$P = I E \times p. f. \text{ (Watts)}$$

where p. f. is the "power factor," the name given to that quantity by which the product of effective volts and amperes in a circuit must be multiplied to obtain the true power in watts taken by the circuit. It is equal to the cosine of the angle by which the current leads or lags behind the impressed E. M. F.

Wave Length and Frequency: The length of a single wave may be determined from the formula:

$$W. L. = \frac{v}{f}$$

wherein W. L. is the wave length in meters, v the velocity of waves in meters per second, and f the frequency in cycles per second. ($v = 300,000,000$ meters per second, or 186,000 miles per second).

From the above it is also evident that,

$$f = \frac{v}{W. L.}$$

Wave Length: To find the wave length in meters, when the capacity and inductance are known, use either of the following formulas:

$$W. L. = 59.6 \sqrt{L \times C}$$

wherein, L is the inductance in centimeters and C the capacity in microfarads.

$$\text{Or } W. L. = 1884 \sqrt{L \times C}$$

wherein, L is the inductance in microhenries and C the capacity in microfarads.

Natural Wave Length of Antenna: The natural period of wave length in meters of an antenna may be calculated approximately by using the formula:

$$W. L. = \frac{1 \times 4.2}{3.048}$$

frequency of the transformer, or the commercial frequency.

Frequency: The frequency at which capacity and inductive reactance are equal is termed the natural period of the circuit and, assuming negligible resistance, the following formula can be deduced:

$$f = \frac{1}{6.2832 \sqrt{L \times C}}$$

wherein L is the inductance of the aerial in microhenries and C the capacity in microfarads.

Antenna Series Condenser: The capacity of the series condenser, necessary to reduce the natural wave length of an antenna to a desired value required for reception, is found from the relation:

$$C_2 = \frac{3552 \times L \times C - (W. L.)^2}{(W. L.)^2} \times C$$

wherein C, is the series condenser capacity in microfarads, WL₁ is the desired

Inductance of Tuning Coil Secondary: For any desired wave length, the secondary tuning inductance may be calculated from the formula:

$$L_2 = \frac{(W. L.)^2}{3552 \times C_1}$$

wherein, L₂ is the inductance of the tuning coil secondary in cm., C₁ the capacity of the condenser in multiple with the secondary, and WL₂ the desired wave length in meters.

Antenna Series Loading Coil: To increase the wave length, a loading coil is connected in series in the antenna circuit. To calculate the necessary inductance of the loading coil, use the formula:

$$L_3 = \frac{(W. L.)^2}{3552 \times C} - \left(\frac{L}{3} + L_2 \right)$$

wherein, L₃ is the necessary inductance of the series loading coil in cm., L the antenna inductance in cm., L₂ the inductance of the tuning coil primary in cm., C the antenna capacity in microfarads and WL₁ the desired wave length in meters.

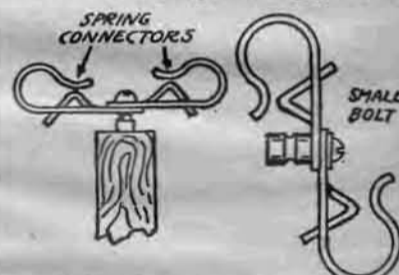
Note: In the above formulas, the following relations hold:

- 1 meter = 39.37 inches
- 1 meter = 3.281 feet
- 1 foot = 0.3048 meter
- 1,000 centimeters = 1 microhenry
- 1,000,000 centimeters = 1 henry
- 1,000,000 microfarads = 1 farad

—THE END—

A Double Phone Connector

If you do not have a double connector for two head sets, one can be made easily from two spring type binding posts taken



from a familiar type of dry cell. The two connectors are joined by means of a small screw or bolt as shown in the illustration.—Oral Harris, Harrisburg, Ill.

TERMS OR UNITS	ABBREVIATIONS
Alternating Current	A. C.
Ammeter	Am.
Ampere	Amp.
Ampere-Hour	Amp.-Hr.
Antenna	Ant.
Battery	Batt.
Capacity	C.
Centimeter	Cm.
Condenser	Cond.
Continuous Waves	C. W.
Cubic Centimeter	Cu. Cm.
Cubic Inch	Cu. In.
Current	I.
Direct Current	D. C.
Electromotive Force	E. M. F.
Filament	Fil.
Foot	Ft.
Foot-Pounds	Ft.-Lb.
Frequency	F.
Gram	Gm.
Ground	Grd.
Henry	H.
Impedance	Z.
Inch	In.
Inductance	L.
Kilogram	Kgm.

TERMS OR UNITS	ABBREVIATIONS
Kilometer	Km.
Kilowatt	K. W.
Kilowatt-Hour	Kw.-Hr.
Kilovolt-Ampere	K. V. A.
Meter	M.
Microfarad	Mfd.
Micro-Microfarad	Micro-Mfd.
Millihenry	Mh.
Millimeter	Mm.
Pound	Lb.
Resistance	R.
Resistor	Res.
Rheostat	Rh.
Second	Sec.
Square Centimeter	Sq. Cm.
Square Inch	Sq. In.
Switch	Sw.
Vacuum Tube	V. T.
Variable Condenser	Var. Cond.
Velocity	v.
Volt	V.
Voltage	E.
Voltmeter	Vm.
Watt	W.
Wave-Length	W. L.

wherein, WL is the wave length in meters and l is the total length of antenna, lead in and ground wire in feet.

Condenser Capacity: To find the capacity of a condenser, use the following formula:

$$C = \frac{KS}{4 \times 3.1416 \times d} = \frac{KS}{12.57 \times d}$$

wherein, C is the capacity in farads, S the area of one plate, or set of plates, in sq. cm., d the thickness of dielectric separating the plates, and K is the "dielectric constant." A table of dielectric constants was given in the previous article.

Capacity of Condensers in Parallel: The capacity of condensers connected in multiple is computed from the formula:

$$C = C_1 + C_2 + C_3 + C_4 \text{ etc.}$$

Capacity of Condensers in Series: The total capacity of a number of condensers connected in series may be determined from the relation:

$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_4} \text{ etc.}$$

Resistances in Parallel: The total resistance of a number of resistances in parallel may be obtained by using the formula:

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4} \text{ etc.}$$

Resistances in Series: The resistance of a series combination equals the sum of the resistances of the components. This relation may be expressed as:

$$R = R_1 + R_2 + R_3 + R_4 \text{ etc.}$$

Inductance of Single Layer Coil: The inductance of any single layer round coil (solenoid) may be computed from the formula:

$$L = \frac{.03948 \times r^2 \times N^2 \times K}{l}$$

wherein, L is the inductance in cm., r the radius of the coil in cm., N the number of turns of wire, l the equivalent length of coil in cm, and K is a variable depending upon the value of the ratio of the length of the coil to its diameter. A table of values of K for various values of the ratio of l to D was given in the previous article.

Capacity (Transformer): The capacity necessary for any transformer may be determined from the formula:

$$C = \frac{KW \times 10^6}{E^2 \times f}$$

wherein, C is the capacity in microfarads, KW is power in kilowatts, E is secondary voltage and f is the frequency of the spark discharge.

Spark Frequency (Transmitter): To find the spark frequency of a Radio transmitting set, use the following formula:

$$f = \frac{120}{n \times R.P.M.} + F$$

wherein f is the spark frequency in cycles per sec., n is the number of points of gap, R.P.M. is the speed of motor in revolutions per minute, and F is the primary

wave length in meters, C is the aerial capacity in microfarads, and L is the aerial inductance in cm.

Antenna Circuit Capacity: The formula below may be used to determine the capacitance of the antenna circuit, containing a series condenser:

$$C_2 = \frac{(W. L.)^2 - (W. L.)^2}{(W. L.)^2} \times C_1$$

wherein C₂ is the capacitance of the antenna circuit in mfd., C₁ the capacity of the series condenser in mfd., WL the natural wave length of the antenna in meters, and WL₁ the wave length with the series condenser in circuit.

Antenna Circuit Inductance: The inductance of the antenna circuit, containing a coil in series with the antenna, may be computed from the formula:

$$L_2 = \frac{(W. L.)^2 - (W. L.)^2}{(W. L.)^2} \times L_1$$

wherein, L₂ is the inductance of the antenna circuit in cm., L₁ the inductance of the series coil in cm., WL the natural wave length of the antenna in meters, and WL₁ the wave length with the coil in series in the circuit.

Inductance of Tuning Coil Primary: For any desired wave length, the inductance of the primary coil of a tuning transformer or coupler may be expressed by the relation:

$$L_3 = \frac{(W. L.)^2}{3552 \times C} - \frac{L}{3}$$

wherein, L₃ is the inductance of the tuning coil primary in cm., L the antenna inductance in cm., C the antenna capacity in mfd., and WL₁ the desired wave length in meters.

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THOS. E. WILSON & Co.
42 South Wabash Avenue Dept. R. D. Chicago

New Type of Sliding Coil Inductance

Secondary Coupler Coil Moved with Spiral Shaft

THE AMATEUR who delights in making his own apparatus is always on the lookout for novel "stunts" and new ways of doing things. In past issues we have given directions for making the conventional type of tickler coil inductance and a loose coupler.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker, if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. RADIO DIGEST is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied. RADIO KINKS DEPARTMENT, RADIO DIGEST, 123 West Madison St., Chicago, Ill.

In this article we propose to explain the construction of a sliding coil inductance, the actuating mechanism of which is, to say the least, novel. It will be found slightly more difficult to make than the foregoing, but when completed it will be found to offer the advantage of great compactness, and easy to fit in a small space or mount in a cabinet which offers but little depth, inasmuch as the coil extends but 3 1/2 inches back of the panel.

Use Large Tubes in Making

To obtain this compactness the tubes—of waterproofed cardboard—are chosen of somewhat larger diameter than usual. For the primary coil is needed a tube 5 inches in outside diameter and 1/2 inch thick. The length should be 3 1/2 inches. The smaller secondary tube is only 1 inch long and 4 1/2 inches in diameter. These are shown under E and F, respectively, in Figure 2.

Four brass clips are used to fasten the large tube to the panel, which is 9x6 inches in size, but can of course be made any size desired, according to individual requirements or preference. The clips are made of brass strip, about 1/2 inch thick, bent at a right angle. Clips of that type, by the way, will be found in any Meccano or other mechanical construction set.

If you lack the equipment to do it yourself have your cabinet-maker turn up two disks, about 3/4 inch thick, one 4 1/4 inches in diameter to form the rear cover of the primary tube, and one 4 1/4 inches in diameter to fit snugly into the secondary tube. Before assembling, drill all necessary holes into the disks, as shown by detail dimension drawing A and B, Figure 1. The holes for the rods should be very slightly undersize in the larger disk to allow a force fit, but in the smaller disk they should be reamed out to allow the disk to slide freely over the rods. The other ends of the rods should fit into two holes drilled at the proper points into the back of the panel, but only about half-way through the latter. This is shown in cross section in Figure 1. It will be wise, therefore, to have a fairly thick panel, at least 1/2 inch. If this is impossible to obtain, an alternative is offered by cementing two pieces of wood or bakelite to the back of the panel and thus increasing the thickness where the holes are to be drilled. The brass rods should be 1/4 inch in diameter, but their length has not been indicated on the drawings, as this depends on the choice of construction, thickness of the panel, etc. A neat job will be obtained if the rods are left slightly projecting beyond the disk during construction, and neatly cut off flush with the latter after final assembly.

Helix Adjusts Coupling

If you refer to the drawing Figure 1 representing a cross section showing all the parts and a rear view, you will see that the dial is attached to a shaft which in turn rotates a helix, or long pitch screw. It will be evident that turning this screw will cause the secondary tube to slide back and forth according to the direction of turning.

The construction of the helix will be found to be the most difficult operation in making this unit. It is indeed likely that you will not get it perfect at the first attempt and that a little experimenting will be required. The material used is a copper strip of generous length, about 3/4 inch thick and not more than 1/2 inch wide. Do not try to use tin or any other material, for unless you have special machinery at hand you will not be able to force it into the required shape without tearing. Even the copper will be found too hard and will have to be annealed before you can twist it. Annealing is done by heating the cop-

CABINET MOUNTING FOR COIL

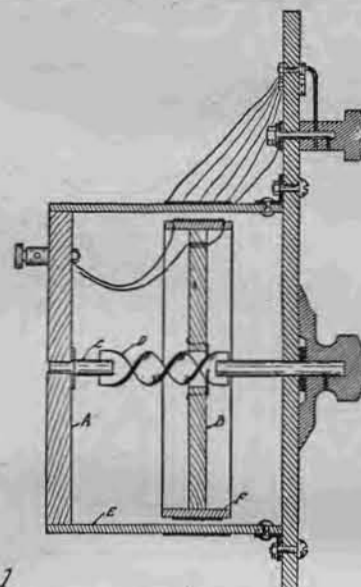
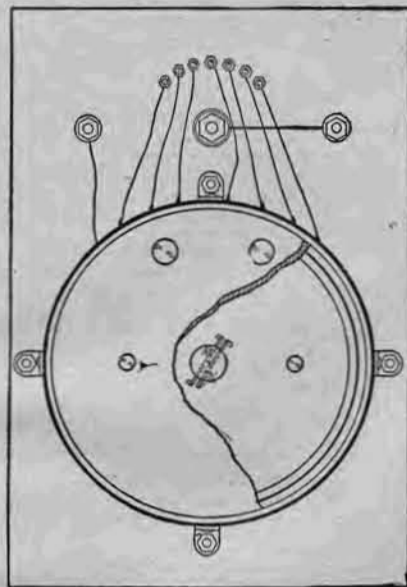
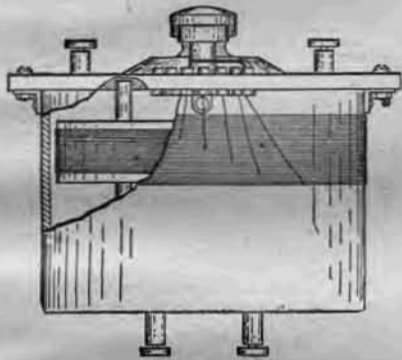


Fig 1



per strip in a gasoline torch or gas flame until it just begins to become red hot, and allowing it to cool slowly. This makes the copper soft and pliable and not so apt to crack or break off.

Making the Helix

As we see from Figure 2, one and one-half complete twists are required. The distance from beginning to end of the twists is to be 1 1/2 inches, that is to say the pitch will be just one inch, and that is the distance that the secondary tube will travel for one revolution of the dial. The total length of the helix should not be shorter than shown on the drawing, but there is no objection to making it longer, if preferred, as long as the pitch is kept at the above figure.

The twisting is best done by means of a bench vise and a monkey wrench. Clamp one end of the strip in the vise and grip the other end well with the wrench. If you cannot get a good hold bending the strip over the head of the wrench will probably remedy that. Just how long the strip should be between the vise and the wrench cannot be deter-

mined beforehand, as it depends on the exact thickness of the copper, the degree of hardness, etc. The best thing to do is to choose a length equal to one and one-half times the required length or

about 2 3/4 inches, and try. If the helix after turns out to be too long take a new strip and try again, starting with a smaller distance. If it is only a little too short, it may perhaps be pulled to the proper length. Two or three attempts will surely produce a satisfactory result, providing a little gray matter is used. After the helix has been made it may be somewhat strengthened by re-heating it as before and quenching it in cold water. Or it may be coated all over with solder, preferably by dipping into a solder pot. Your plumber around the corner will probably be willing to do this for you. Solder is fairly soft, yet not as soft as the annealed copper; a coating of it will, therefore, put a harder shell around the helix and make less liable to accidental bending.

Attaching to Moving Secondary

Next, the shaft must be fitted to the helix. This is best done by taking two pieces of 1/4-inch brass rod (a smaller diameter will do) and cutting a slot in one end of each with a hack saw. The flat parts at the ends of the helix are forced into this and soldered to the shaft. Of course great care must be taken to have the shafts and the helix "line up" so that there will be no wobble when the shaft is twirled.

The hole in the center of the small disk B was made large enough to let the helix pass through. You must now provide a guide so that the helix in turning will cause the disk to move. The simplest way will be for you to bend two pieces of stiff iron wire to a V-shape and to drill four holes near the large hole in the disk for the wires to pass through. The small view in Figure 2 explains this operation much better than it can be done in writing. The exact distance between the parallel wires cannot be determined until that stage of construction has been reached. Once you are at that point, how-

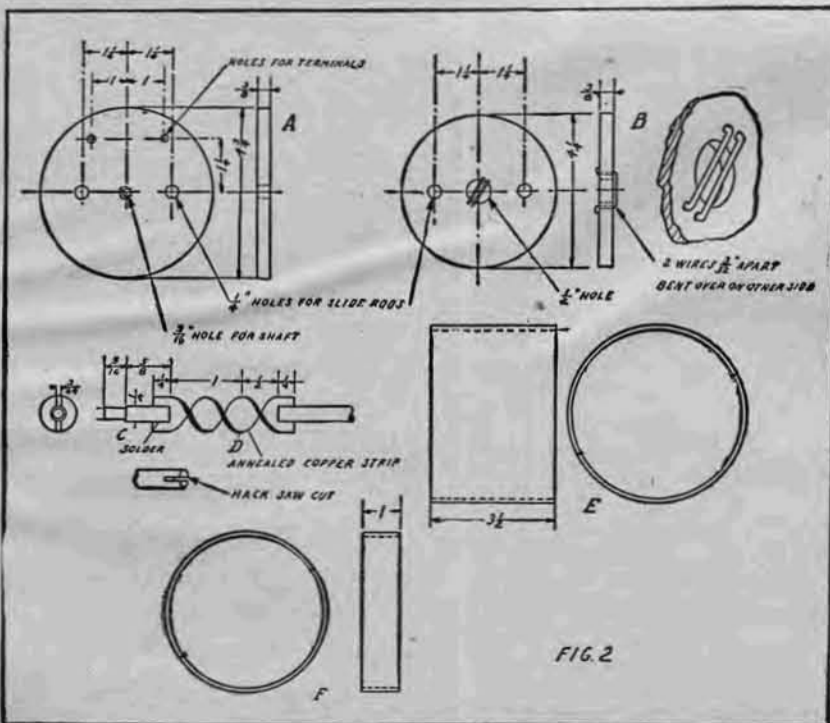


FIG. 2

ever, you will have no difficulty. Note that the helix has to be put through the hole before the second wire has been attached, as the wires will be too close together for the shaft to pass through.

Soldering Flux for Use With Brass and Copper

Probably one of the most difficult phases of Radio work encountered by the amateur is the art of soldering. Good, clean and substantial soldering is absolutely essential for both appearance and efficiency.

It is a well known fact that the soldering iron must be clean and tinned (covered with solder) before attempting to use it, therefore, this article will treat the flux only.

A flux that can be used by the manufacturer as well as the amateur can be made economically by mixing finely powdered rosin with enough wood alcohol to give a consistency of light maple syrup. The solution or flux should be allowed to stand for twenty-four hours before using.—H. E. Jameson, Milwaukee, Wis.

The short end of the shaft may be machined down to provide a shoulder to bear against the end disk as shown in the cross section; or a collar with a set screw (also found in a Meccano set) can be adopted instead.

Winding of Coils and Assembly

The remainder of the assembly of the panel is evident to the Radio fan, and should offer no difficulty. Seven taps are the least that may be satisfactorily used at the tap switch, and nine can be used if available. The dial should be graduated for a full revolution, though one graduated 180° only is shown in the illustration. The secondary winding is attached through flexible leads—use braided wire if possible—to terminal posts which are shown as mounted on the large disk, though they may be attached to the wall of the outer tube, as far back as they can, if there should be not enough space in the cabinet.

The winding on the primary coil should consist of 74 turns of No. 28 enameled wire. This winding will cover just one inch in width and require 116 feet of wire. Before applying the wire give the tube a thin coat of shellac to make the winding adhere. If a 7 contact switch is

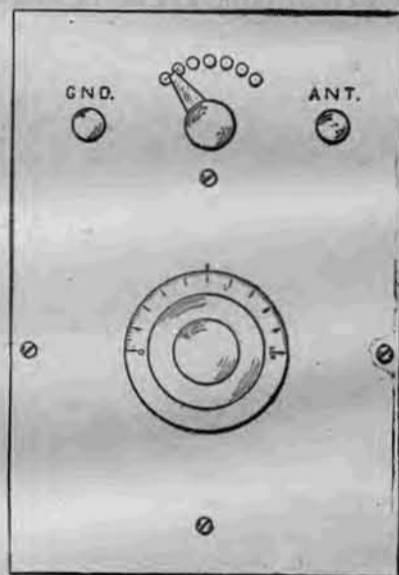


FIG. 3

used, tap the 14th, 24th, 34th, 44th, 54th, 64th, and 74th turn. If a nine contact switch is used, tap the 10th, 18th, 26th, 34th, 42nd, 50th, 58th, 66th, and 74th turn.

The secondary should be wound with 75 turns of No. 30 enamel covered wire. These windings will give an inductance of 1,085,000 centimeters.

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Use of the Radio Receiving Set in the Home

Part I—Principles of Transmission and Reception

By H. M. Towne

VOLUMES could be written on the underlying principles of Radio. Let us, therefore, review only a few of the factors which may pave for a better understanding of what will be discussed later. Radio is made possible by the fact that electro-magnetic waves are able to be produced at one point and detected at some distant point. The medium through which these waves are propagated is called ether. Either is not matter but is merely the name given to that property of space which permits light waves and electro-magnetic waves to exist.

These electro-magnetic waves travel at the same velocity as light waves, which is 186,000 miles, or 300,000,000 meters, per second. Putting this in a more significant form would be to say the waves travel a distance of more than seven times around the earth in one second. The electro-magnetic waves are produced at the transmitting station and received at the receiving station.

Any number of receiving stations can receive the waves from a transmitting station without reducing or affecting the further propagation of the waves. The

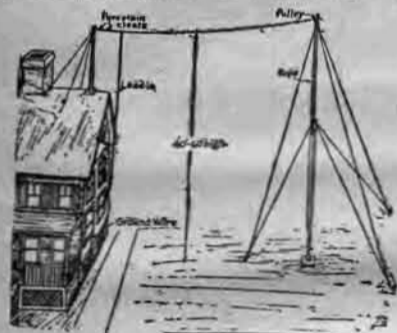


Figure 1

waves radiate out in all directions from the transmitting station, though the intensity of the radiation may be made greater in some one or more definite directions by special design of the transmitting antenna. Uniform radiation in all directions is, however, generally desirable. At the transmitting station there is a wire or system of wires elevated above the ground which form the antenna or aerial. The antenna must be well insulated from its supports. It is connected to the transmitting apparatus in the station and the apparatus is also connected to earth.

Inductance and Capacity

The antenna-to-ground circuit possesses two factors which we are interested in. They are inductance and capacitance.

Inductance (designated by L) is largely governed by the length of the antenna from ground to the most distant end, while capacitance (designated C) is governed largely by the height of the antenna above ground and the number, spacing and size of wires in the antenna. These two factors in combination with the transmitting instruments cause the electro-magnetic waves which are produced to have a definite frequency or wave-length. Frequency and wave length are interchangeable terms. Wave length is the distance that a wave will travel during one complete cycle of the transmitting antenna oscillation frequency. Wave length is therefore the velocity (300,000,000 meters) divided by the frequency, and conversely, frequency is the velocity divided by wave length. The frequency is always stated in cycles per second; while the wave length is generally stated in meters.

Intensity of Signals Diminishes

The intensity of the waves produced by a transmitting station are proportionate to the amount of electric energy or power used to cause the antenna system oscillations. The energy in the waves diminishes as they travel due to absorption in the medium through which they pass, so that for a given amount of power for producing the waves, there is a limit to the distance they can travel and still possess enough energy in them to operate a receiving set.

The receiving station also uses an antenna which, however, does not need to be as large and complicated as a transmitting antenna. The receiving antenna is connected through the receiving instruments and then to earth. The inductance and capacitance of the receiving antenna in combination with the receiving instruments will give the antenna system a definite range of wave lengths. As the waves produced by the transmitter sweep across the receiving antenna the electric field intensity along the receiving antenna alternates in value.

Tuning Gets Maximum Energy

If the receiving station is to get the greatest amount of energy from the transmitted waves it is important that the receiving wave length be the same as the transmitting wave length. This adjusting of the wave lengths is called tuning. In order that a receiving station can receive the waves of many different trans-

mitting stations of various wave lengths, the receiving instruments are made to embody a certain component of the L and C factors of the antenna system. These factors in the instruments are variable so that the wave length to which the receiving station will respond may be varied at will.

The inductance L in the receiving instruments is represented by one or more coils of wire which are generally tapped at every few turns and the taps brought out to a multi-point switch, or two coils may be arranged in series so that the field of one coil may be made to buck or boost the field of the other coil.

Functions of Tuning Instruments

This latter method is used in a variometer and the range of inductance varies from about zero (when fields are bucking) to slightly more than the sum of the individual coil inductances (when fields are in boosting relation). The capacitance C in the receiving instruments is represented by one group of metal plates which interleave, but not touching, another group of similar metal plates, the space between the plates usually taken up by air, oil, mica, waxed paper or other dielectric. This alternation of metal plates and dielectric constitutes a condenser. The amount of area by which one group of plates interleaves the other group of plates is made variable so that the effective capacitance C can be varied. These two variable components of L and C, in connection with the fixed components of L and C represented by the antenna, provide for a certain range of wave length adjustment. The combined effective L and C govern the wave length as follows:

$$\text{frequency} = \frac{1}{2\pi\sqrt{CXL}}$$

and wave length = velocity ÷ frequency

$$\text{Then, wave length} = 3 \times 10^8 \div 2\pi\sqrt{CXL}$$

$$= 1885 \times 10^6 \div \sqrt{CXL}$$

Therefore, the wave length adjustment of the receiving circuit increases with the increase of inductance coil dimensions and also with increase of condenser plate area.

Elimination of Static

The reception of Radio signals is quite severely jeopardized by "static" during the summer months. The "static" causes a scratchy or cracking sound in the receivers which may, under bad conditions, be so loud and continuous as to almost entirely drown out the telephone speech.

The static is produced by charges of electricity in the surrounding atmosphere which discharge to earth through the antenna, and also by electro-magnetic waves caused by distant lightning flashes. There is no simple and satisfactory way to eliminate these static disturbances except by using the indoor coil or loop antenna. This, however, requires much more elaborate receiving apparatus to get the same intensity of telephone signals and is not recommended for this locality.

The indoor loop may be used with an ordinary receiving set where the receiving station is only a few miles from the broadcasting station. Do not try to receive during lightning storms or when a storm is approaching.

Antenna and Ground for Receiving

There are many types of antennae which can be used, but for receiving only, the

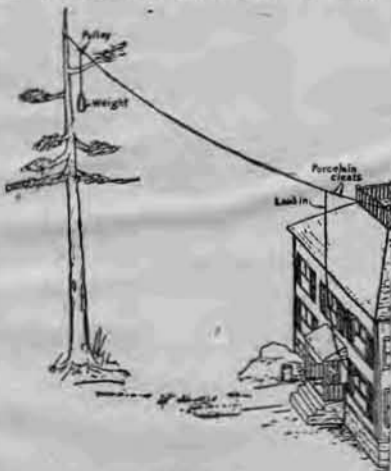


Figure 2

single vertical or horizontal wire has obvious advantages in the way of simplicity and low cost. If well erected, the single wire antenna will give very good results for receiving—and in most cases is to be recommended for home installations. It does not require rugged masts to support it and can be erected without defacing property or appearing conspicuous in a neighborhood. The antenna should be erected as high as possible without going to unwarranted expense.

The height which will suffice to give good results depends largely upon local conditions, having to do with general topography and the presence of high buildings, trees, electric power, circuits and objects in general which will absorb energy from the waves.

If the locality is in open flat country with few objects to shield or absorb, a very low antenna, perhaps 10 feet, above the ground, can be used successfully, but for the average case in this locality and assuming average street residence surrounded by more or less buildings and trees, the antenna should preferably be equal to or higher than the surrounding objects.

The antenna wire will usually be horizontal unless one has some high structure adjacent to his house which would provide for supporting the wire vertically. In any case, the antenna wire does not have to be strictly horizontal or vertical but may incline at any angle.

Antenna Erection

Try to have one end high even though the other end must be low. A good height for antenna in residential districts is from 40 to 60 feet. If this height cannot be conveniently had a lower elevation will give results, but remember that other things being equal, the higher the antenna, the louder the signals and the greater the distance over which stations can be heard.

There is practically no advantage of two or more parallel wires for receiving. The disadvantages are that more rugged supporting fixtures are required, considerable more installation work represented, and greater cost in extra wire. It is a better expenditure to put this extra money and labor toward the proper supports to hold one wire at a greater height.

The length of the antenna is the chief factor in governing the natural wave length, especially in single wire type. The natural wave length is the wave length of the total antenna system from ground connection up through the lead in wire to the far end of the main antenna wire, and not including any coil in the circuit.

Natural Wave Length

The antenna wire has a certain capacitance C to ground and the total length of the antenna represents a certain inductance L, both of which combine to give the so-called natural wave length. The natural wave length of a single wire antenna may be approximated by multiplying the length (ground to far end) in meters by 4. The natural wave length should be slightly less than the lowest wave length that will be received. Amateur transmitting stations operate on 200 meter wave and the receiving antenna should preferably be designed to include this wave length.

Applying the above method of approximation backwards, we can divide 200 meters by 4 to get the total length, which is 50 meters or about 165 feet (1 meter = 3.28 feet). This means the total length of wire from ground connection to the far end of the antenna. Thus, if the lead in or vertical portion is 50 feet, and the ground wire is 10 feet, the horizontal portion should not be greater than 105 feet in order that the total length described does not exceed 165 feet.

Good Average Size Antenna

A good average total length for the antenna is from 125 to 165 feet which enables reception of 200 meter stations. Adding more capacitance or inductance in the receiving set the receiving wave length will generally extend up to 600 or more meters, thus taking in amateur, broadcasting, commercial and ship station wave lengths. Much shorter or much longer antennae will give results but the above are good recommended dimensions.

The antenna should be insulated well from its supports. This is quite important, especially to insure good results during damp, rainy weather. About the simplest insulator for the receiving antenna is a standard 3/4-inch porcelain cleat having a glazed surface. The antenna wire may be fastened in one end hole of the cleat and the supporting wire or rope in the other end hole, thus giving about 2-inch of porcelain between as insulation.

Two cleats may be used in series to give twice the insulation. These cleats, however, are not very mechanically strong and should never be used where a falling antenna wire would be serious, such as when the antenna is hung above telephone or electric light wires entering a house or where the wire spans across a street or roadway. In such cases the insulators should have a good factor of safety in mechanical strength. Moulded or composition insulators are generally recommended by Radio manufacturers.

Insulation of Lead In

The lead in wire coming into the house must pass through a suitable porcelain bushing or insulating tube. This tube may be put through a narrow strip of wood, which, by lowering the top sash an inch or so, will fit between the top sash and the top of the window casing. This

is recommended where the landlord objects to having a hole made through the sash.

The antenna should preferably be spaced well away from or at right angles to electric light wires and telephone lines so that these circuits will not cause a "hum" to be heard in the receiving set. Also for best results, it should not be close to large metal objects, such as steel frame buildings, metal roofs, steel towers, etc. If the antenna is supported by a tree at either end, the insulators should be far enough out from the tree to keep the branches away from the antenna wires in a wind storm. Also the lead in wire should be so arranged that wind will not blow it in contact with objects. When using a tree for support be sure that enough slack or sag is allowed so that the backward sway of the tree during high wind will not break the antenna wire. One simple method of caring for the sway is to use a pulley and sash cord with a weight on the end of the sash cord which will be heavy enough to just keep the antenna wire reasonably taut.

Size of Wire to Use

The antenna wire may be of any size, but a good size is about No. 12 or No. 14 B. & S. gauge, corresponding to .081 inch and .064 inch in diameter respectively. The wire may be either single conductor or standard cable, and should be bare, that is, have no insulation. The presence of

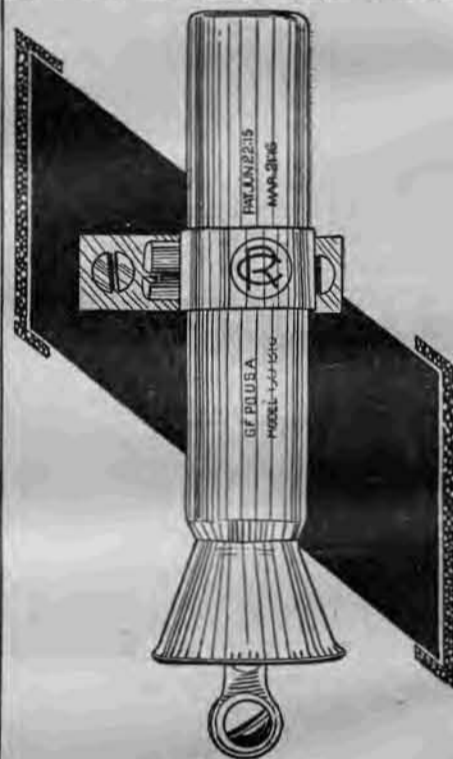


Figure 3

insulation does not affect the results but the bare wire is cheaper. Aluminum or phosphor bronze wire may be used but copper has better conductivity than either of the other two. Copper clad steel wire is very suitable. The steel core of such wire gives increased tensile strength and the copper affords good surface conductivity. The wire must be strong enough to withstand the weight of sleet. All joints or connections in the antenna wire should be soldered so that the oxidation and corrosion caused by exposure to weather will not destroy the conductivity of joints.

Direction of Antenna

The longitudinal direction of the receiving antenna wire has in general slight effect upon results but noticeable improvement in strength of signals is claimed for the antenna which has the far end pointing in the opposite direction from the transmitting station to be received.

Figures 1 and 2 show single wire receiving antennae.

The receiving set must be connected to a good ground. This is just as important as a good antenna. Connection to the steam radiator system or to gas pipes gives fairly good results. The best ground connection can be had on the cold water pipe supply preferably as near as possible to the point where the pipe enters the cellar from the street. It is difficult to solder the ground wire to a cold water pipe and therefore a small ground clamp is recommended for making the connection. These clamps can be bought at Radio supply stores at a small cost. The water pipe must be well scraped all around at the desired place so that the metal is bright and clean. Adjust the clamp at this bright spot and clamp it tightly. The clamp is provided with a detachable terminal to which the ground wire can be carefully scraped and then clamped securely under the lock nut.

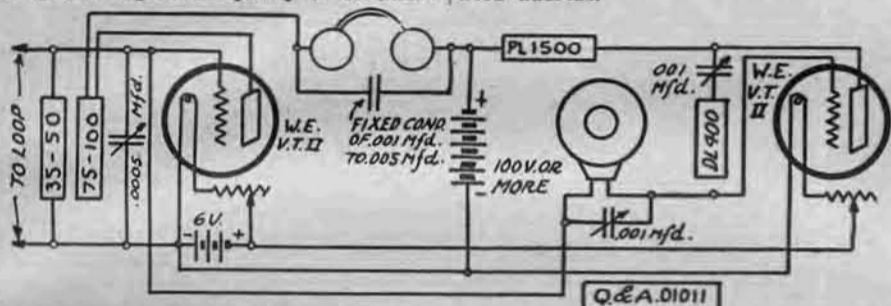
The size of the ground wire should (Continued on page 15)

Questions and Answers

Pickard Super-Regenerator (01011) WAW

Attached is a circuit showing the exact position of each piece of apparatus for Pickard's Simplification of the Super-Regenerator. My coils, tubes, condensers, etc., are all in perfect condition. They are mounted on 10 x 22 inch board, used as an experimental panel. All connections are No. 14 hard drawn copper wire and all leads are soldered.

At times the second tube oscillates O. K., but something seems to be wrong with the detector circuit as I can hear stations five blocks away only about as loud as I ordinarily hear on one tube. When the set was oscillating I could hear NSS and WSO and other long wave stations. The condenser across primary coil had no effect on tuning. The grid battery (3v) killed all signals when connected. When this battery is connected an audible squeal can be heard without phones connected. This evidently comes from the first tube and the frequency of this squeal varies as you change the capacity of condenser



between grid and plate of second tube.

I have retraced my wiring against your original circuit but it seems to be O. K. As I intend to use this set for demonstration purposes I would appreciate it very much if you would correct my copy of wiring in red ink and return it as soon as possible. The tickler coil variations make no difference in tuning.

A.—I suggest that you lay DL 1250 down so as to be at right angles to DL 250 and DL 1500. Also try a DL 400 in place of the DL 250 now in use. The DL 400 has 11 millihenries inductance and is a better value to use for this circuit.

You will note many corrections on your circuit. On this page you will find the corrected circuit.

In case grid bias batteries are necessary, insert them in the leads to the grids just before the tubes. Hardly think you will need them with WE, VT-II tubes. Please note relative positions of various D. L. coils used. See that turns of tickler and primary (or secondary if pri. is used) D. L. coils are running in same direction. Use very close coupling here. See August 12th number, also. Pages 6 and 7 contain matter of interest to you.

Locations of Stations (783) SM

I have been reading your paper for some time and wish to ask some questions.

1. Would you please give me the name and address of the owner of Radio station WCX at Detroit, Mich.
2. The name and address of owner of station WCAX at Burlington, Vermont?
3. Have you heard of a station owned by the Burlington Gazette, Burlington, Iowa, and what are their call letters?

A.—1. Detroit Free Press. You won't need address.

2. University of Vermont, Burlington, Vt., will get them.

3. No. Have no record of such a station as yet.

Wave Length Too High (371) PLW

For some time I have been trying to receive concerts from KDKA, WWJ, etc., but have not met with much success due to the terrible static or rumbling of some sort.

I have absolutely no trouble in receiving the different station whistles, which are very clear. My greatest trouble after getting the music is trying to clear it from induction or whatever it is.

The aerial I have is 230 feet long with

shows a protector of the vacuum gap type. The antenna lead in wire is connected to the bottom terminal, while the ground wire is connected to the terminal on the side of the clamp. With such an arrangement the induced or other atmospheric effects on the antenna are rendered harmless to the Radio set, the building and the operator. It is good practice, however, to avoid using the receiving set during severe local thunder storms.

MAKING WAVEMETER (Continued from page 13)

vacuum tube type, the tube in oscillation will furnish sufficient current in the entire receiving circuit so that measurements can be made.

Another method would be to connect a buzzer to a battery as shown in Figure 7. It is advisable to connect a .001 mfd. fixed condenser between the coil and the vibrator as illustrated. If the sound of the buzzer is too loud in the receivers, making it difficult to adjust the condenser for maximum sound intensity, then place the wavemeter coil further away making the coupling weaker. The amateur must realize that the sound test will not be as accurate as the ammeter would be.

Every amateur with a receiving set containing a variable condenser has a wavemeter without the calibrations. This is illustrated in Figure 4. The inductance should be fixed or complications in scale calibration will be encountered.

Measuring Inductance and Capacity

The wavemeter can also be used for measuring the inductance of coils or capacities of condensers. In the hook-up shown in Figure 8, either the condenser or the coil may have an unknown value. The other must be known. The buzzer is used to excite oscillations in the circuit. The wavelength is measured. With the wavelength and either L or C known, the other can be found very quickly.

For example: The known inductance is twenty-five microhenries. Using the wavemeter the wave length is found to be 600 meters. By substitution in the formula

$$C = \frac{W^2}{3,553,000 \times L} = \frac{600 \times 600}{3,553,000 \times 25}$$

= .004 microfarads.

In using the wavemeter for such measurements care must be taken to keep the wave length values within the range of the instrument. A little judgment must be used in selecting the known values for inductance or capacity so that this conductor may be adhered to.

insulators placed 12 feet away from steel poles that are 30 feet in height, over 35 foot buildings. My lead in wire from aerial to set is approximately 75 feet long.

The wire I tapped on to the aerial about 18 feet from one of my insulators. I may also state that this lead in wire goes through a wall covered on the outside with tin, (of course through a porcelain tube), then through other wooden partitions to my set.

My set is a Westinghouse R A type with detector and two stages of amplification. I am using a 6-volt A battery and two

22.5-volt Burgess B batteries. My connections to set are exactly as was shown in your RADIO DIGEST of Saturday, May 6th.

If you can advise me of any way to overcome this awful rumbling I shall be more than pleased.

A.—Your aerial has too great a natural wave length. Cut it down to about half its present size. Are you near any power lines or stations? If so run aerial at right angles to such lines. Reduce length from 230 to 150 feet.

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A San Francisco theater equipped with a transmitting outfit gave a first showing of a film which was starred by Miss Gloria Swanson. The star is shown receiving the good news of the approval at the studio in Hollywood.

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A chief detective, Clifford Grant, at his post in Washington, D. C., broadcasting reports on stolen automobiles to nearby towns. In this manner the authorities are able to co-operate on crime detection.

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What more could this up-to-date fisherman want? While waiting for the fish to bite he listens-in on the Radio, using his motor in the rear for his ground connection. This vacationist, William Nigey, was caught fishing on the Belgrade Lakes in Maine.

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