THE NATIONAL RADIO WEEKLY

RADIO WORLD

APRIL FIRST 1922

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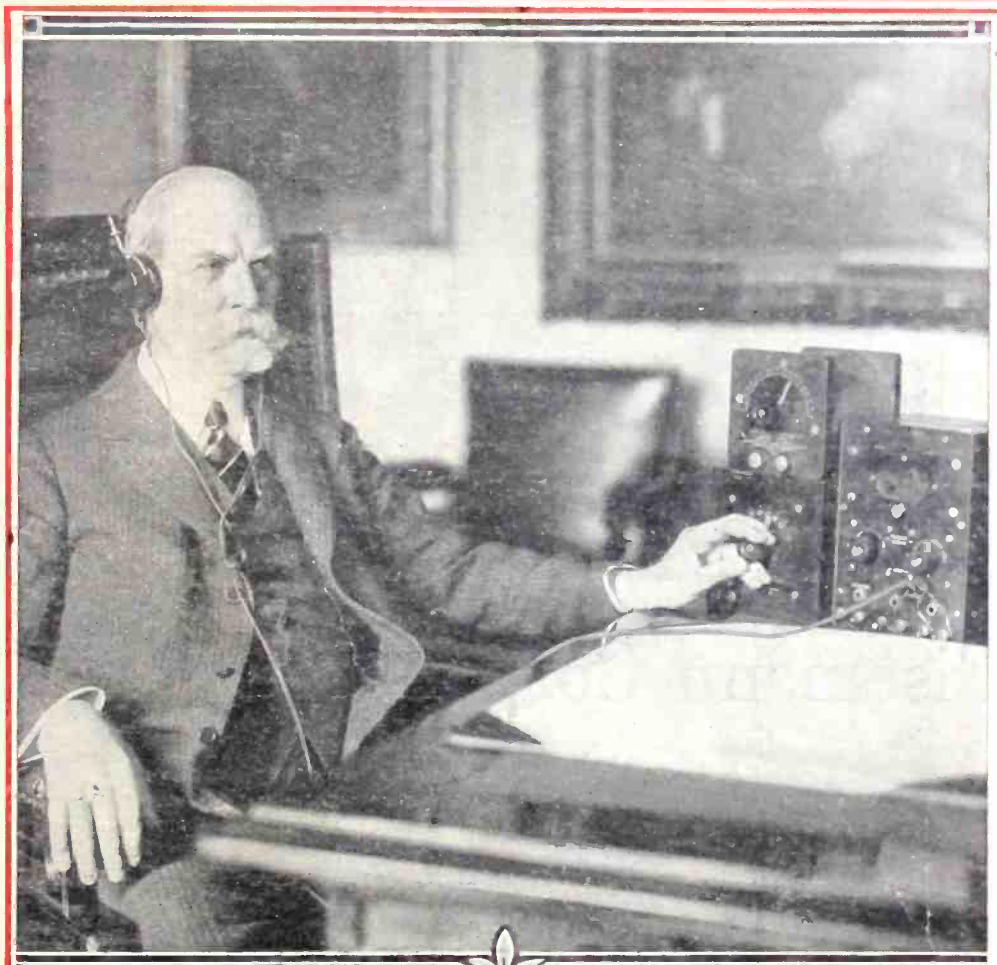


RADIO AT THE STATE DEPARTMENT

Secretary of State Hughes using a government receiving set at his desk in the State Department at the Capitol, Washington, D. C., Reproduction of a special pose taken while Secretary Hughes was actually listening in.—

RADIO PRIMER

For Beginners Starts In This Issue

SPECIAL ARTICLES

by

O. C. Roos (Fellow I. R. E.), Fred. Chas. Ehlert, E. L. Bragdon, Emerson Gaige, and others, including Radio World's staff of experts.

See illustrated article on 2nd Annual Radio Show

Many technical and human interest pictures.

The MARVEL OF RADIO

Have You a Marvel in Your Home?

The "MARVEL" is the lowest priced complete crystal wireless telephone receiving outfit on the market having a wave-length range of 180 to 2600 meters. It sells complete all ready for installation for the small sum of $15.00. It can be set up by anyone all ready for operation in 20 minutes. Not one additional part to purchase. No previous knowledge of wireless necessary—no license, batteries or source of current whatever needed. This $15.00 "MARVEL" is the junior wireless telephone receiving set of other sets made by the Freed-Eisemann Radio Corporation, and selling up to $5,000.00. Although the junior as we say, it is made in the same workmanlike manner and of the same tested and proved material as the higher priced Freed-Eisemann apparatus.

The complete outfit, model 105, consists of a "MARVEL" highly efficient receiver, mounted in a handsomely finished mission oak cabinet, 150 feet of solid copper wire for antenna, 25 feet of insulated wire, 5 porcelain insulators, a 1,000 ohm telephone with leather covered headband and a telephone cord, antenna switch, ground clamp, extra "MARVEL" Radio crystal, codechart, abbreviation chart, and complete simple instructions for installation and operatio.
Nothing else needed **$15.00**

Model 110, same as above, but with a 2,000 ohm double headset **$18.00**

DEALERS: We have some interesting information for you on these nationally advertised outfits. Write us to-day.

Built by the same engineers who designed apparatus now used by the U. S. Navy

Freed-Eisemann Corporation

Formerly Radio Manufacturing Company, makers of Highest grade government and commercial high and low power wireless apparatus. From $15 to $5,000 per set.

255 Fourth Avenue, New York City
Dept. RW

$15.00
COMPLETE

RADIO WORLD

A WEEKLY PUBLICATION, PUBLISHED EVERY WEDNESDAY AND DATED SATURDAY BY RADIO WORLD COMPANY, FROM PUBLICATION OFFICE, 1493 BROADWAY, NEW YORK, N. Y.

Vol. I. No. 1. April 1, 1922 15c. per copy, $6.00 a year

Radio World's Salutation

Radio, in all its varied and marvelous aspects, is the most widely discussed thing in the world today.

Progress in radio is so great and all-absorbing that it is impossible to keep up with it in anything except a weekly publication devoted entirely to this one subject—Radio.

Hence—RADIO WORLD, the national illustrated weekly.

It is perfectly obvious that a weekly newspaper, fresh off the press every seven days and up to date in all its departments, and appearing on the newstands within sixty hours after last page is closed, is required in a field that has grown so immeasurably during the past ninety days and which is by all odds the most interesting scientific and business proposition of the day.

RADIO WORLD, the only weekly in this wonderful department of business, scientific and amusement activities, is published for the purpose of supplying an immediate need. RADIO WORLD will be profusely illustrated, and will be for sale on all news-stands.

RADIO WORLD will cover thoroughly from week to week, all those matters affecting radio fans, as well as the more highly specialized interests represented by the dealers in and manufacturers of radio goods.

Here are some of the regular departments of RADIO WORLD, some of which are in this issue, others to be added immediately:

A Primer for Beginners, Problems Solved, Tips to the Fan, Question and Answer Dept., News and Gossip of Radio Societies and Clubs, Radio Merchandising, Arguments for Radio Salesmen, How to Correct Your Troubles, New Inventions, News From Foreign Lands, Weekly Broadcasting Programs, Radio Personalities, etc., etc.

In addition there will be special articles of interest and value from men who know their business and who know how to express their ideas.

A special effort will be made to guide the hundreds of thousands of new enthusiasts who have begun the study and practice of radio, and who are coming into the game hour by hour. These newcomers form a tremendous army of men, and women, too, who will want instruction, advice, and friendly help. We place RADIO WORLD at their disposal. Our Editor and contributors will endeavor to assist these beginners, as well as to cater to the wants and interest of that legion already engaged in the fascinating science and pastime. We pledge ourselves to do our best to be helpful, while not forgetting that it is necessary also to be interesting at the same time.

This makes a pretty big order for RADIO WORLD, but we accept it with the knowledge that such a paper is needed, that we have the experience, the knowledge, the confidence and the ambition that count for so much if success is to wait on intelligent effort.

RADIO WORLD is to be a weekly paper of service to the radio public, the manufacturer, the jobber, the dealer, and everybody interested in the eighth wonder of the world.

THE EDITORS.

Maj.-Gen. Geo. Owen Squier

Chief Signal Officer of the U. S. Army and Friend of the Radio Amateur

GEORGE OWEN SQUIER, Maj.-Gen. and Chief Signal Officer of the U. S. Army, was born at Dryden, Mich., March 21, 1865. He was graduated from the United States Military Academy, West Point, N. Y., in 1887 and was then appointed second lieutenant in the 3rd Artillery; appointed first lieutenant, June 30, 1893; commissioned captain, United States Volunteer Signal Corps, May 20, 1898; lieutenant colonel, United States Volunteer Signal Corps, July 18, 1898; honorably discharged from volunteer Signal Corps, December 7, 1898; first lieutenant, Signal Corps, United States Army, February 23, 1899; commissioned captain, United States Volunteer Signal Corps, April 17, 1899; honorably discharged from Volunteer Signal Corps June 30, 1901; commissioned captain, Signal Corps, United States Army, February 2, 1901; major, Signal Corps, United States Army, March 2, 1903. Commanded United States Cableship Burnside, 1900-2, during laying of Philippine cable-telegraph system; delegate to International Radio Telegraphic Conference held in London, England, 1912; United States Military Attache at London, England, 1912-1916, when he was recalled to organize the air service of the army.

On February 14, 1917, he was appointed Chief Signal Officer of the Army, with the rank of Brigadier General; he was appointed Major General, Signal Corps, United States Army, October 6, 1917. Served as representative of the War Department and technical advisor to the American Delegation at the International Conference on Electrical Communications, Washington, 1920; represented the Department of State at the sessions of the Provincial Technical Committee of the International Conference on Electrical Communications, Paris, 1921; designated an Expert Assistant to the American Commissioners representing the Government of the United States at the Conference on Limitation of Armament, Washington, 1921; appointed an ex-officio member, representing the War Department, of the United States National Committee, International Electrotechnical Commission.

Soon after his graduation from West Point in 1887, General Squier was sent for duty to Fort McHenry, at Baltimore. While there, he looked around to see how he could best employ his time. Physics was his popular delight and he soon found that the greatest physicists in this country were close at hand—in Johns Hopkins University. For four years he attended Johns Hopkins and studied under the great scientists Rowland, Remsen, and Newcomb, and not only made lasting friendships with these men, but also laid the foundation for the inventions that have brought him to the front of the world's scientists.

Among some of the important contributions that he has made to science are his researches in the electrochemical effects due to magnetization, the sine wave system of telegraphy and ocean cabling, the polarizing photo-chronograph, tree telephony and telegraphy, multiplex telephony and telegraphy over open circuit bare wires laid in the earth or sea. He is probably best known for his invention of "line radio" popularly known as "wired wireless" which made multiplex telephony possible and ranks as one of the great inventions in telephony.

In 1896 the City of Philadelphia, acting on the recommendation of The Franklin Institute, awarded the John Scott Legacy Medal and premium to him, for the polarizing photochronograph, and in 1912 The Franklin Institute awarded to him its Eliott Cresson gold medal, then the highest award of its gift, for his work in multiplex telephony and telegraphy or "wired wireless."

On April, 1919, General Squier was elected a member of the National Academy of Sciences in recognition of his contributions to science. May, 1919, he was awarded The Franklin Medal, by The Franklin Institute, Philadelphia, Pa., in recognition of his valuable contributions to physical science, his important and varied inventions in multiplex telephony and telegraphy and in ocean cabling, and his eminent success in organizing and directing the Air and Signal services of the United States Army in the World War. July, 1919, he was decorated with the insignia of the Order of Knight Commander of Saint Michael and Saint George, by Field Marshal Sir Douglas Haig, at London, England. September, 1919, received the Distinguished Service Medal, United States Army, for exceptionally meritorious and distinguished service. March, 1922, awarded the Italian decoration, Com. of Order of the Crown. Maj.-Gen. Squier is the amateur's friend.

The Tuning of Signals

After the detector and amplifiers are adjusted, the signals desired are "tuned in," by varying the inductance and the capacity of the receiving circuits. Where a separate primary and secondary circuit is employed, the beginner frequently makes the mistake of using too tight a degree of coupling, which increases the likelihood of interference from other stations. To pick up a signal, a moderate degree of coupling should be used, and the tuning of both primary and secondary heard; the coupling should now gradually be loosened, and at the same time the tuning of primary and secondary be slightly readjusted for maximum strength. It will generally be found that, with a proper degree of loose coupling, interfering signals and strays may be diminished, without reduction in the strength of the signals to which the apparatus is tuned.

Where a single circuit tuner is employed, the tuning of the desired signals is greatly simplified, by the absence of coupling and secondary circuit adjustments. In one well-known make of single circuit tuner, both the inductance and the capacity of the tuning circuit are varied simultaneously, by means of a single adjustment; other makes of single-circuit tuners are adjusted to the desired wave by varying the inductance by steps, by means of a tap switch, and then by careful variation of the tuning condenser.

The Washington Conference

There has been no official announcement from Washington of the rules and regulations applying to amateurs up to the time this issue of RADIO WORLD goes to press. The experts are still conferring with Herbert Hoover, Secretary of the Department of Commerce, at Washington. Readers of RADIO WORLD may be certain that they will find all the results of this important conference in these columns as soon as it is possible to give them authoritatively and in detail.

Radio World's "Hall of Fame"

George O. Squier
Major General, United States Army,
Chief Signal Officer of the Army.

The Radio Primer

The A. B. C. of Radio For the Novice Who Wants His Facts Put Plainly and Tersely

Radio Definitions

AERIAL—Referring to a number of wires so arranged as to receive electrical waves.

ANTENNA — Same as above. Heinrich Hertz, discoverer of electric waves, used this term.

ALTERNATING CURRENT—A current which changes its flow periodically. Alternates.

ALTERNATOR — An electric generator for producing alternating current.

AMPERE—The unit of measurement of the strength of an electrical current.

AMPEREMETER—A device or instrument for measuring amperes.

AMPLIFIER—A vacuum tube which adds local energy to the incoming signal.

AUDIBILITY — The measurement of the strength of the incoming signal.

AUDION—An exhausted vacuum tube containing three elements namely: filament, grid and plate.

(See our next issue for definitions in B.)

Wave Length

The electrical frequency of oscillation producing the radio waves is generally defined in terms of wave length, i. e., the calculated length in space of each wave, expressed in meters. Wave length thus indicates electrical quality only, and in itself is no measure of the distance to which a signal can carry. It so happens, however, that very powerful transmitters are best adapted to operate on long wave lengths, while lower powered stations can employ the shorter wave lengths more effectively. Thus, for trans-atlantic and long distance communications by high-powered stations waves from 5,000 to 25,000 meters are generally used. Large spark stations with ranges up to 1,000 miles or more generally employ wave lengths from 1,500 to 3,000 meters. Commercial ship and shore traffic is assigned the fixed wave length of 600 meters. A wave length of 485 meters is reserved for weather and market reports by non-governmental stations, and all radio concerts are assigned the wave length of 360 meters. General amateur stations are restricted to 200 meters or less. For special amateur traffic, and for work between experimental or technical training stations, other waves above 200, but below 600 meters, are granted by the government. It is seen that most of the signals of general interest are sent out on wave lengths below 600 meters, and can, therefore be copied efficiently on so-called short wave receiving sets. An exception is the nightly telegraphic broadcast from the government station at Washington, which includes time signals, weather reports, and press news, all on a 2,500 meter wave length.

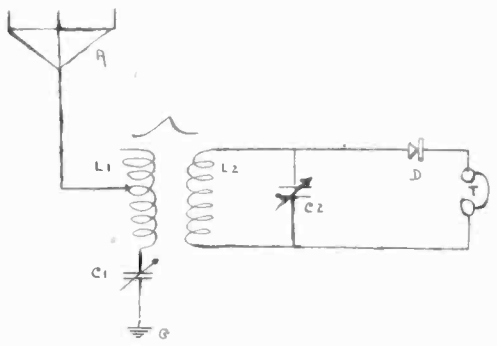
As to Range

By "normal range" of radio telegraph or telephone transmitter is generally meant its dependable daylight range, under unfavorable conditions (local lightning storms excepted). Under favorable atmospheric conditions signals carry considerable further. At night, ranges of many times the normal daylight range are often attained.

Two Circuits Any Amateur Can Work

Fig. 1 shows an inductively coupled crystal receiver which shows L1, a primary winding and C1, a variable condenser.. The antennae circuit may be tuned by means of the variable coil L1 and condenser C1. While the coupled or secondary circuit may be tuned to resonance with the primary or antenna circuit by means of the coil L2 and the condenser C2. This secondary circuit is shunted by the detector D in series with the telephone receiver T.

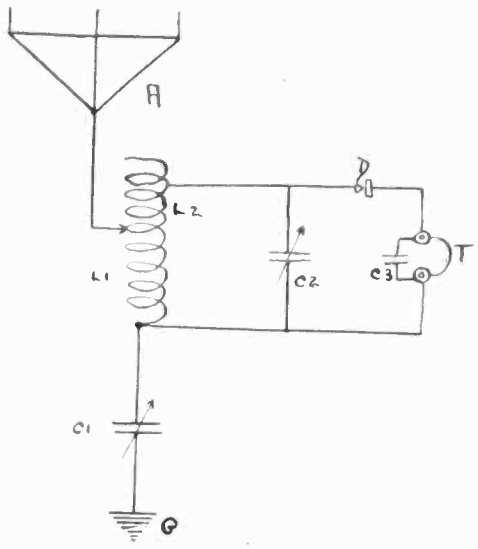
The coupling may, of course, be made as in Fig. 2, by means of a common coil. The primary and secondary circuits, considered independently, are seen to be the same as Fig. 1 not possessed by that of Fig. 2. There is the possibility of changing the relative positions of the coils L1 and L2 thus altering the coupling without changing the actual inductance of either circuit. Also, various combinations of capacitive and inductive couplings are, of course, possible, but are not shown here. The sound in the telephone receiver is frequently improved by shunting the couplings with a condenser "C3" of suitable capitance as in Fig. 2.



An inductively coupled receiver

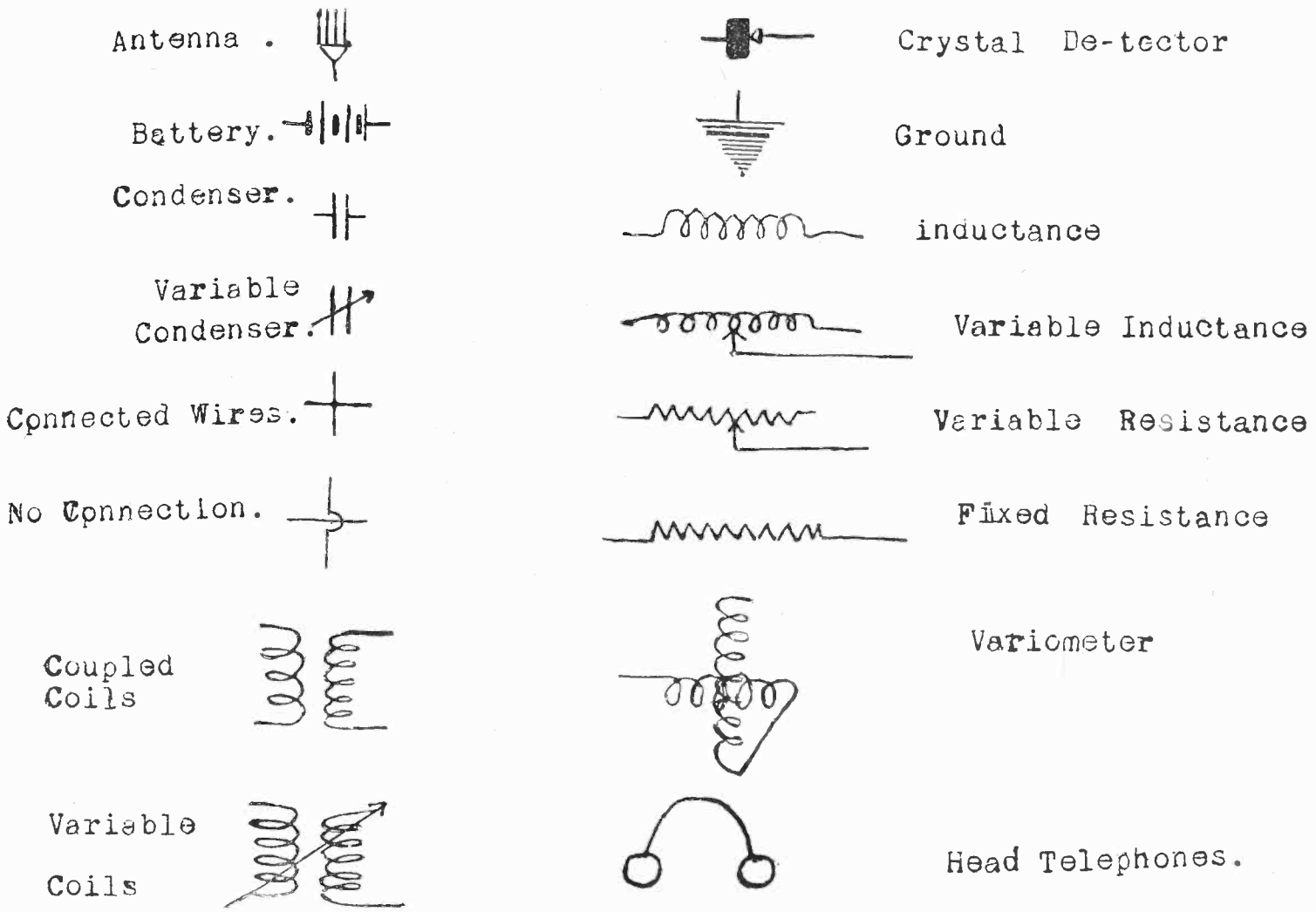
The operation is as follows:

Consider one half cycle of the high frequency rectified current. During the period of its duration the current flows through the detector "D" Fig. 2 and the telephone receiver winding T, and charges the condenser S; during the next half cycle of the oscillation, no current flows through the detector "D.", the condenser S, however, being short-circuited by the telephone receiver, will discharge through the latter and the resulting current in the receiver will be in the same direction as the current of the impulse. There is thus, during each wave train, a more continuous attraction on the telephone receiver diaphragm, with resulting improved audibility. The use of a coupled tuned circuit in receiving signals will have a great effect on eliminating interference.



A conductively coupled receiver

Radio Symbols at a Glance



What is radio? Here are the different symbols used in the circuits of today. If the amateur follows out these symbols he will be able to read and check up all circuits, so that he will understand them.

Transmitting Equipment

Complete radio transmitting sets are on the market, at various prices. A complete spark or continuous wave telegraph transmitter may be assembled by the experienced amateur at a cost of $100 or more, depending on the range to be covered. Owing to its higher efficiency, freedom from noise, and its sharp wave, the continuous wave transmitter is gradually replacing the old spark type of transmitter.

Methods of Signalling

There are several methods of radio signalling in use at the present time: Damped wave telegraphy (Spark), radio telephony (Phone) modulated or interrupted continuous wave telegraphy (MCW or ICW), and continuous wave telegraphy (CW). All but the last one of these methods may be received with any kind of crystal or vacuum tube detector. The reception of continuous wave telegraph signals, however, is accomplished with an oscillating vacuum tube circuit, and is generally not practicable with a crystal detector.

"Fading" of Signals

At nighttime it sometimes occurs that signals from distant stations "swing" badly, or vary in intensity from one moment to the next. They may gradually become weaker, and even fade out entirely, and then reappear with varying intensity. This phenomenon is known as "fading" or "swinging" of signals, and is believed to be due to certain conditions of the atmosphere. Stations within reliable daylight range are seldom or never observed to fade appreciable. If signals from various stations heard appear to fade or swing simultaneously, the receiving set should be suspected; in this case the cause is frequently an exhausted filament or plate battery. The condition of the "A" (filament) battery is indicated by the filament brilliancy attainable or with a storage battery hydrometer, while the "B" (plate) battery units are tested by means of a voltmeter, and should be replaced if the voltage per unit does not come within one volt of the normal value. An irregular hissing or frying noise is frequently another indication of an exhausted "B" battery. Watch for it.

Telegraph Signals

Of general interest are the accurate time signals sent out twice daily by the high powered station at Washington, D. C. (Arlington), as well as by the station at Great Lakes, Ill., and by other naval stations. For those able to read them, the messages in the continental telegraph code will always retain their fascination. Press news, weather and market reports, commercial, ship and shore traffic, and various amateur messages are some of the telegraphic signals which may be overheard anywhere. While most telegraphic messages are sent at a fast rate of speed and are not intelligible to the novice, certain signals are sent more slowly, and thus afford good practice to the beginner, or one who is not a thorough expert.

With equipment especially designed for the reception of long-wave signals from several European as well as Pacific stations are quite commonly overheard almost anywhere in the United States. With the exception of a few high-priced sets, the tuning coil for long waves will also efficiently receive the ordinary short-wave radiophone signals.

A 500-Mile Radio Phone Employing a 5-Watt Tube

By Frank A. Hahnel---Station 2BUA.

I have had many inquiries from different amateurs who have heard me transmit voice on phone, requesting details regarding my set, and from others who ask "How do you do it on one 5 watt tube?—I am sure, therefore, this would be interesting to amateurs, everywhere, who contemplate installing a C. W. or phone set.

Having experimented for many months in the transmitting of voice I found that I could radiate .7 ampere on a single 5 watt tube, which was very neat looking, but I could reach only 50 miles. This was not satisfactory to me, so I reconstructed the set, using another circuit. This was very satisfactory, although I could radiate only .1-amp. more than the first circuit, but it carried much further, using the following hook up:

With the above diagram, I received perfect modulation and reached a distance of 500-miles on voice. During my conversation with station 3ZY, located at Washington, D. C., I was heard by station 3CZ —at Toronto, Canada, and reported as follows: "Jan. 5, 1922—Voice copied at 1:30 A. M. Heard your 5 watt tube, when working station 3ZY. Some stunt for radiation of .8 amp. The party receiving this was using a short wave regenerative set, and 2-stage amplifier."

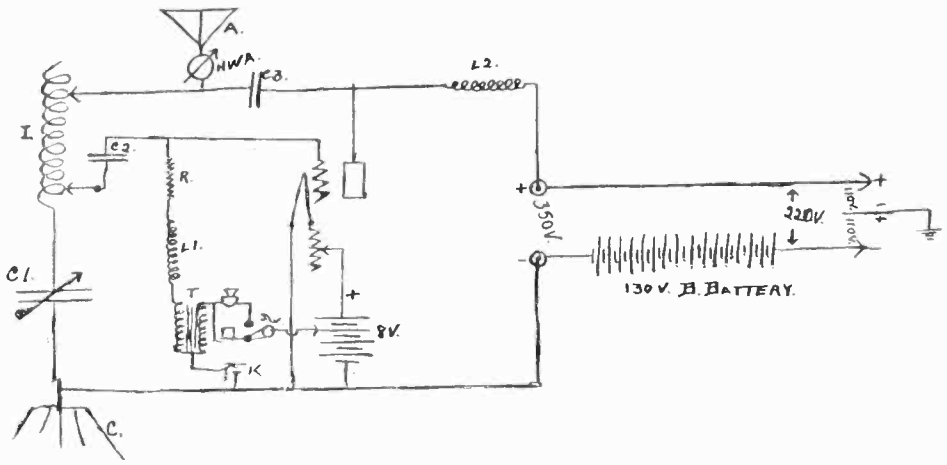
Other stations, such as 3ZY report, as QSA. "Almost fell off the chair when you stated you were using one 5 watt tube radiating .8 amp. Heard every word you said clearly and distinctly."

Other stations I have worked by voice are reported very QSA. were stations 1AJP-Bridgeport, Conn. 1QN-New Haven-3HJ-Richmond, Va. Canadian 3CZ-& 3 ZY-Washington.

You will note on circuit shown that I am using 220v. D.C. of the house current and 130 volts "B" Battery. This gives me 350v. D.C. for the plate. Those having direct current can use this by connecting to the two outside wires of a 3-wire main fuse block and then connecting the 130 volt "B" Battery in series. Iron core chokes are not used in this circuit, as perfect modulation is assured without them. Those having A.C. current can use a motor generator set or a transformer and rectify it, but then iron core chokes will be necessary.

As a modulator transformer I am using a ½" spark coil, as this gives better modulation, with the circuit shown. Inductance I is wound with 40 turns of No. 16 gage copper wire, on a 4-½" Bakelite tube, tapped every 2 turns. Aerial is of 4 wires 35 ft. long, with a 70 foot lead-in. Counterpoise is of 1-wire, 200 ft. long, and at the farthest end is about 35 ft. higher than the aerial proper.

When trying out this hookup, do not get discouraged at first results, but be positive that condensers are of right capacity, aircore chokes of right resistance, and set properly tuned, as one tap on inductance will make considerable difference, as the set will not oscillate. With my set, made according to diagram, you will soon have an answer to the query. "How can you do it on a 5 watt tube?"



C1-Variable condenser. 62-Fixed condenser .0005 MFD. C3 Fixed Condenser .005 MFD.R-Grid resistance 2500 ohms. L1-Air core choke 100 turns No. 28 D. C. C. L2-Same as L1. T-Modulation transformer or half inch spark coil. I-Aerial inductance 40 turns No. 16 copper. H. W. A.-Hot Wire ammeter 0-1 amp. C-Counterpoise. K-Key.

Radio and the Country Clubs

Radio World March 20, 1922
1493 Broadway,
New York City,

Gentlemen:

Q. Several members of our Club are very much interested in radio. Will you please advise us as to the advantages a Country Club would derive from installing a good radio outfit, its approximate cost, just what equipment is necessary, and any other advice or suggestions you think will be helpful?

Yours truly,
F. C. Wilcox,
Chairman House Committee

There are many Country Clubs, that already have radiophone receivers. Their members derive much enjoyment from listening to the various broadcasting stations of the country. News, market reports and various other items, are being broadcasted every evening, besides the fine talent of vaudeville entertainers. There are several different types of receivers on the market today. We would advise you to have your set installed by one of your members if some technical knowledge or some well-known concern. One important point to make clear to you is be sure you purchase a regenerative receiver having its wave lengths variable from 200 to 2500 meters. A two-step amplifier with a loud speaker is recommended as the signal strength will be in volume and rendered from a large horn, instead of the troublesome head set.

Prices range from $15 to $300. It must be remembered that results will usually be in direct proportion, to the amount spent on the set, and an old rule applies to the radio game, as well as to any other—you cannot get something for nothing, in radio or anything else.

Answers to Correspondents

The Editors of RADIO WORLD will be glad to answer inquiries from readers. In sending a letter of inquiry, be sure to add your name and address legibly. Write on one side of sheet only. Address letters to Inquiry Editor, RADIO WORLD, 1493 Broadway, New York City.

Radio As Aid To World Commerce

By A. G. Cruikshank

Edward J. Nally, known as head of the Radio Corporation of America, and one of the greatest authorities on radio communication, gives voice to very interesting and valuable ideas regarding the future of this science. Too many still regard radio telephony as a plaything to be classed with the phonograph. Those who are familiar with its possibilities know how much more is to be done to introduce a new era of communication between the furthermost points on the world's surface. Mr. Nally's opinions are from a viewpoint not often presented to the public at large. His purpose is to show the newly developed science as an auxiliary to commerce rather than to stress the more familiar keynote of the "wonders of wireless," which have been the subject of many articles in the press.

The single fact that radio communication is the one medium capable of placing isolated communities in instant touch with the centres of civilization has a boundless appeal to the imagination. That, too, it has forever ended the vast silences of the sea further adds to its romances. However, until it becomes a general household utility, it will probably remain in the public mind as something very mysterious.

The underlying reason for the rapid strides it has made is not because of its romantic, intangible or mysterious nature. Its important postion in the field of communication is due solely to its utility, and its combination with the three essentials of accuracy, speed and economy.

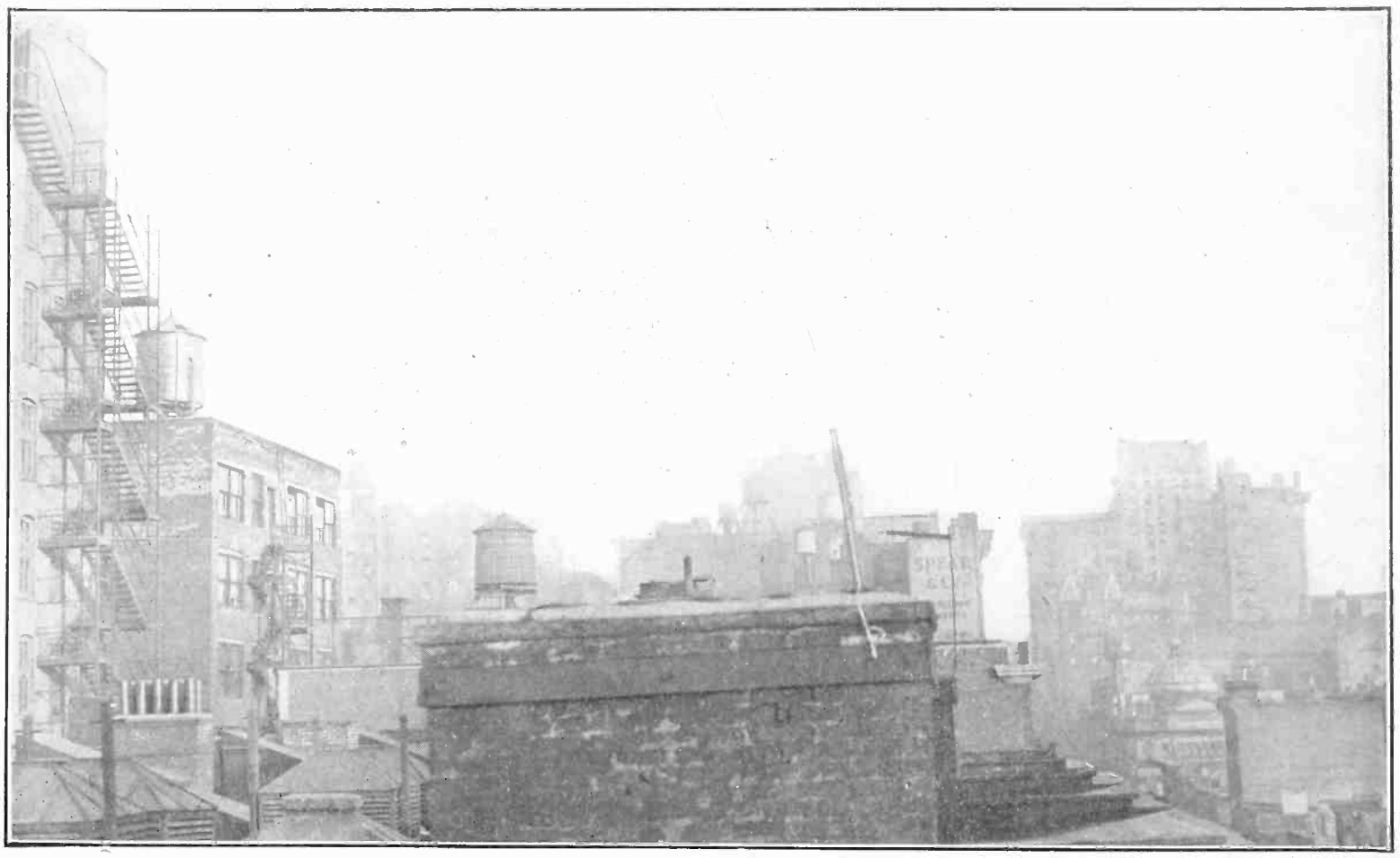
In addition to providing mariners with weather reports, storm signals and warnings of possible dangers to navigation, it enables passengers at sea to keep in touch with world affairs and with the movements of commerce and industry. Daily news bulletins are published on practically all of the ocean going vessels and transactions of great magnitude and of momentous importance are being carried on constantly between ship and shore through the medium of radio communications.

In its international application, radio is today carrying overseas a very material percentage of the world's communications. Radiograms, commercial and social, aggregating millions of words annually, are being sent daily across the Atlantic and Pacific oceans.

Another great advantage possessed by radio is what might be termed its universality, with reference to communication with several distant points at the same time. This was illustrated on the occasion of the formal opening of radio central, a super-powered station of the Radio Corporation of America, located at a point on Long Island about sixty-five miles distant from New York City. President Harding threw a switch in the White House, and a message which he prepared for broadcasting to the world ran through a mechanical transmitter and the words, carried by land wire to radio central, were flung into space without the intervening agency of a human hand.

The first answer came back instantly. Others followed close upon it. Acknowledgments were received from such widely scattered points as Norway, Germany, France, Italy, England, Belgium, Sweden, Hawaii, Canada, Cuba, Japan, New Zealand, Panama, Colombia, Costa Rica, Nicaragua, Honduras and Australia.

A Simple and Practical Aerial



View of a practical aerial installed by a New York City amateur on the roof and which any amateur can work.
(c. Keystone View Co.)

"Tell Me, Please, How Far Will This Set Receive?"

A Story of the Little Things That Add Mileage to Receiving Sets

By E. L. Bragdon

THE other day a radio enthusiast down in a remote part of Texas reported hearing code messages from the far-off German station at Nauen, known to long distance listeners by its call letters POZ. The stunt itself is not so much. Many amateurs are doing the same thing almost daily. The portion of the Texan report that lifted an eyebrow here, and brought forth an ejaculation of wonder there, stated that in picking up the foreign station a simple galena crystal detector was used.

Contrast with this feat the discouraging efforts of fourteen-year-old Charlie in the Bronx of New York City who has been trying in vain to hear those wonderful concerts from nearby Newark, only twelve miles away. Charlie, too, has been using a galena detector. Why, then, does one receiving set have a range a thousand times greater than the other. With all the world, his wife and their children seemingly interested in radio, it is about time that this problem was brought out into the open and examined, analyzed and settled.

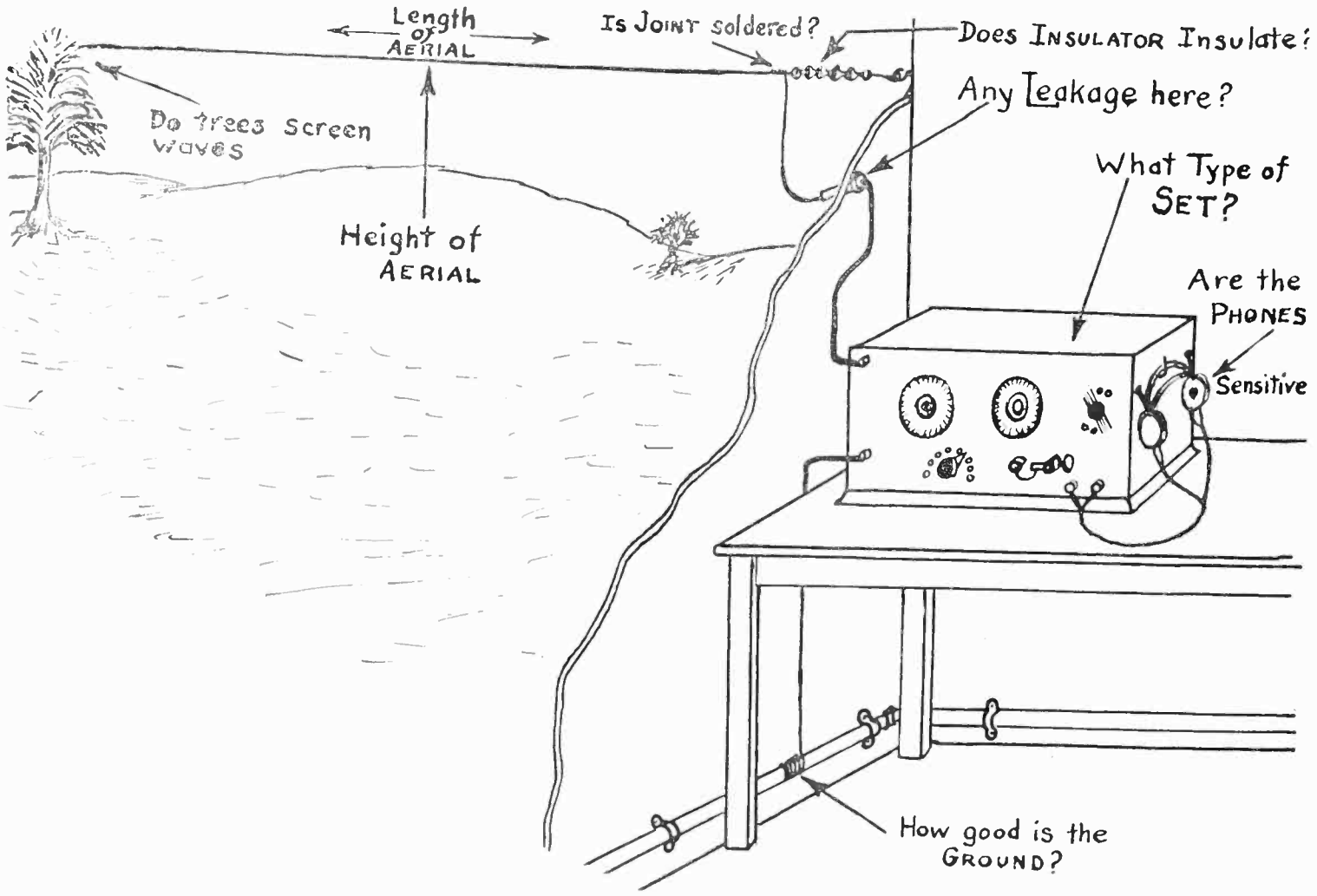
As far as I know the subject has never been scientifically investigated, but it is a pretty safe guess that no salesman sells a wireless receiving out t without being asked that fundamental question, "How far can I hear with this set?" The salesman knows somebody who knows somebody whose friend has one of the outfits and this friend has heard a concert 87 miles with it. So he answers, maybe, "Oh, you ought to hear 75 to 100 miles." That is where all the trouble starts.

The purchaser takes the set home, puts up his aerial according to instructions on page three, last paragraph, hooks the lead-in wire to the post marked "aerial," the ground wire from the post marked "ground" to the radiator, snaps on his head phones and listens. Too frequently he listens, listens and listens. He hears a beautiful buzz but there's no signal to it; it's continuous. He hears, also, the contactors break on a nearby elevator panel and *they* do sound like signals, but as for the concerts, music, speeches, the air is totally dead to them. But—the salesman said the set would receive up to 100 miles and the purchaser is only 20 from WJZ. What's the trouble?

So much for introduction; now to plain talk. Neither transmitting station nor receiving station has any such thing as RANGE. The range can no more be figured than the age of Ann or the length of a section of string. That is the first point on which most of us trip.

Just how far a radio telephone transmitting station can make its program carry, depends on the power used, the kind of night, the time of year, the skill of the transmitting engineer and lastly, but most important of all, on the quality of the receiving station. Which brings us to the heart of our trouble.

A receiving set consists of that lonesome wire on the roof, a secondary wire connecting the aerial with the receiving set, the layout of instruments, the ground connection and the human being with the phones. Five factors in all and each one as important as all the others lumped.



A Typical Receiving Station Layout with Arrows Pointing to Parts that Influence the Receiving Range. Few Stations Can Pass This Test with 100%

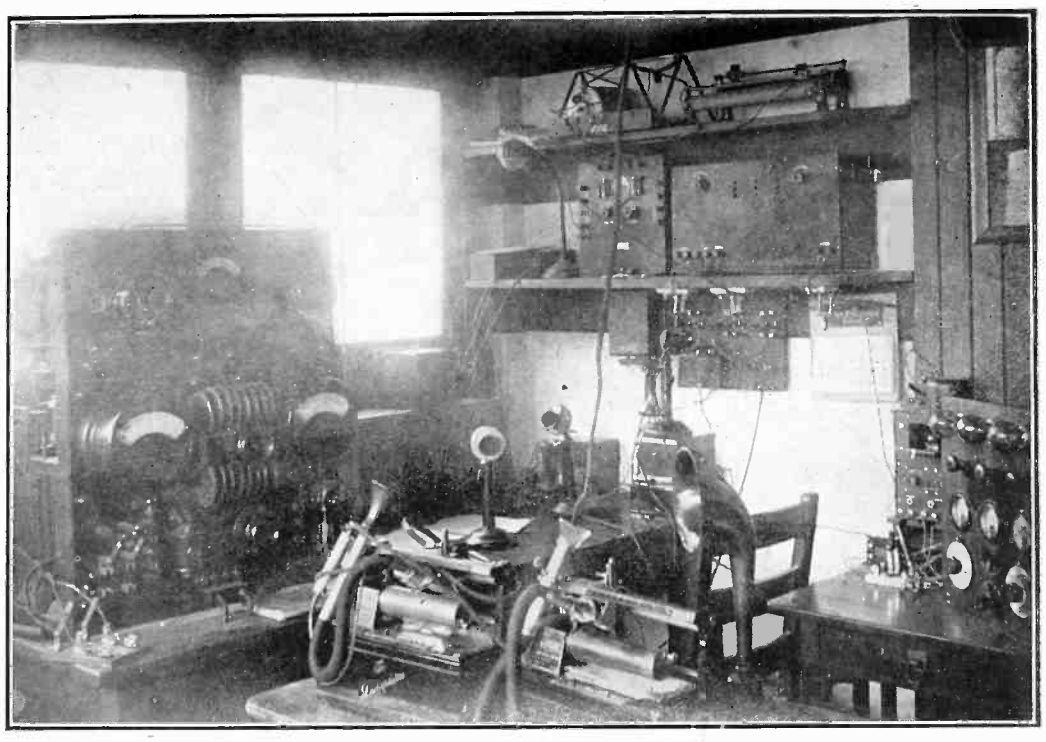
Medical Service By Radio

The Radio Corporation of America announces that, in co-operation with the Seamen's Church Institute of New York ,and the United States Public Health Service, free medical advice to ships at sea is now available.

The Federal health authorities had entered into negotiation for the purpose of placing the service on a national basis, with the result that the Radio Corporation of America, with its great layout of coastal stations, agreed to handle this medical service for all vessels.

Vessels desiring medical advice can secure prompt service by addressing radiograms to the following stations: Chatham, Mass. (WCC.) Siasconset, Mass. (WSC.) New York City, N. Y. (WNY.) and Cape May, N. J. (WCY.).

The medical advice given by the stations mentioned should be phrased in language (English) intelligible to a layman.



Radio Medical Station of Seamen's Church Institute, 25 South St., New York City, showing loud speaker on right, with dictaphones to record the message.

(*Continued from preceding page*)

If four out of five are in perfect working order, with the fifth lagging behind, the set is at 50 per cent or less of its efficiency. The whole is no better than its worst fifth.

Perhaps the best way to become convinced of the need for thorough perfection in receiving sets is to take the factors in order and point out the possible weak spots, just as a health examiner probes and punches and reports, so that you may keep an eagle eye on the most tricky places.

First the aerial: the wire should be as high as it is possible to make it. If height cannot be obtained, then the length must be made greater. With both height and length curtailed the effective range of the set is materially lessened.

The aerial must be lifted above all trees particularly those near it. Branches are parasites of wave energy. If the aerial is over a roof the clearance should be ten feet or more, otherwise the effect of the roof surface will be the same as if it were the ground surface and the antenna only a few feet above it.

After the aerial comes the leading-in-wire. If this is soldered to the aerial some of the already depleted energy of the wave will be used up in changing from one wire to the other unless the joint is soldered and made electrically perfect. And the making of a good joint is an art. Then, following down the "lead-in" through the wall by means of an efficient insulator we come to the receiving apparatus.

How far, now, will the set receive? Well, we have already noticed a half dozen points where the energy may be lost before it ever reaches the set to be detected. So that, right up to the first binding post of the tuning coil, there have been opportunities for the wavelets to depart before meeting the set with "the hundred mile range." And not one of the faults can be laid at the door of the apparatus. Which provides us with the first chance to ask this other question "How can a set *have* a range when the waves are not allowed to reach it to *give* it a range?"

There is nothing gained by detailing the other weak spots in the receiving station. Each one of them is a potential wrecker of ranges. There is the poor crystal with few sensitive molecules; there is the poor ground connection on the radiator pipe; there are the cheap and often unsatisfactory head phones; and there is the so-called operator.

After considering all these points it is possible, even if not permissable to make a formula for the receiving range of any set, as follows:

The receiving range of a receiving set is equal to

the Power of the Transmitting Station plus the design quality of the receiving set minus the poor aerial, poor ground, poor adjustment and plus or minus the operator.

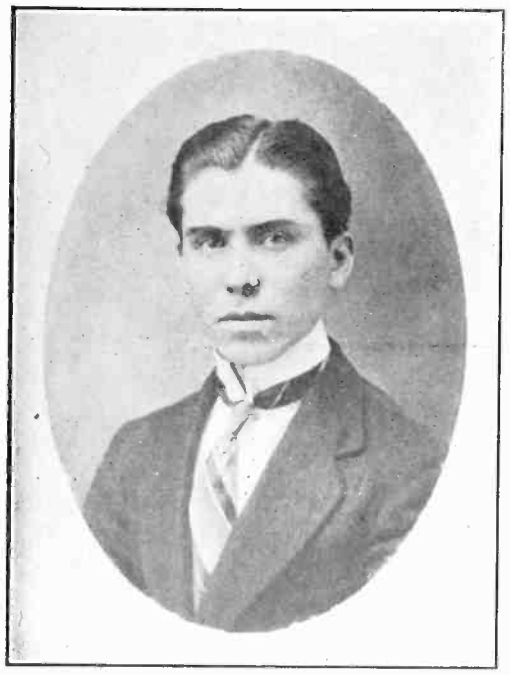
Translated, this equation reduces to the fact that there is no such thing as a receiving range. The one and only way to determine the type of set needed at a certain point is to locate another amateur and study his conditions. If they are similar to those in mind, a similar set can be used. But if conditions are different, resort must be had to the old reliable "cut-and-try-again" method.

The man who has plenty of money to pay for a set need not be bothered by these limiting factors. He can afford to install a set with reserve power; but the amateur who wishes to purchase the lowest priced outfit consistent with results to be obtained must consider them seriously and set off, one against the other, the advantages and disadvantages of his location and the excellence of the various parts of the installation.

That receiving set in Texas that eaves-dropped on POZ might be a total fizzle if transported to New York City, while little Charlie's disappointing outfit in the Bronx might well startle the world if set up in Texas.

Probably the only real, dependable range of a receiving set is the wide range of its possibilities, and no one can tell how good or how bad they will be until the set has been actually tried out under conditions exactly similar in every respect to those where the purchaser lives.

Radio Championship Won By Chilean



Jose M. Seron, of the Radio Corporation of America

A new world's record of 49½ words a minute for the reception of the Continental code by wireless has been made by Jose M. Seron, of the Radio Corporation of America. B. G. Suetter, wireless operator of the New York "Times" radio station, who held the former record for two years, finished second.

Seron, with three errors in his copy, was a slight margin ahead of Suetter, who received the same number of words a minute but with four errors. George Otten, of the Radio Corporation of America, had five errors. Three other men in the final of the contest were Bernstein, of the Eastern Radio Co., C. C. Henderson, of the Radio Corporation, and J. G. Smythe of the Western Union.

Seron will receive a cup as the winner while Suetter will receive a gold medal, and Otten a silver medal.

The Faces of Amateurs

Radio World will be glad to receive pictures of radio amateurs for an important group of portraits now in preparation.

Send your portraits , with name and address written on back, (cabinet size, preferably, whether taken in a studio or posed with instrument) to Editor, RADIO WORLD, 1493 B'way, New York City.

Run On Radio Books

The public libraries are experiencing a run on their books referring to radio telephony. Numbers of libraries have a long waiting list averaging ten to fifteen names for each book.

Do Not Fear Intelligent Regulation

By Emerson Gaige

Some years ago there was a great deal of apprehension on the part of a few pioneer automobile owners when the various government bodies decided that regulation of motor cars was a necessity. A hue and cry was raised that it would mean the retarding of the development of automobile transportation.

It is evident today that this fear was not well founded. It can hardly be said that the development of automobiles has been retarded by government regulation.

The same holds true in wireless. Intelligent regulation on the part of the government will, in all probability, do more for the advancement of wireless telephony than any other step that can be taken. If it comes to a point where thousands of amateurs are sending forth into the ether any kind of sounds or messages on any wave length, there would be little opportunity for those inclined to experiment for the betterment of the industry, to attain success,

The United States Govenment well realizes that a great deal of the credit for the wonderful advances in radio has been due to the fact that any man. woman or child in any city or hamlet has been able to experiment in wireless telegraphy to their heart's content. The acknowledgment of this fact has been made by France in only recently removing the restrictions on amateur radio operations in that country. "Freedom of the Air" is necessary for radio development.

It is not to be expected that the United States will place restrictions upon the amateurs that will prohibit their experimenting and operating along lines that will leave plenty of room for improvement and development. The radio amateurs should cooperate with the government in whatever manner possible.

She's An Expert

Miss Mary Moley, of New York City, has become an expert operator. She is shown here taking down weather reports over her phone (c. by Keystone View Co.)

A Wireless Kiss From Mid-Atlantic

A kiss, wave-length unknown, traveled from some five hundred miles out on the Atlantic Ocean to a young woman in Brooklyn, N. Y., recently. Its twin, eluding all the frontier guards, traveled back over the Atlantic ocean to the steamship "America" straight to the man it belonged to.

There is nothing scientifically new in sending a kiss by wireless, for anyone who can send a kiss over the ordinary telephone can send it through the ether. However, it remained for Hugo Estburg, chief radio operator of the "America," and Miss Ranghilde Anderson, of 629 Vanderbilt Avenue, Brooklyn, to actually accomplish the deed. The "America" sailed on a Saturday for Bremen and on Monday, Chief Estburg called up Miss Anderson via wireless. At the close of their conversation the wireless kisses were exchanged.

Over in London

A handy little pocket wireless, the shape and size of a pocketbook. The small aerial can be slung over a lamp post. Photo shows a girl regulating her watch from the Paris time signals which she is receiving. (c. Keystone View Co.)

Radio World's Notice To Daily Papers

In order to increase the interest in the radio field, the publisher of Radio World hereby grants full permission to daily and other papers to reprint the material in this issue, without restriction as to length, except when contents bear a special copyright line, but with the request that the usual courtesy of reprint credit be given this publication and the writers, whose names appear over articles.

One of the most remarkable evidences of the way the radio field has attracted and held the attention of the millions, is shown by the daily newspapers. Every newspaper in the country is, of course, devoting some space to radio matter because it figures in the day's news, but many of them have gone still further by starting regular radio departments. All this is grist to the mill The more space and attention the American press gives to radio, the greater will become public interest and the more far-reaching will be the results.

Radio has been likened to the motion picture in the matter of quick growth—except, of course, that radio, in its latest broadcasting developments has forged ahead faster than the motion picture ever did during any period of its growth. Years of motion picture activity and progress were required before the daily papers paid much attention to it, and in fact, it is only within recent years that papers like the New York "Times," The Chicago "Tribune," and others in their class deigned to carry a motion picture heading over their reviews or news notes.

In order to help along the radio proposition and to aid everybody connected with it in any capacity whatsoever, RADIO WORLD announces here that radio editors everywhere may use material from its columns. It can be readily seen that a paragraph or an article in RADIO WORLD that reaches the eyes of, let us say, 100,000 to 200,000 people. thru this paper (as more than one person sees each copy) would eventually be seen by a total of millions, according to the number of papers that use this material thruout the country.

We consider this a matter of so much importance that this permission is hereby granted until further notice, except as noted in the foregoing.

Hints On Purchasing Good Receivers

After the beginner has surveyed the radio field, he may be so mixed up and dizzy that his mind is not fixed upon any specified type of receiver.

There are two receiving sets on the market at present, and they are commonly known as the crystal set, and the set that employs a vacuum tube or audion. Both of these receivers will receive both spark and telephone messages. Still, there are none that will simply just receive telephone. However, with the better class of receivers made today, tuning is so sharp that the undesired spark stations can be easily eliminated.

The present market has quite a number of different types of crystal receivers, which are simple for the beginner to adjust, but remember, these sets will only bring the music in for short distances, as the receiver is what is termed Non-Regenerative.

At the present time there are many beginners complaining about interference from other stations and most of this can be laid to the crystal receivers, as they do not tune sharply. Remember that interference is our great difficulty of today, as there is no such thing as having the air clear entirely for broadcasting purposes.

The regenerative set is far superior to the other type just mentioned and will bring in the signals much louder, but the great advantage of this type of receiver is that, with the aid of a step or two of amplification, we can tune our circuits to such a degree of efficiency that we can eliminate most of the stations undesired. A loud speaker can be easily used on this type of receiver.

When purchasing a receiver of this type (regenerative) be sure and ask the salesman for a set that tunes from 200 meters to at least 2000 meters or above — the higher the better — as some broadcasting stations are working on much higher wave lengths than others. It is wise to get a receiver that will work on the wave lengths mentioned. Any particular set cannot be recommended as there are good ones and bad ones, cheap and expensive ones, but the old saying applies to radiophone receivers just as well as any other—you cannot get something for nothing. Think before you buy.

Fire Fighters at the Wireless

How firemen of No. 9 truck of Jersey City spend their leisure time.
(c. Keystone View Co.)

Short Cuts In Receiver Circuit Design

By O. C. ROOS (Fellow I. R. E.)

The Engineering Dept. of RADIO WORLD is designed to reach the earnest student who is not afraid of simple tables, curves or even a bit of algebra. There are certain facts that can not be mastered by cut-and-dried methods. Many a budding experimenter has never successfully run the gauntlet of hard facts and figures leading to the haven of the professional designer.

A discouraged experimenter will never "bone" to become a designer. There are approximately 50,000 enthusiasts capable of analyzing a simple receiving circuit. Hence the following series of articles.

Have you ever figured out a set of wavelengths for a new combination of coils and condensers—only to have it "way off" the expected range? I should say that 75 per cent of the sets designed by the beginners themselves would justify this experiment being called a failure.

To design a set to range from 250 to 3,000 meters and to find that its actual range is from 300 to 3,200 meters causes a shock.

The shock has occurred so frequently to most students of radio design that they have become hardened to it and make allowances for the exceptional lengthening of the smallest wavelength and the reduction of the instrumental range as shown above. In this case it was calculated to be a 1 to 12 instrumental range in wavelength, but alas, it turned out with an actual range of 1 to 10. In other words, the expected range has been cut down 17 per cent by some ever-present cause.

Well, what can we do about it? The answer is simple: stop and examine the elements which are essential to a tuned circuit and then look around for unexpected opportunities given them to act, which have not been considered in calculating the range of the instrument.

To go to the root of the matter at once, it may be stated that the condenser effect of the wiring in the instruments for radio work is at the root of 95 per cent of this kind of trouble, in spite of the fact that the wiring adds an inductance or coil effect to that already given by the coils. This inductance effect of the leads is, however, small compared to the above condenser effect of the leads. It does not in itself appreciably change the actual behavior of the set from that calculated for it.

Let us glance over the elements which go to make up an instrument passing from, say, 200 meters to 24,300 meters in four coils or with three "taps" on the same coil and with a condenser whose maximum capacity is 20.25 times its zero or minimum capacity. We will omit the question of efficiency or damping for the present.

Suppose we ask:

Firstly—How many elements must we select in this problem, so that, knowing them, we shall be able to design *accurately* any set with a variable condenser and a set of coils or else a set of changes in inductance? The answer is, there are five elements and no more. Knowing any three we can determine the other two at once.

To obtain the first, experimentally proceed as follows: Keep the inductance of the radio circuit constant and vary the condenser. The smallest wavelength in the 200-24300 meter set will go about 4.5 times (we find) into the largest wavelength. This ratio is very important and is called the condenser wavelength ratio. It is denoted by the letter "g." If it is squared it equals the condenser capacitance ratio 20.25; since the wavelength increases as the square root of the capacitance, and is denoted by the letter Rc. Capacitance is the standard word used among radio engineers for denoting the ability of a condenser to store electrical energy. Its popular forms is "capacity," but you might as well start right.

To obtain the second element, we proceed in the opposite way, by keeping some particular condenser setting fixed throughout the experiment and by changing the coils or "taps" on the inductances. If the instrument is to be well designed we shall have to make each step a certain constant ratio with the previous one as a standard—this saves wire.

Hence with four coils or three coil changes we get 3x3x3 or 27 times the wavelength obtained with the first coil. This ratio for the coil-change is called the coil-change wavelength ratio and is very important. It is always less than "g," the condenser wave length ratio and is denoted by the letter "h."

Applying "g"=4.5 and "h"=3 to the above wave meter we start at 200 meters and apply g *once* this gives a maximum of 900 meters with the first coil. Applying h three times we get 24300 meters, which is what the instrument should reach.

If we had cared to examine a similar receiver ranging from 200 to 8100 meters we could have used three coils instead of four. Then, starting with condenser plates all in to give 900 meters we would have two instead off three, so that 900 multiplied by h=3=9 gives 8100 meters, which checks. We are still ignoring the wiring, remember.

The third element is obvious, as it is the number of inductances used and is denoted by the letter N. The number of inductance-changes are, of course, one less than this or N-1. In the above examination of a 200-24300 set N-1 therefore has a value of three.

The fourth element is found experimentally by dividing the longest possible wave by the shortest, or in the above case we have the quotient of 24300 = 121.5. This is called the total wavelength ratio and is denoted by the letter RA. It tells the actual range in terms of the shortest wavelength *whatever that is.*

The fifth and last element is called the "overlap" and tells how much of the condenser range is used *twice* in passing from one inductance to another. Some overlap is necessary to avoid a "break" in the wavelengths receivable by the instrument. It is no use to have an instrument read from 200 to 900 meters by varying the condenser and then, when a new coil was put in, to start a second range exactly at 900 meters. There would be no "overlap" for tuning at 890 meters with the first coil in! as it would be too near the end of the scale.

The actual "overlap" between Range 1 and 2 in meters is the difference between 900 meters, the maximum of Range 1 and 600 meters, the minimum of Range 2. This value, 300 meters, is divided by Range 1, which is 900 meters, minus 200 meters, or 700 meters. The percentage overlap divided by "v" is thus 300-700, or about 43 per cent a good value. It will be found that Range 4 and Range 3 have this identical overlap, as well as the other ranges.

We may now write down two expressions which connect all five of the above elements for radio design:

$$Rt = gh—N-1 \quad \ldots\ldots\ldots \quad (1)$$

(The total range) equals (the condenser wavelengths ratio) multiplied by the coil-change wavelength ratio taken as many turns as there are inductance changes.

$$v = (g-h) \div (g-1) \quad \ldots\ldots\ldots \quad (2)$$

(The overlap equals the difference between the condenser and inductance change ratios divided by the condenser ratio minus unity. In this case $v = (4.5-3) \div (4.5-1)$ or $1.5 \div 3.5 = 43\%$.

We have already seen that $Rt = 4.5x3 = 121.5$.

Making A Short Wave Regenerator

By Fred. Chas. Ehlert

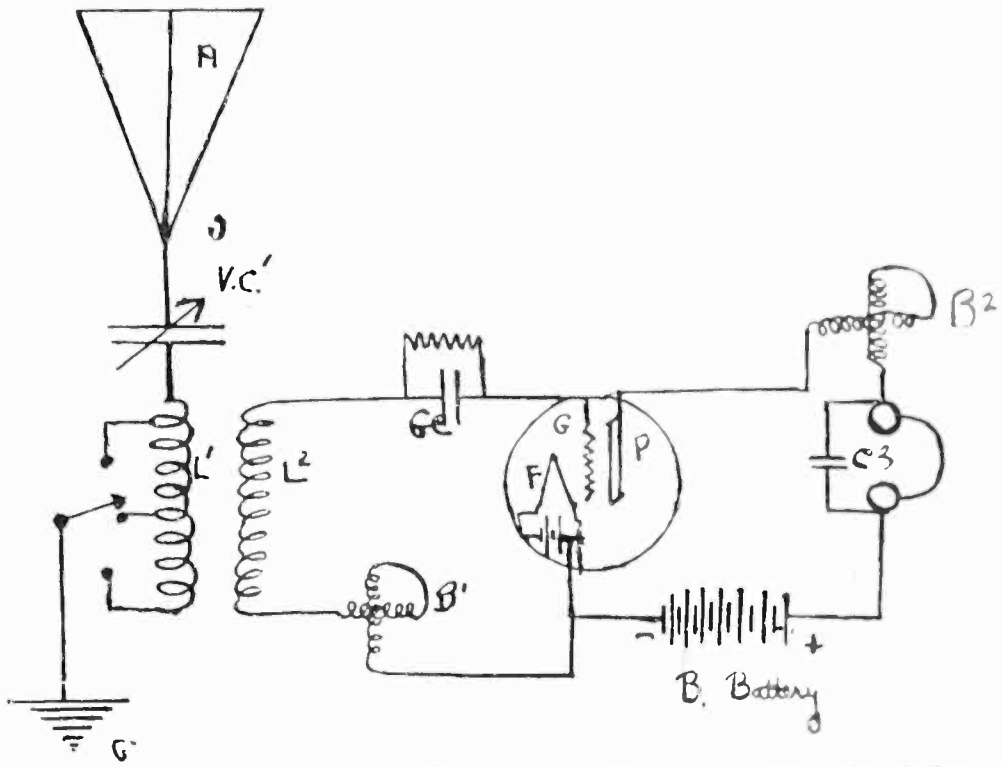
Many radio amateurs experience difficulty in the operation and construction, or assembling of the continuous regenerative type of receiver which is at the present time so popular.

There are many ways by which troubles can be divided: namely, inability to tune to a given wave length, or difficulty in controlling the regeneration effects, an important factor in this type of receiver.

The former trouble is due to an improperly designed circuit and the latter trouble to the plate circuit failing to regenerate. However, this may be laid to improper connections or incorrect plate voltage. This trouble can be overcome by testing out your circuit or by a little experimenting. Tubes sometime give you trouble, as they all have different characteristics which require specific amounts of current for successful operation.

This diagram shows you a regenerative circuit using two variometeres and a variocoupler, and if they can be purchased at any radio shop you can start building your own set.

The assembly is as follows: One .001 Variable Condenser (VC1.) Variocoupler as (L1 and L2 in diagram,) two variometers as B1 and B2, Grid Condenser and leak as GC, "B" Battery, Telephones, Tube and socket, A-Battery of six volts to light filament. Rheostat to control filament, and a condenser as C2.



Efficient circuit employing two Variometers—See accompanying description.

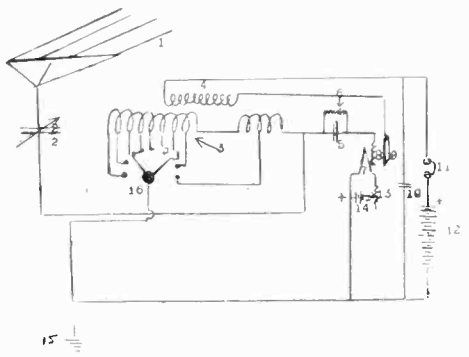
This set when wired up as per diagram will operate on amateur wave lengths and if properly adjusted will give absolute satisfaction. The grid variometer tends to tune the input or secondary circuit, while the plate variometer controls the amplification on regeneration by tuning the output on plate circuit in resonance with the input circuit, thus causing it to oscillate direct, feed-back being avoided in this receiver.

The condenser is a great help in controlling the plate circuit for fine adjustment and acts as a by-pass for high frequency currents. Of course, in picking up stations, tight coupling should be used.

A Simple Regenerative Receiver

This regenerative receiving set employing a tickler coil can be easily constructed by the average amateur.

The primary inductance winding in the aerial circuit should consist of about 160 turns with taps every 15th turn. The capacity of the variable condenser should be of .001 m. f. and the phone condenser of .0005 m. f. The tickler coil, which is in series with the plate circuit, should rotate one half a turn inside, and at one end of the main inductance and should consist of a wooden rotor wound with 60 turns of No. 28 wire. This circuit will receive wave lengths up to about 1000 meters.



Simple circuit with tickler coil.

1. Aerial or Antennae.
2. Variable condenser.
3. Primary inductance.
4. Tickler coil.
5. Grid condenser.
6. Grid leak.
7. Filament of Vacuum Tube.
8. Grid of Vacuum Tube.
9. Plate of Vacuum Tube.
10. By-pass condenser.
11. Telephones.
12. "B" Battery, 22 to 45 Volts.
13. Variable Rheostat.
14. "A" Battery, 6 Volts.
15. Ground.
16. Switch for changing wave length.

Earth May Conduct Radio

Dr. Steinmetz, Chief Consulting Engineer for the General Electric Co., states that under certain conditions radio waves might travel through the ground or the sea easier than through the air.

He considers well founded the supposition that recent performances of low power radio sending apparatus, in transmitting messages to surprising distances, give an indication that the radiations peculiar to wireless transmission passed through the earth as easily as through the air. Such radiations, he said, would accord with accepted electrical laws, as the ground, to which both the sending antennae and receiver set are connected, would act as a return circuit for the current. In like manner, Dr. Steinmetz pointed out that water might serve as a medium for radio conversations between ships, or between ships and land.

Second Annual Radio Show

THE closing of the Second Annual Radio Convention within the glass-inclosed roof garden at the Hotel Pennsylvania, in New York City, marked the ending of the biggest thing of its kind in radio history.

The success of the show which ran March 7 to 11, inclusive, is the more remarkable when it is to be considered that it was arranged for the amateur and dealer, and not for the general public. Casual visitors were amazed to see the vast crowds of people who came to witness the latest developments in this art and science. Despite the thousands that filled the halls, the exhibition was carried out with skill and precision. The next convention will undoubtedly be held in one of the larger exhibition halls or armories in New York City.

So dense was the crowd at times that the police and fire departments took a hand regulating the crowd. At various times, policemen on duty called a halt and no one was permitted to enter until others had left. When the crowds had been thinned out a little, eager fans were allowed to enter in batches, while others went home to return some other evening. It is a notable fact that in the first two days of this year's show more people were turned away than visited last year's show during the whole week.

Among those on hand was J. O. Smith, chairman of the Executive Radio Council of the Second District, and owner and operator of the station 2ZL. Paul Godley, "long distance demon," demonstrated his long distance receiver, while Alexander Lolass and his Chief Electrician, E. W. Dannals (DA) of the American Electro-Technical Appliance Co., claimed the largest assortment of radio apparatus.

There were many features, along the lines of efficient receivers, telephone and spark transmitters, besides what was displayed by the manufacturers of accessories. One of the most remarkable pieces of apparatus displayed at the convention was the Lyradion concert grand, which was built to fill a concert hall with radiophone music. It convinced those who saw it that radio is not a fad. The volume that came forth was amazing.

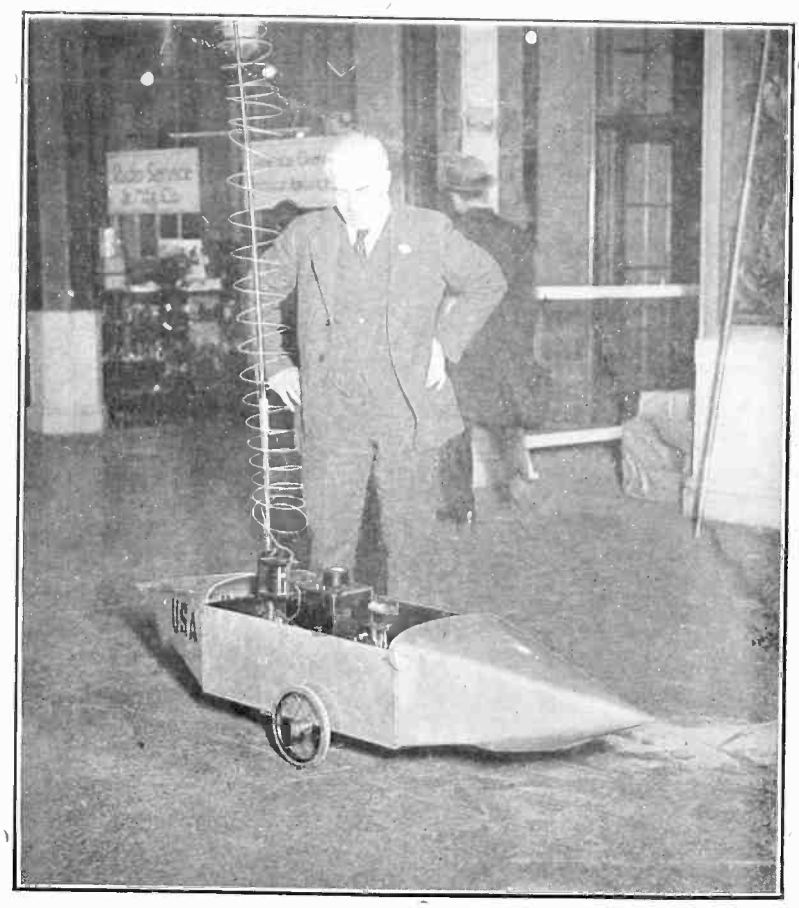
The show concluded with an annual dinner of the amateurs, at which some 1,100 guests sat down. Among the speakers were Prof. Alfred N. Goldsmith, David N. Sarnoff, of the Radio Corporation of America, and Lieut.-Commander D. C. Patterson. Other guests were skilled technical men and expert operators in governmental and business positions in New York City many of them travelling thousands of miles to lend their presence at the exhibition.

It is curious to note thaat the visitors at this year's Show did not represent any particular element of the general public. Men, women and youngsters representing every stratum of society were on hand to prove how general is the interest in everything pertaining to radio. All were animated by the same desire to learn as well as to see and to hear.

A speech made by Paul F. Godfrey, the man who put up the station in Scotland last year for the purpose of picking up the messages of more than a score of American amateurs, delivered an especially interesting address at this show. Mr. Godley said in part:

Whether at peace or war, no nation could possibly possess a greater asset than a great body of radio amateurs—practical young scientists in diligent pursuit of the last word in communication. The story of prog-

The Lyradion Concert Grand, built to fill a concert hall with radiophone music. Heard at the recent Radio Show in New York.



The first "wireless mailman," the invention of E. D. Glavin of Tuckahoe, N. Y., on view at the Radio Show. (c. by Keystone View Co.)

rict Carries New York By Storm

An innovation at the Radio Show, Pennsylvania Hotel, N. Y. C., was the dance held in the dining room while the music was furnished by radio. (c. Keystone View Co.)

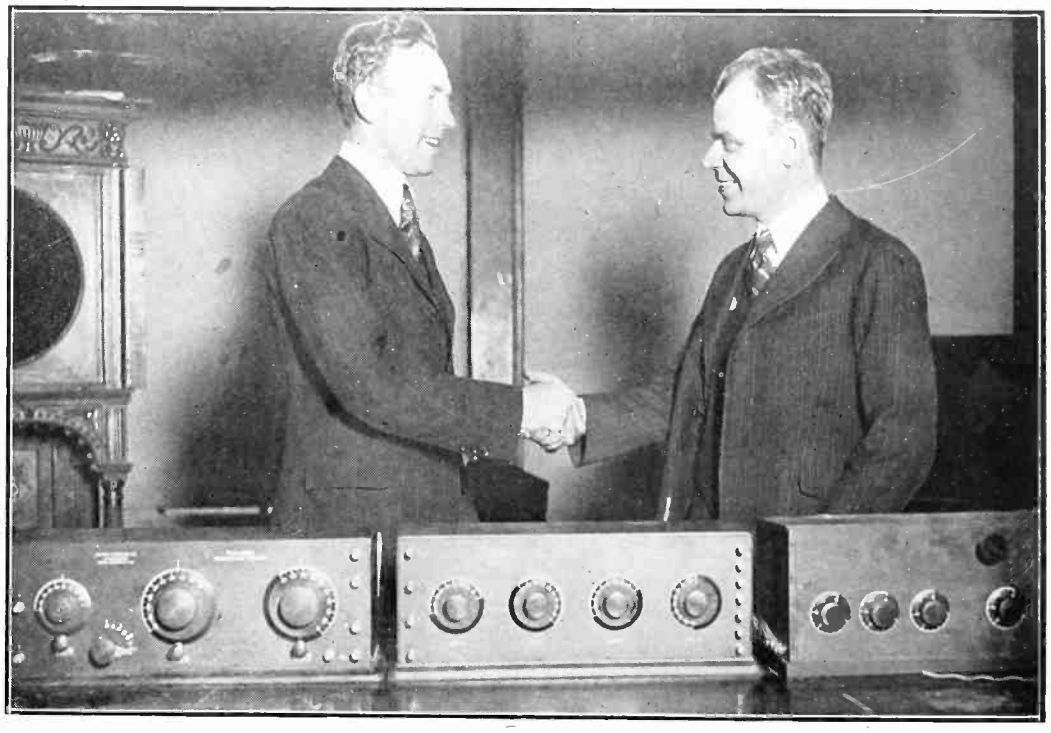
ress in our lifetime is written by communication methods. The high spots in our progress during the next decade are now being reached by radio telephony and telegraphy.

A few months ago the world at large, as represented by the great public, knew very little concerning radio communication methods. As the result of a great love for their hobby, radio amateurs have so perfected these communication methods as to demand the attention of the entire world.

A few months ago only America in the least degree encouraged operation of amateur radio plants. American radio amateurs have rapidly forced all the great nations of the world, as a matter of self-interest and self-preservation, to initiate a policy of encouragement for this sort of work.

Now we have Holland taking every advantage of radio phone broadcasting. Mexico follows with a similar policy. South American republics are greatly interested in the possibilities of this wonderful thing, and only recently, to the great surprise of amateurs in America, France has legalized amateur transmitting and receiving stations in a thorough fashion.

This points unmistakably to that time, now almost here, when the free exchange of private radio communications between the citizens of all lands will occur at more or less regular or frequent intervals. Ready communication is the bond of a nation. This sort of communication will prove a real world bond, too. America may well be proud of the accomplishments of her 30,000 radio amateurs.



Two famous operators meet at the Radio Show. Jack Binns (right), who was wireless operator on the famous "Republic," and Paul F. Godley, who received the first trans-Atlantic wireless phone message. (c. Keystone View Co.)

Pianist Broadcasts Program of Detroit Symphony

By Dixie Hines

It is probable that the first time a complete symphony orchestra concert has ever been broadcasted by wireless was when, in Detroit, at Orchestra Hall, Ossip Gabrilowitsch, the famous pianist and conductor of the Detroit Orchestra, assembled his organization. Before an audience that taxed the capacity of the Orchestra Hall, he gave a full and complete program which filled not only the hall but the air as far as the radio carried with Mendelssohn's "Calm Sea and Happy Voyage," with which the program was inaugurated, and thereafter the regular program, as scheduled, was given exactly as it had been planned. Tschaikowsky's Sixth Symphony was the principal number, and when the concert was ended a new chapter written in musical history. Director Gabrilowitsch, as well as the entire orchestra and Arthur Schnabel, the soloist, were accorded enthusiastic ovation.

"For the first time in the lives of many who possess these receiving instruments they heard a symphony orchestra," Mr. Gabrilowitsch remarked, "and it will mean a lot to the musical education in the future if this policy is continued."

The experiment was made under the auspices of a Detroit newspaper and the following day more than a page was given over to wireless message received by it from every part of the country, the oceans and many foreign countries.

Pathe News Reel to Use Radio

Emanuel Cohen, representing the Pathe News, a picture news service, has completed arrangements with E. F. Albee, head of the B. F. Keith Vaudeville Circuit, for what is claimed will be the most elaborate radiophone circuit in existence. A new wireless tower is in process of erection on the Pathe building, on Forty-fifth Street, New York City, from which communications will be established with Pathe wireless stations in West Palm Beach, Florida; Portland, Maine; Chattanooga, Tenn.; Pawtucket, R. I.; Minneapolis, Minnesota; Hampton Roads, Va.; Fort Worth, Texas, and Denver, Col., where messages will also be received and relayed from California.

In addition to this chain, all the Keith theatres are now equipped with wireless apparatus, and in case of any momentous occurrence, in or near any of the Keith cities, they will be put at the disposal of the Pathe News.

Mr. Albee has furthermore directed that every possible effort be made to facilitate the work of the Pathe organization in such emergencies as may arise.

From his headquarters in New York Mr. Cohen will be able to direct by wireless the activities of reporters and cameramen at the scene of disaster no matter how remote it may be. In line with this latest Pathe wireless project, was the recent Pathe feat of flashing on the screen in Keith theatres pictures of the ill-fated Roma a few hours after the disaster which wrecked the dirigible.

Advertises New Houses Wired For Radiophone

In Philadelphia the popularity of the radiophone was reflected in an advertisement appearing in newspapers in which a local builder announced that the $1,000,000 worth of houses he is building will be wired for radio telephone service. This, of course, will add greatly to the saleability of these new homes.

Radio in Boiler Plate

The expected has happened. Radio telephony is being covered by the big newspaper syndicates that furnish country newspapers with what is known as "boiler plate." This is good for radio as a science, an amusement or a business. The more radio knowledge is circulated, the better it will be for everybody concerned directly or indirectly with the field.

Canadian Regulations

The radio regulations of the Canadian Government are expected to allow amateurs to use a wave length of 200 meters for spark and 250 meters for continuous wave transmission.

At Station W.N.O.

A wireless phone transmitter and operator Station, W N O in Jersey City, N. J.
(c. Keystone View Co.)

How One University Does It

University of Minnesota---WLB-9XI

Because of the great number of letters received at the University of Minnesota, acknowledging reception of WLB or 9XI broadcasts and requesting information concerning schedules, apparatus, etc., it has been impossible for the University officials to answer all inquiries by personal letter. They have, therefore, issued a bulletin to cover most of the points mentioned in the letters.

All market and weather broadcasts sent out from the University of Minnesota Station under the call letters WLB are supplied through the mutual co-operation of the Minnesota State Department of Agriculture, the United States Bureau of Markets and Crop Estimates, the United States Weather Bureau and the University of Minnesota. The transmitting schedule of the University station is as follows:

Beginning at 12:00 Noon—Weather forecasts for Minnesota, Wisconsin, North and South Dakota and Montana followed by a press report covering prices, supply and demand on live stock at the South St. Paul market.

Beginning at 7:30 P. M.—Closing cash and future prices on Minneapolis wheat (all important grades) followed by a press report covering the Minneapolis-St. Paul potato market.

Market broadcasts are sent on a wave length of 485 meters first by radio telegraph then, immediately following, by radio telephone. The speed of transmission is about 10 words per minute. The conservative daylight range of the radio telegraph set used is about 250 miles while that of the radio telephone set now in use is about 40 miles.

It is expected that forms for abbreviating all broadcasting will be used in the near future. Special forms for interpreting these abbreviations are in process of preparation and will be issued to all receiving stations desirous of making use of market broadcasts.

A weekly radiophone concert is given on Wednesdays from 7:45 to 9:00 P. M. on a wave length of 360 meters. Programs for these concerts are specially prepared and inculde only worth while music. Special concerts given by noted artists at the University are sent out from time to time throughout the year.

Reports on reception of signals and suggestions for betterment of service are solicited.

The bulletin is signed by C. M. Jansky, Jr., Director, H. C. Forbes, Chief Operator, University of Minnesota Radio Station, Minneapolis, Minnesota.

Here is one week's broadcasting program of the University of Minnesota:

(Notice: All times given on this sheet are Standard Central Time.)

W. H. A.

DAILY, EXCEPT SUNDAY

Radio Telegraph Broadcast, by 4KW Spark, on 485 meters: 12:00 to 12:15 p. m. MARKET REPORT by Wisconsin Dept. of Markets, cooperating with U. S. Bureau of Markets and Crop Estimates. 12:20 to 12:25 p. m. WEATHER FORECAST for Wisconsin, by U. S. Weather Bureau .

Radiophone Broadcast on 485 meters: 12:25 to 12:30 p. m. WEATHER FORECAST, by U. S. Weather Bureau. 12:30 to 12:35 p. m. Special Notices and Announcements. On Saturdays, announcement of our complete broadcasting program for the following week.

12:40 to 12:55 p. m. MARKET REPORT, by Wisconsin Dept. of Markets. 12:59 to 1:00 p. m. TIME SIGNAL.

FRIDAY:

Radiophone Broadcast on 360 meters: 8:00 to 8:45 p. m. radio concert, Edison Phonograph and Special Features.

8:45 to 8:50 p. m. announcement of program for following week.

SATURDAY

Radiophone Broadcast on 360 meters: 1:05 to 1:25 p. m. LECTURE on Radio Subjects, preceded by Music.

ADDITIONAL BROADCASTS:

By Radiophone on 360 meters wavelength: Frequently, additional features will be sent out, such as local concerts by famous artists, or by University musical organizations, special lectures or speeches, and reports of athletic contests. Whenever possible, advance notice of such events will be included in the announcements on Friday night of the preceding week.

INTERCOLLEGIATE NEWS EXCHANGE:

(Western Conference Radio News Service)

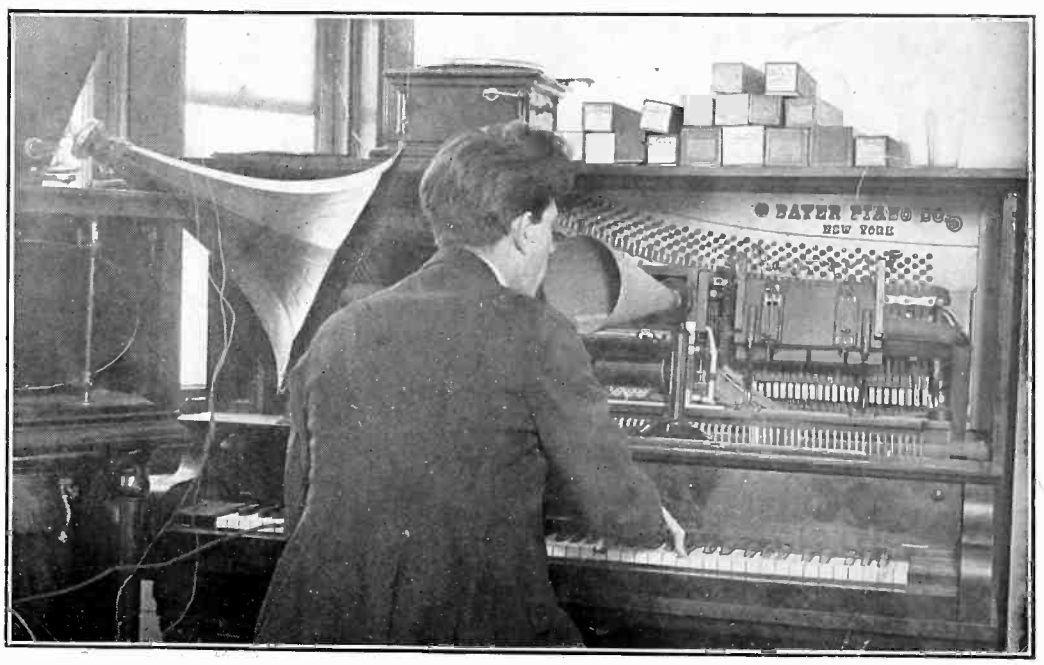
By Continuous Wave Telegraph, 410 meters: Monday, 10:00 to 12:00 p. m. NEWS Items received from other Universities.

Midnight to 1:00 a. m., Tuesday, Broadcast Distribution.

RADIO EXPERIMENTAL STATION 9XM

Wednesday, 10:00 to 12:00 p. m. TESTS and Experimental Message Traffic with Amateurs, by Spark, C. W., or Radiophone, on 375 meters. Other tests from time to time, at irregular intervals.

He Gets His Effects



The larger horn gets the tones of the piano while the smaller one receives his voice. (c. Keystone View Co.)

Where to Reach U. S. Radio Inspectors In Various Districts

RADIO World is in receipt of a communication from the Department of Commerce, Bureau of Navigation, at Washington, D. C., informing us that the law regarding radio telephone service should be upheld and in no way violated.

The law states that amateurs are required to obtain a license from the Bureau of Navigation, providing they have transmitting sets. No matter what power is to be used, the license must cover the station.

Amateur stations are not permitted to broadcast at the present time, but those who have spark transmitters must obtain a license. Failure to obtain a license will result with a fine or imprisonment.

Amateurs having only radio phone receivers are not required to hold licenses, but bear in mind that when any transmitter installed, the amateur must obtain a license.

Below is a list of government radio inspectors, where license and information may be obtained:

Radio Inspector, Customhouse, Boston, Mass.

Radio Inspector, Customhouse, New York, N. Y.

Radio Inspector, Customhouse, Baltimore, Md.

Radio Inspector, 205 Citizens' Bank Building, Norfolk, Va.

Radio Inspector, Customhouse, New Orleans, La.

Radio Inspector, Customhouse, San Francisco, Calif.

Radio Inspector, 2301 L. C. Smith Bldg., Seattle, Wash.

Radio Inspector, Federal Building, Detroit, Michigan.

Radio Inspector, Federal Building, Chicago, Illinois.

Listening In On "The Perfect Fool"

That the radio entertainment given recently by Ed Wynn, "The Perfect Fool," was far-reaching, there is no doubt. Read the following penned from Rangeley, Maine:

Mr. Ed Wynn,
George M. Cohan Theatre,
Broadway, New York City,
Dear Sir:—

Altho we are away up in the "wilds" of Maine we greatly enjoyed your play "The Perfect Fool" last night.

We tuned in about five minutes after the performance began with our entirely home-made apparatus; the regenerative tuner being made of tubular ice-cream cartons, tea kettle knobs—spools and upholstery tacks. The detector apparatus was also home-made, consisting of one radiotrom tube U. V. 200.

We received the whole program in a very clear and distinct tone without interference from other stations.

We would greatly appreciate picture and literature of the above as you mentioned last evening.

Yours very truly,
Percy E. Dennison."

This is only one of the thousands of letters received at the George M. Cohan Theatre.

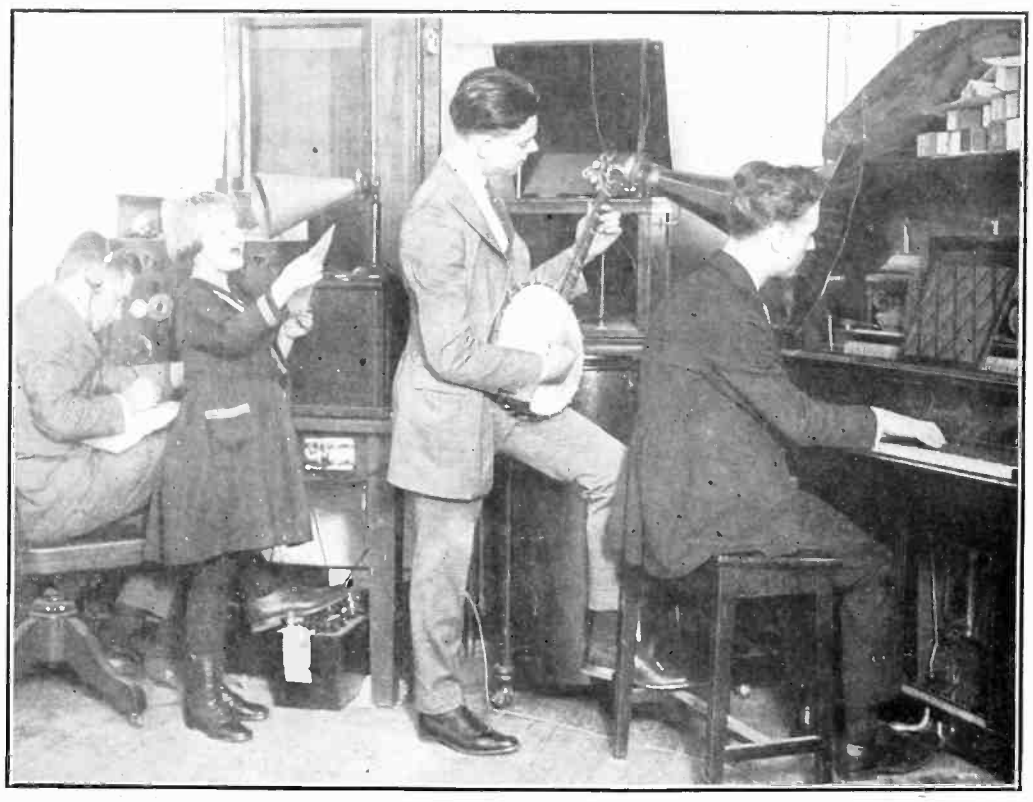
Different Types of Good Amplifiers Now In Use

In radio communication, the radio signals sent out by a transmitting station are made up of alternating currents and E.M.F.'S which in a tuned receiving antenna circuit, are then coupled or connected to the detector and telephone receiver circuit. In many cases, the energy received in the antenna circuit is so extremely small that after being transferred to the telephone receivers it is too small to operate them properly and no sound, or only a very weak signal, is heard. It then becomes necessary to amplify the received signals.

There are several types of mechanical amplifiers in use that are not adaptable to radio frequency currents. The vacuum tube amplifiers on the other hand have been very successfully applied to this purpose.

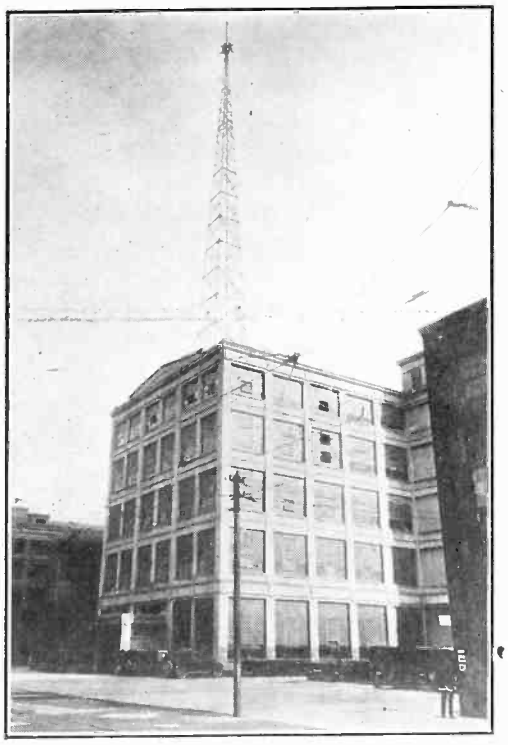
The three element electrode vacuum tube is inherently an amplifier of signals. In connection with power amplification it may be easily said that the plate circuit of the tube which comprises resistance and inductance, may be adjusted for maximum power amplification by a suitable choice of its constants. This amplification, due to the detector tubes, however, is frequently insufficient, and it has been found necessary to use several tubes in succession for effective amplifying purposes. These are so called cascade amplifiers, which make use of the amplifying properties of the three element vacuum tube or audion.

Wireless Concert At Home

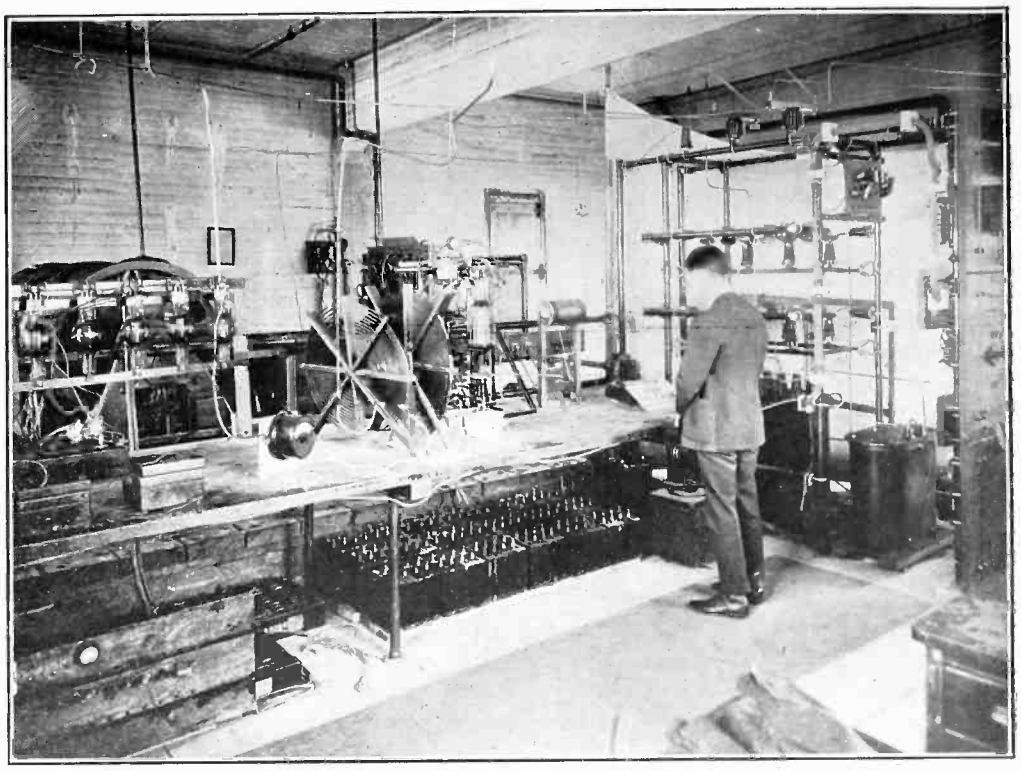


Florence Healy, an 11-year-old concert singer, is seen here giving a few of the latest jazz songs to the receivers. Particular attention should be given to both transmitters, as they combine with each other when leaving the aerial. (c. by Keystone View Co.)

Wonderful Long-Distance Results



Two aerial towers, 183 feet high, mounted on a five story factory at the Schenectady works of the General Electric Company, support the antenna.



Interior, showing the apparatus which amplifies several thousands of times, then reaches out to space at the rate of 186,000 miles per second, of the wireless broadcasting station at the Schenectady plant of the General Electric Company. This station, in tests, has been heard as far as Santa Clara, Cuba, which is a full 1,450 miles distant.

The huge antenna supported by two towers, 183 feet in height, represent the lofty aerial, which is mounted on a five-story factory, at the General Electric Co. plant at Schenectady, N. Y. Due to its effective height, wonderful long distance results are obtained.

The interior shows the apparatus which amplifies the voice several thousands of times, then hurls it out through space at the rate of 186,000 miles per second. This station is one of the most powerful radio stations in America and in tests has been heard as far as Santa Clara, Cuba, approximately 1450 miles. "Don't stop your music, we're dancing to it down here" read a cablegram received recently from a hotel in the Cuban city. The music kept up.

The General Electric station operates on a wave length of 360 meters, under the call letters WGY.

Schenectady is the home town of the General Electric Co., and it is there that some of the great wizards of electricity have worked their wonders for the benefit and edification of the world.

Fakers Hurting Industry

By the Editor of the Radio Dept. of the New York "Evening Mail."

Every new art has its fakers. There is a good crop of radio fakers growing up and it is high time that some one exposed their methods of squeezing sales out of unwary purchasers.

This writer recently witnessed a demonstration where a loud speaker was connected to a crystal receiver that was being sold for less than fifteen dollars. Nothing but the loud speaker and the receiver was in sight.

The entire outfit was set up in a location where only an expensive receiver would have served. Yet there was a little crystal set feeding a loud speaker with currents of such great magnitude that the volume of sound was sufficient for a crowd of fifty people or more!

Every listener was a babe in arms as far as the mysteries of wireless were concerned, and outfits were being sold. Of course, every one thought they were going to get the same wonderful results. The disillusionment was yet to come.

The writer did not get a chance to peep back under the counter but he is betting a new Sunday hat that at least one vacuum tube detector and five stages of amplification were used in this trick.

Hence Our Type

We agree with the following from the New York "Morning Telegraph," and which is reprinted for the purpose of clearly illustrating our idea of the importance as well as attractiveness of a handsome readable type:

Lord Riddell, British publisher, who has been the liason officer between the British delegation at the limitation of armament conference in Washington and the newspaper men, sailed yesterday for home on the Orbita.

Lord Riddell, who is the publisher of a weekly with 2,000,000 circulation, stated his belief that for the most part the main type of the body of American newspapers was too small for the eyesight of the average reader to grasp without eyestrain.

"Some time ago the British publishers found the type used was too small and changed for a larger size," he said to the newspaper men, "and I think the same change could be made to advantage in the majority of American newspapers. I believe it is a contributing cause to the poor eyesight of many of your people, for I will admit they are omnivorous readers."

The Wireless and the Singer

Showing an operator sending music over the wireless phone. The horn is attached to the telephone through which the voice comes. This in turn is sent out through another phone and reaches the receiver. (c. Keystone View Co.)

What a New York Editor Thinks of the Radio Phone

THE radio telephone is one of the latest contributions of science to humanity. It is, briefly, a means whereby the voice of a speaker or the song of a singer can be heard in natural tones at distances of hundreds or even thousands of miles.

Special receiving apparatus must, of course, be used to hear the messages sent out from the transmitting stations. These instruments, are, however, surprisingly simple and, except for the longest distances, can be operated by anyone without technical experience. All that is necessary is to run a well-insulated wire, preferably over 50 feet long, from any two convenient points, such as the house and garage, and connect the receiver to it. The radio waves, sent out by the transmitting station in all directions at the rate of 186,000 miles a second, strike this wire and induce in it currents corresponding to those generated by the sound waves in the transmitting station. These currents are caught by the receiver and transformed back into sound again, and thus the listener receives the message just as it was delivered.

Some of the economic aspects of this new enterprise are very interesting. It has, in the first place, created what is practically a new industry, heretofore very limited. It is now running into many millions of dollars annually. It is also benefitting the nation by providing farmers with a means of getting instantly, news, market reports, weather forecasts, and other useful data, and also by making his farm a much more attractive place for his family than it has been heretofore. That this will have some influence in improving agricultural conditions, can hardly be doubted.

For the average dweller in a town or city, it has great educational possibilities, as it brings to him music and ideas of a kind that he would never otherwise get. Nor must its special ability to bring the services of the church into the home be overlooked; there is a power for good in this that can hardly be overestimated. What the future will bring forth is difficult to determine with certainty, but that this system will have far-reaching social and economic results is beyond question. — William H. Easton, Ph. D., in *Forbes Magazine*

Farmer to Get Radio Crop Reports

The farmer need be no more than thirty minutes behind his city brother in receiving news by radiotelephone of the factors that determine prices of agricultural products.

The radio system will cover the territory of Chicago to within 500 miles of the city. In this area there are thousands of radio sets, in villages and farms. Even on farms where there is no apparatus there are telephones and the nearby village will have the radio reports.

Hello, London!

Vice-President John J. Carty, of the American Telephone and Telegraph Co. has told the Public Service Commission: "We should be able to talk to South America soon, and we know now we can talk to London." He stated farther that radio telephony would supplement but not displace the use of wires.

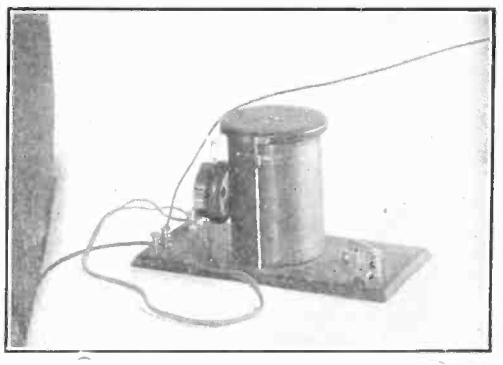
Due to new inventions and developments, the telephone service will improve. This may not come to pass for five or ten years, but the telephone systems in the east in a few years will be "Blizzard proof."

The radio field is at present limited to communication with ships broadcasting, and several other special services, both civil and military, but due to lack to secrecy and to atmospheric disturbances, there is still much to be done in the way of further experiments.

The Most Sensitive

The vacuum tube employed in radio today is known to be the most sensitive electrical device ever invented.

A Modest Home Radio Service



When one can get a set as small as this that will receive broadcasted programs within a radius of 25 miles, there is no reason why any home should be without this most modern of entertainers. (c. Keystone View Co.)

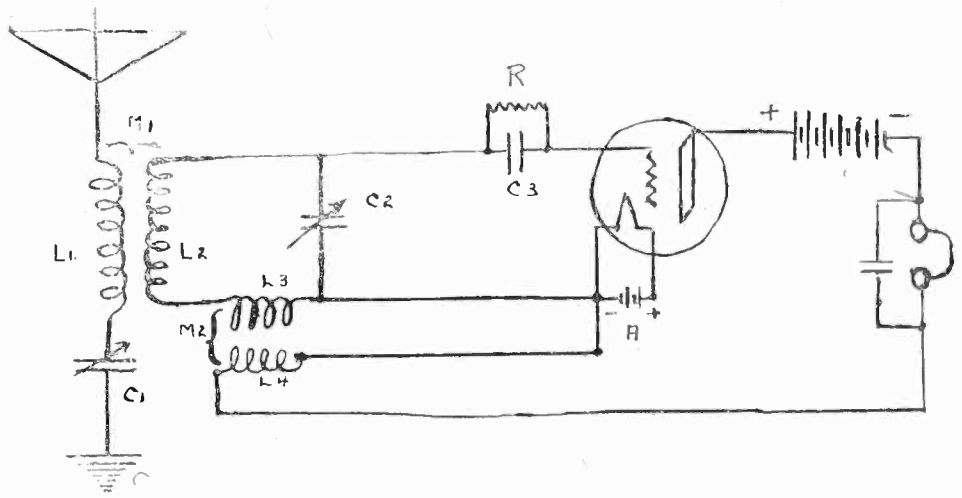
A Tried-and-True Receiver

THIS illustration shows a receiving circuit, using one three electrode vacuum tube, for detection and amplification. The tuned antenna circuit comprises the aerial, inductance L1, variable condenser C1, and the ground. Coupled to this circuit is a vacuum tube detector circuit, with coils L3, and L4, inserted in the grid and plate circuits, respectively, and coupled to each other.

An incoming damped oscillation sets up an oscillatory current, in the antenna circuit L1, C1, of the same frequency and general damping characteristics. Through the coupling M1, of the antenna circuit and the secondary tuned circuit L2, C2, L3, energy is transferred to the latter, setting up in it a damped oscillatory current.

The resulting alternating difference of potential, between filament and grid of tube, produces pulsations of the plate current, at the same frequency as the oscillations of the circuit C2, L2, L3. In other words, an alternating current is superimposed on the normally unvarying current in the plate circuit. This alternating current, flowing through the coil L4 induces in the coil L3 an emf. which, under conditions to be set forth, is in phase with the oscillatory emf. operating in the circuit C2, L2, L3. In other words, energy is synchronously supplied by the plate circuit, to the oscillatory grid circuit, which partly compensates for the resistance losses in that circuit, and thereby increases the amplitude and decreases the damping of the oscillation.

The duration and amplitude of every incoming wave train, as impressed upon the grid of the tube, are thus increased, and the signals heard in the telephone receivers are correspondingly louder.



A Regenerative Circuit Employing Two Coils, One in the Grid and Plate Circuits, Coupled to Each Other Respectively.

Tips For Fans

To reduce the howls and noises coming through your receiving set, sheath your cabinet inside with copper sheathing, aluminum sheathing, or use tinfoil in sheets. Do not use any glue, use paint with shellac, and stick the tinfoil to the wet shellac. Glue is not an insulator.

When this has been done, let the shellac dry so the tinfoil is actually stuck to the cabinet, and then ground the entire sheath to the grounding binding post. If you cannot obtain tinfoil from a store, tinfoil from cigarette boxes will answer the purpose.

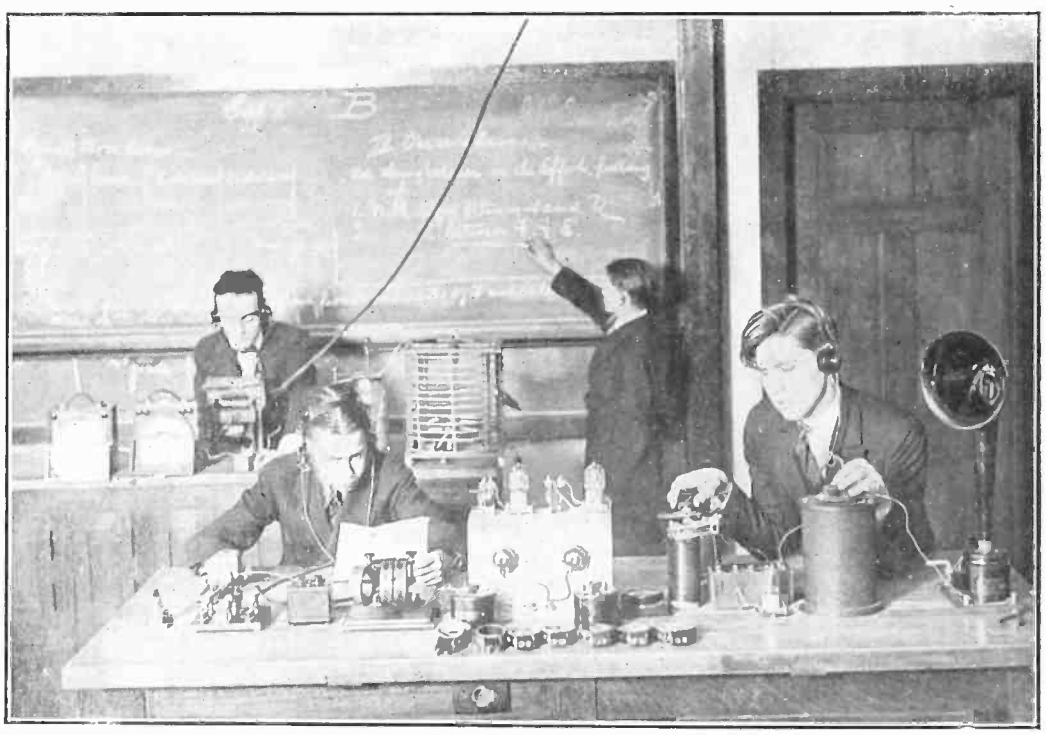
Another tip: place between the tubes aluminum or copper sheets and ground these also. This will tend to prevent all body capacity effects from entering your receiver and much of the howling will be lost.

An Ocean Conflab

A ship to shore wireless telephone call with an ordinary telephone instrument was achieved recently. Engineers of the American Telephone and Telegraph Co., and the American Radio Corporation, carried out the successful experiment. Captain William Rind, on board the steam-ship "American" talked to H. B. Thayer, president of the telephone company in his home at New Canaan, Conn.

This experiment demonstrated, officials of the telephone company said, that it would soon be possible to call ships hundreds of miles at sea and to talk with friends on board as easily as one now can telephone to New Haven or Philadelphia. Telephone company officials said that they had talked to the "America" when she was 1,600 miles out. The experiment lasted for a period of 30 minutes.

First Radio High School Class



The First School to Teach Radio to Its Pupils is the Central High School of Washington. Here Pupils of the Radio Class Are Diligently Tapping Keys of Their Sending Sets While Others Receive and Transcribe the Various Messages Floating Thru the Air.

(c. Keystone View Co.)

Radio Merchandising

A Department of Service for Dealers
Selling Campaigns and Problems

Dealers—
Are You Equipping Yourselves To Get Your Share of Sales of 10,000,000 New Radio Sets
That the Public Will Demand In the Next Few Months?

Read RADIO WORLD
And Get the Trade Angles of This Wonderful
New Science and Industry

The publishers of RADIO WORLD, knowing how great a factor the dealer is in a business so important as that of radio merchandising, have decided to start this department with the initial issue of the publication and to continue it as a regular feature from week to week.

The various problems of retail merchandising, as related to the question of selling radio goods of any kind whatsoever, will be discussed in this department.

The experiences of dealers in the stocking and selling of radio goods will be given space here, so that the good points of selling will be accentuated and the wrong methods be called to the attention of dealers.

Over-the-counter propositions of various kinds, and of big or small importance, will be covered; the object in mind being to make this department a real business help to every individual or concern engaged in the retail selling of radio goods.

Business talks with men whose opinions are worth putting into type will be published from time to time.

Personality—that is, pictures of and interesting facts about the men who prove that they are leaders among the merchandisers in this great field—will also be made an important part of the trade section.

Sales arguments, tabulated answers for your salesmen to make to the queries of prospective buyers, and the many other angles that are interesting and call for explanation or advice will be made a part of the message of these pages.

If you have anything to suggest—
Write us.

If you want advice—
Write us.

If you want to have any problems solved—
Write us.

And we promise to give your letters our earliest and most conscientious attention.

Address, Editor, Trade Department, RADIO WORLD.

Trade News and Gossip

Timely Stimulant for Electrical Trade

Wherever the sign of "Radio Supplies" is displayed today, activity reigns. It's a call from the general public—thousands of interested persons—buying or about to buy something in radio.

Vast quantities of radio merchandise are being exploited by department stores, through mail order houses, radio stores, electrical jobbers, electrical contractors, sporting goods stores, retail automobile supply stores, drug stores—all serving conscientiously, making earnest effort to accomodate this unparelleled call from neighbors, friends, everybody, near and far.

And the radio market—an electrical market—is being supplied—shall and must be completely supplied—so that no radio enthusiast shall be disappointed in getting his set or any parts he might want for it.

Manufacturers of:
Copper wire for electrical purposes.
Electrical insulation materials.
Amplifying tubes
Machine screw products
Storage batteries
Dry batteries.

are loaded down with orders and seem to find it extremely hard to "catch up" with the continued demand—but everybody is working hard to supply the demand.

Yes, radio has strongly stimulated a very large part of our electrical producing capacity, and marketing capacity, too.

"Hitch your wagon to radio and get your share of this big business."

L. FRANCIS TISSOT.

New Radio Corporations

Radio Appliance Corp., New York, $20,000; C. D. Koerner, W. J. Garvey, F. R. Fox. (Attorney, C. S. Aronstam, 100 Broadway.)

Teleradio Engineering Co., Manhattan, wireless machinery, $5,000; T. W. Kirman, H. M. Lintner, M. N. McCullough. (Attorney, W. W. Geddes, 79 John St., N. Y. C.)

Air-O-Phone Corp., Manhattan, capital increased from $50,000 to $500,000.

Radio Stores Corp., New York, electrical dise, 1,000 shares common stock, no par value; active capital, $21,000; M. A. Hogan, T. W. Cummins. (Attorney, S. D. Jones, 120 Broadway, N. Y. C.)

American Radio-Phone Sales Corp., Queens, $12,000; G. Schubel, E. G. Raeder, F. Sprower. (Attorney, Ridgewood R. Times, Myrtle and Cypress Avs., Brooklyn, N. Y.)

Home Radiophone Corp., Manhattan, changes name to Home Radio Corp.

McPhilben Radio Electric Corp., Jamaica, make instruments, $20,000; M. Fisher, M. Jacobs, M. Bernstein. (Attorneys, Fisher &Deima, 38 Park Row, N. Y. C.)

United States Wireless Corp., Manhattan, make apparatus, $20,000; H. and J. and R. Uswald. (Attorneys, Stone & Glaser, 116 Nassau St., N. Y. C.)

Premier Radio Corp. of America, Manhattan, $20,000; D. and J. Bloch, O. Wechsler. (Attorney, M. Schwebel, Woolworth Building, N. Y. C.)

Dodge Radio Corp., Manhattan, $10,000; P. C. Flint, P. F. and J. H. Cortese. (Attorney, Republic Industrial Co., 1 East 42nd St., N. Y. C.)

Radio Receptor Co., Manhattan, merchandise, $5,000; H. Cohn, V. Greiff. (Attirney, H. Glasser, 276 5th Ave., N. Y. C.)

Mignon Electric Mfg. Corp., Rochester, $25,000; E. C. Mignon, A. L. and R. C. Howard. (Attorneys, Lynn Bros., Rochester.)

S. & H. N. Radio Supply Co., Manhattan, $10,000; L. and M. Sanger, J. Nugent. (Attorney, M. Greenberger, 1,133 Broadway, N. Y. C.)

Rochester Electric Equipping Corp., Rochester, $15,000; H. Benzon, N. C. and A. Plank. (Attorney, N. E. Spencer, Rochester, N. Y.)

Philadelphia Radiophone Co., Philadelphia, $100,000. (Corporation Guarantee and Trust Co.)

National Radio Electric Corp., Wilmington, Del., increased capital from $300,000 to $1,200,000.

Radio Equipment Products Corp., Manhattan, $100,000; G. W. Rocklein, J. C. White. (Attorney, J. G. Fenster, 206 B'way, N. Y. C.

United Radio Corp., Wilmington, Del., instruments, $750,000. (Corporation Service Co.)

Another Radio Show

The International Travel Exposition arranged for a Radio Show section this week at the Grand Central Palace, commencing March 25, and ending April 1.

Prominent concerns in the industry will exhibit the latest goods of interest to the traveler, along with the exhibition of radio equipment.

Scores of Radio exhibitors have reserved booths, including the following:

Independent Wireless Telegraph Co.
Times Appliance Co.
Novo Manufacturing Co.
Franco Electric Corp.
Radionola Manufacturing Co.
Gould Storage Battery Co.
Lexington Radio and Electric Co.
Everett Manufacturing Co.
Prest-O-Lite
General Apparatus Co.
Wireless Appliance Co.
Herbert & Huegson Co.

Improved Type of Amplifier by Skilled Craftsman

The Federal Telephone & Telegraph Company of Buffalo has recently placed on the market, new amplifying units which are very unique in design and extremely efficient in operation.

The Type No. 8, consists of Detector and one-step Amplifier. A front view of the Type No. 9, which is a two-step Amplifier, is here shown. The panel is made of the highest grade of black laminated phenol plate. The cabinet is ruggedly constructed of heavy sheet brass with securely welded corners. This makes the apparatus dust proof. Dimensions of cabinet are 9" long, 6" wide and 6¾" deep.

The cabinets are finished in a black satin enamel. Metal partitions in the cabinets serve to shield the separate stages of amplification from interacting with one another, thereby eliminating the usual howling due to audio frequency feedback. These partitions place each stage in a separate compartment. A separate rheostat is supplied in each stage, thus making possible the best adjustment from each stand, independent of the others, and assuring through the gentle heating of the rheostat the maintenance of each compartment in an absolute moisture-free condition.

An efficient two step amplifier

The units are equipped with Federal automatic filament control jacks, which provide a convenient and rapid means of shifting the telephones from one step to another without necessity of adjusting filament rheostats. They are so connected as to cause the insertion of the telephone plug in any stage to light only those filaments required by that stage of amplification. The use of the automatic filament control jacks greatly increase the useful life of the vacuum tube and the drain on the filament battery is reduced to a minimum.

RADIO WORLD'S QUICK ACTION CLASSIFIED ADS

This department is intended for everybody who wants quick action on short announcements covering the buying, selling, exchanging or general merchandising in the radio field. Readers of RADIO WORLD will find that it pays to read these columns every week. Advertisers will get a sixty-hour service here—that is, copy received for this department will appear in RADIO WORLD in about three days after copy reaches us.

The rate for this RADIO WORLD QUICK ACTION CLASSIFIED AD. DEPT. is 5c. per word (minimum of 10 words, incuding address), 10% discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified advs., if copy is received at this office before 4 P. M. on any Monday preceeding date of publication. RADIO WORLD CO., 1493 Broadway, New York City. (Phone, Bryant 4796.)

Government Positions. Men, women, 18, over. Wanted for Railway Mail, Postoffice, other Government positions. Examination soon. Salary $1,400-$1,500 year. Experience unnecessary. Particulars free. Write Columbia School of Civil Service, 383 Pope Bldg., Washington, D. C.

Amateurs Attention—We are 4 blocks from Grand Central station. Variometers & Couplers $6. Regenerative sets mounted, unwired $35. Phones, Tubes, Transformers, Condensors, Aerial Wire Rhoestats in stock. Amplifying units $15. Detector units $12. Sets made to order. Mail orders receive prompt attention. Open to 7 P. M. Vanderbilt 2038-Murray Hill Electric. 214 East 38th St.

Amateurs, Attention.—$6 for Variometers and Variocouplers. Regenerative sets, unwired, $35. Parts of all kinds for sale cheap. Phones, tubes, rheostats and coils. Why go downtown when we are four blocks from Grand CentralC Station. Estimates cheerfully given. 2 BUA. Murray Hill Electric Co., 214 East 38th St. Phone Vanderbilt 2038.

Audion Renewals—Any type single stem, tungsten ,lament, detectors repaired for $2.75; amplifiers as above, $3; 5 watt power tubes, $4; VT-1 oxide filaments and to use 20-35 volts "B," $3.50. Terms cash, or C. O. D. plus charges. Trimount Laboratory, Milford, Mass.

Agents Wanted.—One live amateur in every town to sell radio apparatus. Attractive discounts given. Write immediately for full particulars. Wilmington Electrical Specialty Company, Dept. C, 705 Adams Street, Wilmington, Delaware.

Advertise.—Country town newspapers. Lists ree. Pennill Company. Covington, Kentucky.

Amateur Agents Wanted in every town to sell radio apparatus. A few stocking agencies still open. Delfelco, 12 Meeting Street, Pawtucket, R. I.

Handbooks for Electricians and Experimenters, 20c. Joe Tillberg, Proctor, Vermont.

Buy Direct From Manufactuerrs, mahogany cabinet containing short wave tuner with detector. $30 with one stage amplification, $45; two stage, $60; three stages (Use loop), $80. No jacks. Rear connections. Rogers Radio Company, 5133 Woodworth St., Pittsburgh, Pa.

Multigraphs, Typewriters, Addressing Machines, Duplicators, Folders, Sealers, Check Writers, Dictaphones. Office Equipment. Bought, sold. exchanged, rebuilt. Pruit Company, 110 North LaSalle, Chicago.

Patents—Send for free book. Contains valuable information for inventors. Send sketch of your invention for free opinion of its patentable nature. Prompt service, twenty years' experience. Talbert & Talbert, 440 Talbert Bldg., Washington, D. C.

Only Exclusive Amateur Radio Dealers in Western Canada. We handle complete line of standard Amateur Radio supplies, specializing in Mail Orders. Send stamp for list. WESTERN CANADA RADIO SUPPLY, 919 Fort Street, Victoria, B. C.

We Buy and Sell back issues of Radio Ameteur News and Electrical Experimenter. Boston Magazine Exchange, 109 Mountfort St., Boston, Mass.

TELEGRAPHY—(Morse and Wireless) and Railway Accounting taught thoroughly; big salaries; great opportunities. Oldest, largest school. All expenses low—can earn large part. Catalogue rfee. DODGE'S INSTITUTE, Hass St., Valparaiso, Indiana.

250 Wireless Exam. Questions Answered! Just out! New License Quiz Book for Government License Examinations. The first edition printed with new rules, regulations and gradings laid down by the Government on July 1, 1921. Invaluable information for amateurs taking Radio License Examinations. Answers to 250 Questions Many of Which Will be Useful in Examinations. Full descriptions of hook-ups. New devices, practical equations, international laws, official gradings, diagrams, definitions and other important information. Just off the press! 80 illustrations. Clip out this ad. Pin a dollar bill to it! Mail it today. This wonderful book comes by return mail. Don't miss it! Dept. 21-M National Radio Institute, 1345 Pennsylvania Ave., N. W., Washington, D. C.

Wire.—B. & S. Ga., S. C. C. wire ¼ lb. lots No. 34 to 36, $.50, No. 30 to 33, 40c; No. 23, 23c; No. 25, 28, 32, 34 enameled, very reasonable. For ½ and 1 lb. lots proportionate prices. Write for price and information. F. Benedict, 3916 N. Irving Ave., Chicago.

This is Real Success.—Panels cut to order, smooth sawed edges. We cut them exactly to size and ship the same day your order is received. ¼" thick, $.01½c per square inch; 5/16" thick, .02c; ⅜" thick, .03c; 7/16" thick, .03½c; ½" thick, .04c, why pay more? These radio panels are made o fthe highest grade black fibre. This material possesses high dielectric strength, is inexpensive, unbreakable and easy to work. Our special offer, radio panels 6 x 6 x ¼", 50c; 6 x 12 x ¼", $1. We also carry a complete stock of fibre rod and tubes, the real thing for electrical insulation, special prices quoted upon application. We pay postage. Radio Instrument & Panel Co., Box 75, Cicero, IIIinois.

Radio Bargains—50c each postpaid. Phone plugs; 3 contact jacks, work either open or closed circuit; receiving station lighting arresters, carbon gap with high voltage use, on porcelein base, $1 value; Bakelite 3" diameter tubing, pe r foot; Ward Leonard resistance tubes, up to 2,000 ohms; non-inductive alloy wire resistance units on wooden spools, any resistance up to 2,000 ohms; six feet No. 5 ground wire flexible 61 strand R. C.; postage not paid on wire. D. C. C. Enam. No. 14 copper wire, 40c pound. Miscellaneous, bargains—change-over switches, for panel mounting with knob, six pole, D. T., $2 each; same. 2 P. D. T., $1; same, single pole D. T., 80c; Wheatstone Bridge resistance boxes, with plugs, 6 circuits, $4.50. F. O. B., Chicago. Twelve hour service on all above. American Radio Supply, 2140c So. Harding Ave., Chicago, Ill.

Stop! Look! Act! V. T.'s and accessories!—With each of the listed tubes Radiotron U. V. 200, $5 and A. P. detectors, $5; radiotron U. V. 201, $6.50 and A. P. amplifiers, $6.50. We will supply free of charge your choice of either of these five premiums—latest Fada rheostat, $1, No. 810 Remler smooth running rheostat, $1; Paragon V. T. socket, $1; Murdock V. T. socket improved contact type, $1, or Crosley porcelain panel or base mounting V. T. socket, $0.60. Either of the Federal single, closed or double circuit jacks listed respectively at $0.70, $0.85 and $1 will be given as premiums with each Federal 226W amplifying transformer, $7 or R. C. of A. U. V. 712, $7, and the U. V. 1714 radio frequency amplifying transformer. Fada 5 ampere Nichrome power rheostats, $1.35 or R. C. of A. U. R. 542 porcelain V. T. socket supplied free of charge with each $8 U. V. 202 5-watt power tube, for C. W. or radiophone transmission. We absolutely guarantee the oregoing apparatus. Only new and high grade equipment carried in stock. Unsatisfactory goods subject to return within five days. Twelve hou rservice. Postage and insurance prepaid by us, thereby saving time and money. Remember us. The Kehler Radio Laboratories, Dept. R, Abilene, Kansas.

Radio Circuits on Blueprints are Convenient. Our VT circuits, each on a separate blue print, enable you to try out a large range of proven hook-ups. Set of twelve, receiving or phone and combination transmitting, 50c. Complete set of 24 for $1. The Plan Bureau, 1929 McCausland Avenue, St. Louis, Mo.

Perasco Tested 150-2,600 meter regenerative receiver, $40. Perasco detector control, $15. Both $52. Unwired Perasco 150-475 meter regenerator with detector control in same cabinet, $40. Grid and phone condensers, 25c each. All standard parts at standard prices. Perry Radio Supply Co., 604 N. Grove Avenue, Oak Park, Illinois.

Baldwin Phones.—Why are Baldwin Phones so sensitive? Briefly because—(1) the small armature is pivoted and designed to act as a fulcrum when connected to the diaphragm by a small link. There is no tension or springing of metal as in ordinary receivers. (2) Four pole pieces of a single solenoid act upon both sides of a lightly balanced armature. (3) The force is concentrated at the exact center of a mica-diaphragm, (identically the same as used in all high grade phonograph reproducers). Original Type C $12; Improved Type E, $13; Lighter Type F, $14; Anti-Static Type G, $15. Single loud speaker unit Type C without cord, $6. This is the same unit as used in the Vocaloud and are excellent for making your own loudspeaker. With each pair of phones purchased we will extend or give as premiums a one year's subscription to the RADIO NEWS or one o the latest Federal Universal Plugs, $1.75. These well-known head sets are absolutely guaranteed and subject to return within five days if not satisfactory. Postpaid, insured, and twelve hour service. The Kehler Radio Laboratories? Dept. R. Abilene, Kansas.

RADIO WORLD

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Settling A Boundary Dispute

Over half a century ago the parallel of 129 degrees East Longitude was chosen as the boundary line between Western Australia on the one hand and South Australia and the Northern Territory on the other, says the "Science News Bulletin" (Washington). But the line had never been accurately laid down. As runs through a wilderness, the uncertainty of the borderline did not matter. The discovery of oil toward the northern end, however, made it desirable to fix the position exactly. Moreover, the states concerned were anxious to avoid a dispute such as that between Victoria and South Australia.

The work of fixing the true border between Western Australia and the states to the east was undertaken by State Astronomer Curlewis of West Australia and State Astronomer S. F. Dodwell of South Australia. With a field wireless plant they were able to receive direct the time-signals from the high-power plant at Lyons, France, and also from Annapolis, U. S. A. After allowing one-twenty-fifth of a second for the transmission of the wireless signals, the position of a point on the 129th degree was worked out at each end of the boundary line, at places over 1,000 miles apart. When asked how nearly to absolute accuracy he had approached in fixing the line Dodwell said, "Well, we're within thirty yards of it. There are two possible sources of error: the personal equation and some defect in the instruments". It all turned out perfectly.

Regenerative Circuits

The strength of signals obtainable with an electron tube detector may be increased greatly by the use of a regenerative circuit, in which a part of the energy is fed back into the input side of the detector, and serves to Practically all modern tuners for use with electron tubes incorporate some form of regenerative circuit, with the necessary controls for the receiving operator. This is a principle that is well established and known to students of electricity.

A Sample Program

WESTINGHOUSE KDKA

SUNDAY, MARCH 26

11:00 A. M.—Services of the Emory Methodist Episcopal Church, North Hiland avenue at Rippey street, Pittsburgh, Pa. Rev. W. Wofford T. Duncan, Minister.

3:30 P. M.—Radio Chapel at Station KDKA, conducted by Rev. W. O. Yates, of the Swissville Presbyterian Church, Swissville, Pa.

7:30 P. M.—Services of the Calvary Episcopal Church, Shady avenue, Pittsburgh, Pa. Rev. E. J. Van Etten, Rector.

MONDAY, MARCH 27

12:30 P. M.—Lenten services from the Trinity Episcopal Church, Pittsburgh, conducted by Rev. Frank H. Nelson of Christ Church, Cincinnati, Ohio.

8:00 P. M.—"Pittsburgh" by C. C. C. Stotler, Secretary and Treasurer, Title Guaranty Company, Pittsburgh, Pa.

8:30 P. M.—Instrumental and vocal duets and solos by John Rodda, tenor; Hazel Drake pianist; Mrs. Oliver S. Heck, contralto; Clyde DeRoy Kocher, violinist, and Mrs. William W. Andrew, accompanist.

TUESDAY, MARCH 28

12:30 P. M.—Lenten services from the Trinity Episcopal Church, Pittsburgh, conducted by Rev. Frank H. Nelson, of Christ Church, Cincinnati, O.

8:00 P. M.—"Modern Photography," by R. W. Johnson, manager Trinity Court Studio, Pittsburgh, Pa.

Weekly talk on dress.

8:30 P. M.—Entertainment by Mrs. Adele Eggers Furniss, soprano; T. F. Willman, violin, and Mrs. T. F. Willman, piano.

WEDNESDAY, MARCH 29

12:30 P. M.—Lenten services from the Trinity Episcopal Church, Pittsburgh, conducted by Rev. Frank H. Nelson of Christ Church, Cincinnati, O.

8:00 P. M.—"Pittsburgh — Its Industrial Importance," by A. L. Humphrey, president of the Westinghouse Air Brake Co. Message from the National Safety Council.

8:30 P. M.—Popular entertainment by Allan's Serenaders of the McKeesport Cyclers, McKeesport, Pa.

THURSDAY, MARCH 30

12:30 P. M.—Lenten services from the Trinity Episcopal Church, Pittsburgh, conducted by Rev.

(*Continued on next page*)

Frank H. Nelson of Christ Church, Cincinnati, Ohio.

8:00 P. M.—"Co-Operation Between Banker and Farmer," by Dr. J. T. Holdsworth, vice president, Bank of Pittsburgh N. A.

8:30 P. M.—Vocal and instrumental selections by W. F. McNally, baritone; Mrs. W. H. Long, pianist; also several violin selections and readings by artists, to be announced later.

FRIDAY, MARCH 31

12:30 P. M.—Lenten services from the Trinity Episcopal Church, Pittsburgh, conducted by Rev. H. W. Anthony, New Brighton, Pa.

8:00 P. M.—"The Junior Civic Club and its Accomplishments" by Nellie S. Hoover, Peabody High School.

8:30 P. M.—Artists from the studio of Richard Knotts.

SATURDAY, APRIL v

12:30 P. M.—Lenten services from the Trinity Episcopal Church, Pittsburgh, conducted by Rev. H. W. Anthony, New Brighton, Pa.

3:30 P. M.—Popular concert by Mason's Orchestra.

7:30 P. M.—Special Children's entertainment. Bird and animal imitations by Dr. Carlton C. Anthony, D. D. S.

8:00 P. M.—Talk by speaker to be announced later.

8:30 P. M.—Entertainment by the Geneva College Musical Club.

SUNDAY, APRIL 2.

10:45 A. M.—Services of Calvary Episcopal Church, Shady avenue, Pittsburgh, Rev. E. J. Van Etten, Rector.

3:00 P. M.—Radio Chapel at Station KDKA, conducted by Rev. John Ray Evans, Pastor East End Christian Church, Pittsburgh, Pa.

7:30 P. M.—Services of the Point Breeze Presbyterian Church, Fifth and Penn avenues, Pittsburgh, Pa., Dr. P. H. Barker, Minister.

NOTE—The time mentioned is Eastern Standard Time.

The Westinghouse Station's call is KDKA, operating on a 360 meter wave length, located at East Pittsburgh, Pa.

New Radio Books

The series of eight books published by the Norman W. Henley Publishing Company are widely read standard up to date books which deal with their respective subjects in a practical manner and are written so that the Novice and Amateur Experimenter alike can understand them and make use of the information contained in them.

Radio Design Data by Mr. Sleeper enables the Amateur and Novice alike, so clearly is it written, to design his or her receiving equipment from the formulas data and tables contained between its covers.

For those desiring to listen to the Transatlantic high power stations "Construction of New Type Transatlantic Receiving Set" by Mr. Sleeper is an excellent book. Among other interesting things the subject of Loud Speakers Relays, etc., is dealt with quite completely.

MURDOCK

radio necessities

MURDOCK REAL RADIO RECEIVERS have delivered complete satisfaction, on a "money-back" basis for 14 years. Those years of experience have so simplified and perfected our production that there are today no receivers quite so good at so low a price.

The latest Murdock achievement, the No. 56 Receiver, is a highly sensitive instrument which retains all the rugged strength of previous types. Important features are, the improved comfortable headband, the "Murdock-Moulded" ear pieces shaped to exclude outside noise, and the moulding of all parts into one durable unit.

All models of Murdock receivers are sold with free trial offer and money back guarantee. Use them in direct comparison to any other phones for 14 days. Make any test you wish. Then at the end of the two weeks, if the Murdock Phones are not entirely satisfactory, return them and your money will be refunded!

Many of the complete "ready-to-operate" wireless sets now on the market include Murdock Phones as standard equipment. If the set you buy does not, be sure you get a set of Murdock receivers to complete your station. We strongly urge you to go to your dealer and convince yourself of the quality of Murdock receivers, by actual examination, before you buy. Prices $4.50 to $6.

Murdock Phones are the standard bearer for a complete line of "Made-by-Murdock" radio parts and instruments. This includes the famous Murdock condensers, couplers and variometers, and the new Murdock Rheostat at $1.00.

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