Easy Ways to Make and Operate Sets—Pages 5, 11, 13, 14

Radio Digest Illustrated

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TRADE-MARK

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AIR CONCERT AIDS LEGION

NEW AERIAL FOUND TO BE HUMAN BODY

REMARKABLE DISCOVERY ACCIDENTALLY MADE

While Aerial Is Disconnected Captain Receives Concert Music Through Own Body

CINCINNATI. — Radiophone operators have utilized a hundred different things for aerials to be used with their receiving sets. Ribs of raised umbrellas, a tin roof, the springs of a bed, the rain spouts at the side of a house, and many other devices, all to have answered the purpose satisfactorily. But now the discovery has been made that the human body is an antenna.

Credit for this discovery goes to Captain Donald H. Muse of the Air Service Reserve. Captain Muse was not making a Radio demonstration at the time but simply was entertaining a number of officers with a receiving set he has installed in his quarters.

A concert was being broadcasted over WLW operated by the Crosley Manufacturing Company of Cincinnati manufacturers of Radiophones and Captain Muse had tuned in with excellent results.

(*Continued on page* 2)

Radio Is Now Used For Treating Sick

Persons Ill Aboard Ship Can Keep in Touch with Doctors by Phone

LONDON.—American millionaires who are or who fancy themselves ill can now keep in practically constant touch with their pet specialists at home while crossing the Atlantic and can receive "absent treatment." This can be done with the Radiophone.

It was asserted, for example, that on the last eastern bound trip of the Baltic she was able to talk to the Cape Cod station when she was almost alongside the Liverpool docks. The Marconi company promises in the future a practically 24 hours a day shore to shore service for the whole trans-Atlantic trip.

DYING MAN LISTENS TO MUSIC BY RADIO

NEW YORK.—Eugene K. Martin, a wounded veteran, stood beside his Radiophone with headpiece in position listening to the music. He turned on the gas and inhaled it until dead. Notes written in pencil while he listened in stated that he was a failure for thirty-eight years and did not want to be a burden to others. What he heard on the Radiophone no one knows.

Jeanette Vreeland, Opera Singer, and Bert Acosta, Foremost Aviator, Who Make Concert Flight to Aid Legion ©U. & U.

TOURISTS IN BERMUDA SAVED WAIT BY RADIO

Passengers Are Picked Up on Receipt of Message

NEW YORK.—Radio spared many visitors to the Bermudas a three or four day wait for a steamship, when officials of the Royal Mail lines requested the Lamport & Holt line to send a Radio message to Capt. Oscar Penrice of the steamship Vasari, which was bound for New York from Rio Janeiro, to call at Bermuda for passengers booked by the Royal Mail line. Capt. Penrice immediately changed his course and picked up the passengers. This is said to be the first time that such an order has been issued by Radio.

Bonding House Will Broadcast Branches

Predicts Practical Use of Radiophone by Big Business

SAN FRANCISCO, CAL.—The prediction of the promoters of the Radiophone that this means of communication will soon be used by big business firms to keep in touch with their branches was made practical recently when the bond house of Cyrus Pierce & Co. announced its intention of installing Radiophones in each of its ten branches throughout the state.

A 500-watt broadcasting station will be erected at the Insurance Exchange building. When this equipment is installed the bond house will broadcast news of bond issues and prices several times a day.

FLYER USES AIR RADIO FOR APPEAL

Lieutenant Broadcasts Call for American Legion Support to 50,000 Stations

Fokker Limousine Used

Test Proves How Future American Air Lines Can Benefit by Communication

NEW YORK.—Special to Radio Digest. —Recently, Lieut. Melvin W. Maynard, better known as the "flying parson," Misses Thais Magrane and Jeanette Vreeland with E. W. Dannels as operator, flew in a huge five passenger monoplane, piloted by America's foremost aviator, Burt Acosta, over this city. The flight was one of the most unique demonstrations of the world's aeronautic progress. Flying in a monoplane, 5,000 feet above the city the lieutenant broadcast from the clouds to about 50,000 receiving stations in the metropolitan district. Lieutenant Maynard made a spirited appeal for the public support to carry on the American legion mountain home. Following, Miss Vreeland rendered a vocal program.

Commercial Air Liner

The plane used for this purpose was a Fokker F-3 limousine, made by the Netherland aircraft company. It was identical with those that are maintaining daily service on several of the European air lines. It is on ships of this commercial type that Europe is installing Radiophone apparatus in order to make the commercial air lines safe for the large number of passengers being carried back and forth daily, between the larger European cities. This test furnished conclusive proof the ease with which communication with land can be maintained by passengers of the future American air lines. The Radio telephone will be the alarm clock that will awaken the American public to help in the encouragment of progress and development of American commercial aeronautics.

(*Continued on page* 2)

CONFERENCE FAVORS A RADIO LANGUAGE

Recently an international conference was held in Paris. The American representative declared that Radio may be the means of establishing an international language or code. One of the greatest hopes for the future will be the establishment of an international Radio language or code, like Esperanto, understood by all. The world's activities would be at everybody's ears.

AIR RADIO APPEAL

(*Continued from Page* 1)

The flight was made under the auspices of the American legion as part of its campaign on behalf of the proposed Soldiers' Mountain Home. The route taken began at Hazel Hurst field at Minneola, Long Island, 18 miles from New York, and covered all Brooklyn, middle Manhattan and part of New Jersey.

Lieutenant Maynard spoke about the aims of the American Legion mountain home. The home is to be built to provide members who are suffering from ailments requiring pure mountain air, a retreat during convalescence.

Miss Vreeland rendered a vocal program which included the "Star Spangled Banner," "Holy, Holy," and also the well known prayer from "La Tosca." Her accomplishment as a singer was doubly remarkable, because she was able to hold the correct pitch throughout the selections in spite of the din of the 200 horsepower motor that was carrying the party through the air. Finally, Miss Thais Magrane spoke on behalf of the Women's auxiliary of the American Legion.

Before and after the announced program, conversations were carried on with various stations and amateurs, all of whom reported clear signals. A Brooklyn amateur said that he could see the plane sailing through the air while speaking to the occupants.

Details of the Equipment

The transmitting set consisted of a C. G. vacuum tube transmitter of 300 Mfds capacity. It was built for aerial Radio transmission for the United States Navy. Type C. G. 1141 dynamotor with a Type H. G. relay, Dubellier condenser of .0004 Mdf capacity was used. A Westinghouse receiving set was part of the equipment. The wave length was 500 meters and 300 feet drop antenna was used. The total weight of the apparatus was 147 pounds. It was fastened to two pine boards screwed to the floor of the roomy cabin. The reel was attached under the seats.

The tests were in charge of E. W. Dannels, the Radio engineer of Brooklyn, connected with the General electric company. Mr. Dannels was one of the leading Radio operators of the U. S. Naval aviation. He is remembered by many as the man, who some years ago, was wrecked in a Blimp as it burst off Sandyhook, while the occupants were watching the sailing races. His daring in sending messages until the machine struck the water received world wide comment.

The New Loud Speaker

The interesting part of the tests was made possible through the courtesy of the army authorities of Mitchel Field, Long Island. By hooking a receiving set to the regular telephone system they enabled the officials and guests of the Fokker company, assembled in the hangar, to follow the whole program. The test proved, too, that an ordinary gasoline funnel held against a telephone receiver with a handkerchief wrapped around the connection made a very acceptable loud speaking horn.

Ceremony Performed Above the Clouds

On a later trip at about 5,000 feet above Times Square a nuptial kiss was broadcast from the cockpit of a speeding airplane to the ears of thousands of Radio fans.

The "flying parson," Lieut. Belvin W. Maynard, performed the ceremony. Each detail of the ceremony, except the blush, was transmitted by Radio. The honeymoon was immediately started and the trip was made by air to Albany, Schnectady, Syracuse and Niagara Falls.

THOUSANDS FLOCK TO DETROIT SHOW

Radio Freaks One of the Features of the Big Show

DETROIT.—One of the first shows for the Radiophone closed last week in Detroit. The show was opened by Mayor James Couzens. The show was sponsored by the American Exhibitors' Association, Inc. Not only were there thousands of Detroit and Michigan fans there but many came from outside of the borders of the state. The show was a complete success.

Exhibitors were numerous and every new device in Radiophone and Radio telegraph were shown.

Amateurs who already have delved into the realms of ether waves and novices who are ready and eager to become members of America's fast expanding Radio family found much at the Radio show to interest them. For those intending to install receiving sets were given the opportunity of viewing collectively instruments at all prices.

One of the unique features of the show was the showing of Radio freaks and novel Radio apparatus, products of the amateur. Another feature was the answering of questions by Radio engineers. Amateurs were given help, beginners advice, thus aiding them in avoiding common errors made by those to whom Radio communication remains a mystery.

Two miniature houses, completely equipped with sending and receiving apparatus, displaying the latest and most efficient methods of erecting antenna was shown.

Those who had exhibits at the show were: Commercial Electric Supply Co., Victor Electric Supply Co., Radio Topics, Radio Digest, Fauver-Cavanaugh Co., Charles H. Rouse, Ra-Tone Electric Co., Federal Electric Supply Co., Twentieth Century Radio Corporation, B. E. Polczynski, American Enamel Magnet Wire Manufacturing Co., Crowley, Milner & Co., The Detroit News Radiophone Broadcasting Station, WWJ; Great Lakes Electric Co., Detroit Electric Co., Wells Radio Co., National Electric Supply & Fixture Co., F. Joseph Lamb Manufacturing Co., Electric Battery Service Co., Wartell Radio Co., United Radio Co., Allied Electric Co., Willard Storage Battery Co., J. Thomas Rhamstein, A. T. Knowlson Co., W. J. Hartwig Co., Stewart-Walker Co., Columbia Radio Corporation, Detroit Radio Co., Radio News, Everett Electric Corporation, A. E. Wells, Radio Receiver Adaptor, Weston Electrical Instrument Co., Radio Specialty Co., Cabinet Radio Co., Superior Engineering Co., Maring Wire Co., MacCauley's Book Store, Radio Books; Radiolatone Manufacturing Co., The Radio Shop, Peerless Wireless Co., Lyradion Sales & Engineering Co., Michigan State Auto School-Radio School, R. L. Polk & Co., Radio Directories; Michigan Radio Co., Crescent Electric Co., The Telca Co., Newcomb-Endicott Co., Service Pattern Machine Co., Premier Radio Corporation, Jewett Phonograph Co., The Radiofone Corporation, Detroit Radio Supply Co., Radio Apparatus Co., Cummings Brothers, Radio & Model Engineering Magazine, The Automatic Electrical Devices, Bowman-Gould & Co., Lincoln Radio Co., Morrisson Radio Laboratories, Matthews Radio Equipment Co., Jacob Manufacturing Co., Allan-Jackson Electric Co.

Extensive Plans Are Being Made For National Radio Exposition

Prominent Government Organizations and Corporation Interests Are Planning to Participate and Offer Exhibits in Immense Affair at Chicago June 26 to July 1

Plans are being perfected for the participation of the army, navy, the Government, Boy and Girl Scouts, technical schools, the Radio Corporation of America and the Westinghouse Electric & Manufacturing Co., in the National Radio exposition to be held in the Leiter building Chicago, June 26th to July 1st, according to an announcement by Milo E. Westbrooke, general manager of the exposition.

Alfred Thomas, Jr., district manager of the Radio Corporation of America, a member of the show's advisory committee, is arranging for a contest of amateurs at the national exposition. This contest will settle who is the fastest amateur Radio operator. Mr. Thomas is working out the details of the contest with Mr. Westbrooke.

Radio Inspector to Be There

L. R. Schmitt, United States Radio inspector for the ninth district, another member of the committee, will have an exhibit from his department at the exposition. G. H. Jaspert, who has charge of the Westinghouse broadcasting station in Chicago, announced that Westinghouse would install the official receiving station at the exposition from which the vititors at the show would get the complete service of the broadcasting station, KYW.

The Radio fan will have an opportunity to see at this exposition just what the army and navy are doing in wireless. In all the technical schools of Chicago the students are experimenting on radio devices and it is from one of these that some day may emanate an invention that will startle the electrical world. All these technical schools will display at the exposition specimens of their Radio handicraft. The Boy Scouts and the Girl Scouts also will have an exhibit at the show.

The exposition advisory committee consists of W. S. Hedges, Radio editor, Chicago Daily News; J. C. Hail, City Hall Station, WBU, Chicago; G. H. Jaspert, Westinghouse Electric & Mfg. Co., Station KYW, Chicago; F. D. Pearne, department of electricity, Lane Technical High school, Chicago; L. R. Schmidt, Radio inspector, 9th district, Chicago; Chas. A. Sloan, Radio editor, The Chicago Tribune; E. C. Rayner of the Radio Digest Illustrated, Chicago; Alfred Thomas, Jr., district manager Radio Corporation of America; Prof. R. E. Hughes, Evanston High school. The chairman of the committee is J. Elliott Jenkins of Chicago.

President Harding Is Enthusiastic Fan

Nation's Chief Listens In Almost Daily on High Powered Set

WASHINGTON.—President Harding has become one of the most enthusiastic Radio telephone fans in Washington. Scarcely a day goes by that he does not listen in on the receiving set specially installed for him a short time ago by the Radio experts of the navy department.

The President is quite fortunate, as his set can take a wave length of 25,000 meters, while the average amateur cannot receive on a wave much longer than 375 meters. Under ordinary conditions the President can hear not only all the stations in the United States but also those in Hawaii, Europe and Panama, although the overseas stations do not send in voice but in the International Morse code, which the President is yet unable to read.

The receiving set is placed in a bookcase near the President's desk in the White House. The aerial goes out from the roof to one of the tall trees on the south side of the mansion; however, at a later date the navy department intends to supplant this with an indoor "cobweb" antenna.

BODY IS AERIAL

(*Continued from Page* 1)

For a time the captain and his friends were content to listen to the program of the evening. Then the owner of the set was seized by a fever of experimentation. It was while he was demonstrating some of the things of which his set was capable that he stumbled onto something of which he himself would have thought was quite impossible.

The ground wire of the set had been disconnected to demonstrate that the set would receive as usual. Then the captain, his hands slightly moist with perspiration, unhooked a three-foot insulated copper wire leading to his outside aerial and by accident held the bare wire or exposed end of the wire between his fingers. To his surprise music, faint but audible continued to reach his ears through the head phones.

Hastily he removed the insulation from half of the three-foot copper wire and then tuned in his set to its most delicate adjustment. He divided up the available listening apparatus and gripping the wire firmly in his hand, told the guests to listen. They were amazed. Before their eyes was the set functioning without a ground connection, with the body of their host as an aerial.

Captain Muse clamped a pair of head phones on his phonograph so that the horn would act as an amplifier. Then he held the bare copper wire in his hand and the room was filled as if with distant music. He transferred the copper strand to his mouth and the harmony instantly was intensified by the more perfect conduction.

He asked another officer to take hold of the wire with him and learned that the music came in stronger by virtue of the dual aerial. A third, fourth and fifth man attached himself to the wire and its non-insulated surface and the music became so strong that the doors of the phonograph had to be closed. When all the men let go of the wire so that it dangled in mid-air the sound stopped entirely.

HYPNOTIST CHARMS WOMAN BY RADIO

Successful Test Completed on Atlanta Stage From Station in Newspaper Office

ATLANTA, GA.—A hypnotist from a broadcasting station in a local newspaper office brought under his control and put to sleep Miss Beatrice Kyle on the stage of the Lyric Theater. Committees of disinterested persons both at the broadcasting station and the theater declared the test completely successful. The following evening the hypnotist awakened his subject by Radio.

Before casting the hypnotic spell over his subject, Vishnu the hypnotist, told his audience of the effect that his suggestions might have on some persons present. On his advice, several, who afterward said that they felt themselves growing sleepy while the experiment was in progress, left the theater to avoid being also hypnotized.

Miss Kyle within a few seconds fell asleep, and slowly was raised from her chair limp. Vishnu's voice then commanded her to become rigid. Instantly her muscles flexed and attendants lifted her by her ankles, thus showing her body to be stiff.

Stage of River Radiophoned

DAVENPORT, IOWA.—Realizing the interest that people in this vicinity have in present river conditions, the Palmer school started Radio broadcasting of river data today. The information broadcasted is obtained from the local station on the weather bureau.

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CONTENTS

Looking Ahead

Broadcasting Stations of note will be illustrated and described in our next issue. These pages will contain articles from well informed writers from different parts of the country.

Radiophone Broadcasting Stations are corrected each week and brought up to date. This feature will be of interest to every owner of a receiving set.

Instructions for the Beginner, by Harry J. Marx. Valuable information for the amateur and novice. There is also a clip sheet, which gives diagrams and hook-ups useful for every owner of a set.

How to Make. A whole page will be devoted to kinks and how to make apparatus at home. An exchange of ideas on stunts worked out by the amateur.

MARKETING MEETING HELD BY RETAIL MEN

Association Considers Plans for Co-operative Broadcasting by Dry Goods Stores

NEW YORK—Special to Radio Digest—The marketing of Radio by retail stores, and particularly the consideration of plans for cooperative broadcasting by these stores, were the subjects for which a conference of the National Retail Dry Goods Association was held at Hotel Pennsylvania.

In advance of this conference the Bureau of research and information of the association had compiled an exhaustive analysis of Radio telephony conditions in the United States. The report of this bureau shows that there are now in the United States seventy-one licensed broadcasting stations, of which seven are department stores. Of the seven, Philadelphia is the location of three; New York of one; Newark, New Jersey, of one; St. Louis, Missouri, of one, and Los Angeles, California, of one.

These stores constitute a chain of broadcasting stations extending across the continent with every station equipped to take up Radio sendings directly North and South within the boundaries of the United States. The risks, coupled with a vogue that is only in its formative stages, were recognized at the meeting, as was the possibility that the demand might materially slacken or that so many firms might be coaxed into what at present looks like a very fruitful industry that merchandise values and qualifies might be completely reversed.

David Sarnoff, general manager, and Elmer E. Boucher, sales manager, of the Radio Corporation of America, explained the difficulties under which they are working and expressed a wholehearted desire to co-operate with the dry goods men in their movement.

A committee of five men was formed to cover the five main geographical divisions of the country. They are F. W. Tully of the R. H. White company, Boston, for New England; C. S. Hammond, of Frederick Loeser and Co., Brooklyn, for the Atlantic Seaboard; Joseph Fisher, of Kirby, Block and Fisher, resident buyer, for the South; Joseph V. Ryan, of the J. L. Hudson company, Detroit, for the Middle West, and Alfred Fanti, resident buyer, for the West.

As the National Retail Dry Goods Association is not a merchandising body, it may be necessary to form a separate organization, but so long as the Radio committee is investigating, it will be part of the parent body.

Retail stores, the National Retail Dry Goods Association's Research Bureau points out, must also take the lead in broadcasting, serving in no localities a function more useful than in the sparsely settled districts, where their normal capital investments point to them as the natural broadcasters as well as vendors of Radio equipment.

Under conditions of flood, storm, fire and other disaster the enterprising store in the rural district will remain a rock of refuge, with its broadcasting station, for passing the warning and for summoning aid.

Under normal conditions, it becomes the reliable daily ally of the United States department of agriculture in transmitting to farmers weather forecasts, national and local produce quotations and practical lectures by the government's own experts on husbandry. The farm produce price situation, as it now exists, calls for the interjection of a factor such as the store broadcasting station to provide the American farmer with the practical equivalent of the stockbroker's ticker and to place him on even terms of information with the middleman handling his various crops.

RADIO SHOW TO BE HELD IN MILWAUKEE

MILWAUKEE.—Plans for an exhibition covering every phase of the Radiophone and Radio telegraph field will be held at the Auditorium June 21 to 25. Amateurs will play a large part in putting on the show. Most of the exhibits will be arranged to attract the fellow who has put together and operated his own Radiophone or Radio telegraph set.

BROADCASTS FASCINATE THE NEWEST RADIO FAN AMONG THE PICTURE FOLKS

Lois Wilson, Paramount favorite, listening in on a broadcasting concert ©U. & U.

EQUIPS AUTOS WITH SETS

Sales Force to Be in Touch with Their Own Office

CAMDEN, N. J.—Arrangements are now being made for the installation of receiving and sending stations in each of the three offices of the Thomas Barlow Real Estate Company. At the same time every automobile used by the sales force will be equipped with a receiving station.

In this manner every salesman will be in constant touch with each of the three offices while they are within a radius of twenty miles. Consequently, prospective purchasers can be put in touch with any salesman.

PILOTS USE RADIOPHONE

Shore Stations Relay Messages to Pilot Sloops at Sea

SAN FRANCISCO, CAL.—Steamships entering the port of San Francisco no longer will be held up in foggy weather for the pilot boats to come alongside with a pilot. All pilot boats which put out from the Golden Gate have now been equipped with Radiophones.

As soon as the steamer arrives off the headlands and sends a Radiophone message for a pilot the message is relayed from shore to one of the Radio equipped pilot sloops and the latter immediately puts off with a pilot for the incoming ship.

RADIO APPROACHES BUSINESS STATUS

MOVEMENT THOUGHT PAST THE CRAZE STAGE

It Is Said Manufacturers' Output Only Limits Number of Receiving Stations

WASHINGTON—Special to Radio Digest—Radio which started as a scentific experiment only, recently has become a craze, but now certainly it is rapidly approaching the status of a business, or perhaps a profession.

Even the experts do not dare estimate the number of receiving stations, although 600,000 has been hazarded as a fair guess, most of them saying that the output of the manufacturers only is the limit to which receiving stations will go. It is known, however, that there are 18,690 sending stations today; this surprising figure was reached on April 15 and includes commercial, ship and amteur stations licensed by the Department of Commerce. Of the total, 15,907 are land stations, of which 678 are commercial, the balance being amateurs and special amateurs.

There are ten trans-oceanic companies operating in this country. One hundred and twenty other stations licensed to operate from city to city, while 30 "PG" stations are licensed to communicate from the coast to ships.

The number of limited commercial stations commonly called Broadcasting stations, which send out Radio telephonic entertainment, market and weather reports, reached 182 on April 15, but other applications are on file and the daily mail brings dozens of them. There were only 67 such stations on March 10, showing an increase of nearly 3⅓ a day. Thirty-two were issued during the past week. Special stations total 534, comprising 213 experimental, 123 technical, mostly colleges, and 198 special amateur stations. There are today 15,031 regularly licensed amateurs transmitting, and of course receiving also, all of whom are licensed through their district inspectors in the nine districts into which the country is divided for their convenience.

American ships to the number of 2,783 are carrying radio and are listed as ship stations; this number is nearly four times the total ships which were licensed before the war, which indicates the growth of radio on the high seas.

The Radio telephone is rapidly coming into ordinary business life:

Among the 32 new broadcasting stations licensed recently, Los Angeles secured eight, including one license for a laundry and dye works. St. Louis opened three stations, one of which is operated by the local Chamber of Commerce; six newspapers took out broadcasting licenses, bringing the total number daily papers sending news and entertainment to 23.

Of course there are many Radio corporations, electrical manufacturing equipment companies sending entertainment, but there are also hardware and departmental stores, oil, stone and motor dealers, as well as chambers of commerce, municipalites, churches and colleges.

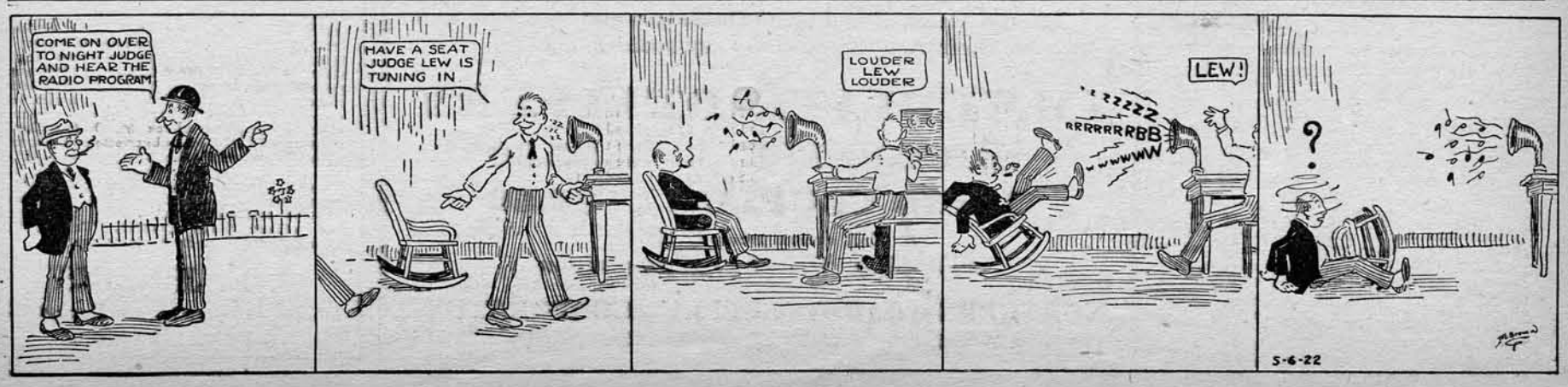
PLAN STOLEN CAR SERVICE

Dayton Automobile Club Will Broadcast Theft Information

DAYTON, OHIO.—Members of the Dayton Automobile Club are to have another service added to their membership. Paul E. Ackerman, secretary of the organization, has made arrangements to have information concerning stolen cars broadcasted by the Rike-Kumler Radio station.

The service will be available at any hour of the day. In this manner the description of the car will be picked up within a few minutes after the theft has been reported.

THE ANTENNA BROTHERS — Spir L. and Lew P. — RADIO K. O. IN ONE-STEP



HOW TO OPERATE A RECEIVING SET

SECOND OF A SERIES OF STANDARD EQUIPMENT

Simple Explanation of All Essential Parts Illustrated So Beginners Can Get Broadcasts

See Diagram Page 5

The set shown on page 5 illustrates the parts and method of connecting the Westinghouse Detector Amplifier, Type DA. This set consists of two separate units. The one is the Type RA Short Wave Regenerative Tuner, and the other is the Type DA Detector and Amplifier Unit, containing the three vacuum tubes with their controlling elements.

Tuning Unit Connections

The two parts are connected together by means of straps on the top and bottom. In addition the four parallel binding posts are connected together as shown in the illustration. That is the two on top marked "Grid" are connected together. The second set of two marked "Fil. G'd" are connected together and are also the terminals to which the ground wire is connected. Likewise the third set of terminals marked "Tickler" are connected, also the fourth set marked "Plate." This completes the connections between the two units.

The extra terminal on the tuning unit is the one to which the aerial lead-in is connected, and is therefore marked "Ant." This completes all the connections on the Tuning Unit.

Detector Amplifier Unit

On the detector amplifier unit we have eight binding posts, the four on top have already been accounted for in the connections between the two units. The lower four are the connections for the batteries, of which we require two. We need the usual 6 Volt "A" battery and also the 45 Volt "B" battery, with a 22½ volt tap. As before, two batteries can be used instead of the one "B" battery, one 45 volt and one 22½ volt. Starting in with the lowest terminal, we find that this must be connected to the positive terminal of the "B" battery using the full 45 volt output. The amplifier tubes always require the full 45 volts for proper operation. The second terminal from the bottom is connected to the 22½ volt tap of the "B" battery and supplies the current for the detector vacuum tube. The detector tube requires only 22½ volts for operation, this current however is not the one that lights up the tube, but is the one that pushes the broadcasting wave through the tube and to the receivers. The third terminal from the bottom is the connection for the negative terminal of the "A" battery. This furnishes the 6 volt currents that lights up the three tubes and is really required to heat up the inside of the vacuum tube making it easier for the broadcasting wave to pass through the tube and on to the receivers. The fourth terminal from the bottom is connected to the positive side of the "A" battery and the negative side of the "B" battery. This closes the circuit of the two batteries, as we must have one side for the current to flow out of the batteries and another side for the current to come back in, very similar to the return pipe on a heating system.

Head Receiver and Plug

The Head Receivers have a cord, at the end of which we have a round brass terminal called a plug. This plug fits into the three holes at the base in the front of the detector amplifier unit. These holes are called jacks and act as connections from the set to the receivers. The first hole marked "Det" connects the receivers to the detector part of the set, that is to say we are connected to the receiving set, but are not trying to amplify the sound as received. We might compare it to the human sight, we can see without glasses but we wear glasses so as to bring the objects nearer by enlargement. The amplifiers bring the sound nearer by making it louder. The second and third jacks are marked "1st Amp" and "2nd Amp" and serve to connect the receivers to the amplifying steps, giving us the benefit of louder tones.

Tuning the Set

In tuning the set we insert the plug in the detector jack and light the detector bulb by turning the detector rheostat knob, this controls the amount of current that lights up the Vacuum Tube. Too much current will give a lot of noises in the receivers, so the knob should not be turned too far. Then turn the large dial in the tuning unit, this tunes the set, so that we get the proper wavelength for receiving. If broadcasting is going on, and all connections have been properly made, reception should be heard in the receivers, turn the dial until the tones are the loudest. Then turn the small dial in the lower left hand corner of the Tuning unit, which will permit a more accurate adjustment for wavelength making the tone louder and clearer. If the third dial, in the lower right hand corner of the Tuning unit, is now turned, it will be found that this will help in eliminating other noises that are heard and will bring out the broadcasting much clearer than before.

The receivers are then plugged into the first stage of amplification and the second or amplifier rheostat knob turned to light up the amplifying vacuum tube. As before, too much current will add a lot of noise to the reception without improving the reception. When this is adjusted properly, the receivers can be plugged into the third hole or the "2nd Amp" jack. A slight readjustment of the Amplifier Rheostat Knob may be necessary, as this one knob controls the current to both the amplifying vacuum tubes.

Cause of Faulty Reception

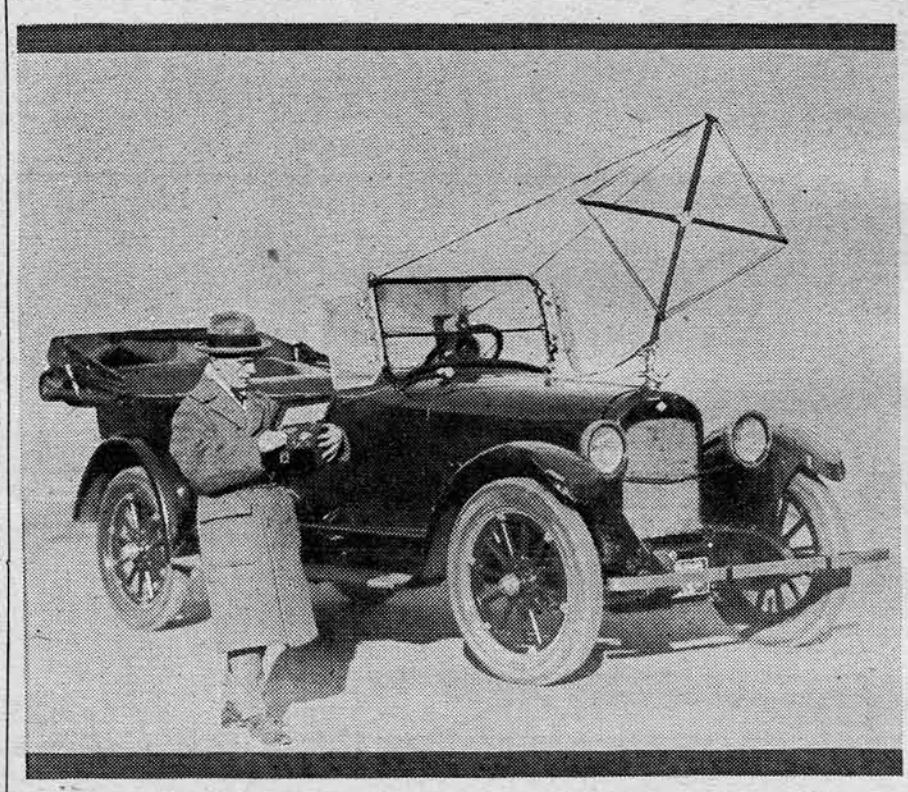
Weak Signals:
- Open antenna or ground circuit.
- Incoming signals outside wavelength range of Tuner.
- Improper tuning.
- Defective detector vacuum tube.
- Defective amplifier tube.
- Storage battery polarity reversed.
- "B" battery polarity reversed.
- Insufficient filament current.
- Defective telephone head set.
- Low "B" battery voltage.

Inability to tune:
- Open antenna or ground.
- Antenna too small.
- Signal outside wavelength range of tuner.

Local noises:
- Too much tickler coupling.
- Loose contacts in "B" battery circuit.
- Defective "B" battery.
- Tubes loose in sockets.
- Defective tubes.
- Loose or worn telephone plug.
- Defective contacts in head telephones.
- Imperfect contact at rheostat.
- Condenser plates touching.

Poor Amplification:
- Storage battery leads reversed.
- Defective amplifying tubes.
- Low resistance of defective telephone head set.

PUZZLE—FIND THE CHAUFFEUR!



Although gasoline supplies the motive power of this car, it is started, backed up, turned around and guided entirely by radio devices.

© Kadel and Herbert.

Radiophone Training For Disabled Soldiers

Course in Receiving and Sending at Elgin Hospital

ELGIN, ILL.—The ex-service men receiving vocational training at the Elgin State Hospital will soon have a receiving set to furnish them with entertainment. Only a receiving set will be put in at the present time, but it is intended later to make Radiophone work a part of the course of training when a sending apparatus will be installed.

FINDS SISTER BY RADIO

Amateur Relay Locates Lost Relative Among Orphans

DAYTON, OHIO.—An amateur living at Elyria recently found a long lost sister with his Radio outfit. He asked his amateur friends in other cities to help him and she was located in an orphan home.

Radio New "Speaking Tube"

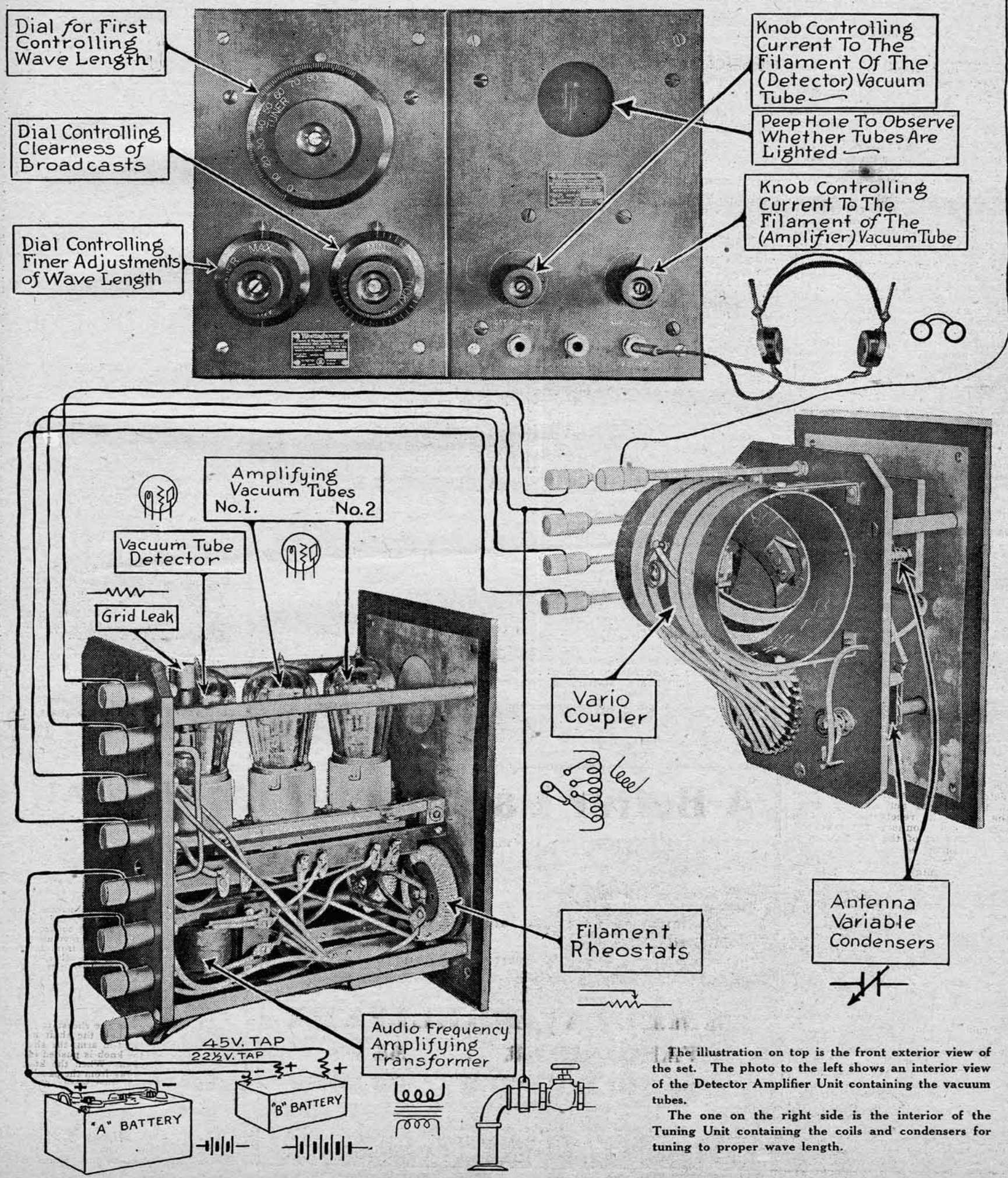
The Radio "speaking tube" is coming, say architects. New apartments have instead of speaking tubes, telephones from the main entrance to each suite. The receivers may be connected easily for use as Radio.

Radio Receiving Sets

To facilitate the receiving of broadcasts and to further the knowledge of new Radio fans in the operation of apparatus, the RADIO DIGEST presents the second of a series of illustrations of standard receiving sets.

Each part is designated and named and its purpose is explained. Many of the new terms that the beginner in Radio hears or reads are given, with an arrow pointing to the part of the unit named. Although the instrument shown herewith may not be the one owned by the reader, nevertheless many cloudy points in his mind about the various units of a standard receiving set will be cleared up.

Instructions and full directions for operating and tuning the set shown are given in the first column of page four. Many of the points given there are not only applicable to the set shown, but are valuable for improving the reception on other sets. Below in the three illustrations are shown the front and interior views of a standard receiving set manufactured by the Westinghouse Electric & Manufacturing company, East Pittsburg, Pa. This set is known as Westinghouse type D A.



The illustration on top is the front exterior view of the set. The photo to the left shows an interior view of the Detector Amplifier Unit containing the vacuum tubes.

The one on the right side is the interior of the Tuning Unit containing the coils and condensers for tuning to proper wave length.

W O K BROADCASTS STIR SOUTH

NEW PINE BLUFF STATION AROUSES ARKANSAS FANS TO BURST OF ENTHUSIASM

Programs Heard All Over Country—Cripple Children Listen In At Local Hospital—Telephone Users Hear Church Services

PINE BLUFF, ARK.—Special to Radio Digest.—Of the hundreds of Q. S. A. letters and cards received by the Arkansas Light and Power Company since the establishment of its broadcasting station at Pine Bluff early in March, the one saying: Dear W. O. K.—We admire the way you say *saw*. Ark-kan-saw. We know you are proud of it. We enjoy your concerts hugely, so here's to Pine Bluff, Ark-kan-saw. C. Y. M. (Morgan.), best pleased H. C. Couch, president of the company and responsible for the establishment of the broadcasting station.

"One of the chief aims of WOK is to put Arkansas on the Radio map," Mr. Couch said in commenting upon the card. "If we succeed in letting a few thousand Radio fans in the middle and southwestern states know that the correct pronunciation of Arkansas is Arkansaw, it will be a good thing."

That the station has already turned the eyes and ears of thousands of Radiophone owners toward Pine Bluff and Arkansas is conclusively proven by the letters and cards that pour into the station daily. One large filing cabinet is already jammed with them and two stenographers spend most of their time answering those who ask for details of the station, its programs and other information.

Heard All Over Country

WOK is one of the largest telephone broadcasting stations in the South or Southwest. When conditions are favorable its programs cover 25 states from North Dakota to the Mexican border and the Gulf and from Colorado to North Carolina. Among the receiving stations that have reported listening in regularly on WOK concerts are Kelso, N. D., Laredo, Tex., Barnard, N. Y., West Bend, Wis., Lattimore, N. C., West Baden, Ind., Chicago, Jackson, Mich., and hundreds of others closer to Pine Bluff.

When the station was established there were less than a dozen first class receiving sets in operation in Arkansas. Within a month the number had increased to scores and inside of six weeks the station was being deluged with long distance calls from persons in Arkansas, Mississippi and Louisiana, asking the station to "start up" so the caller could test out his set before the next program. After the second program the manager of a popular hotel at French Lick Springs, Ind., wrote that hundreds of his guests enjoyed the programs through the use of a loud speaker. The service has already been extended to include nightly broadcasting of baseball scores, news bulletins, weather and river reports, Sunday church services, and will soon add to the number of musical programs.

Pine Bluff People Get "Bug"

The establishment of the station started a run on Pine Bluff electrical dealers for all kinds of Radio supplies. The local telephone company was deluged with complaints of stolen receivers after small boys found out that a 75-ohm receiver, a piece of galena and some wire could be used to make a receiving set that would work at close range. Men caught the fever and hastily bought crystal assembled sets only to discard them after a few days and begin wiring for amplifying tube sets. The telegraph operator at the cotton exchange demonstrated a crystal set on the floor of the exchange one day after the market closed and in a week's time more than half the members either had bought or were trying to get delivery on sets. One of the most rabid fans among the cotton men had two aerials installed at his home. If anyone disputes his statement that he can pick up more distant stations and tune in faster than anyone in town, the challenger promptly is offered the chance to prove it for a side bet by installing his set side by side with the champion's, each set being hooked to identical aerials.

Crippled Children Hear Concerts

Soon after station WOK was established, Mr. Couch donated to the children's ward at a local hospital a vacuum tube detector set and four head phones. The ward is maintained for poor children by the Rotary Club, aided by other organizations. The receiving set has brought more happiness into the ward than anything that has ever been donated for it according to nurses in charge.

"To watch those children listen in on one concert was well worth the price of the set," Mr. Couch said after attending a concert at the ward. "I was particularly impressed by one little girl who had lain in bed many weeks with a spinal affliction. When a head set was clamped to her ears and she heard her first radio music her eyes lighted up and she smiled for what her nurse said was the first time in weeks. She was so eager that we hadn't the heart to have her change about with the others, so she listened in for the rest of the entire concert."

Send Out Baseball Returns

Station WOK broadcasts results of the National, American, Southern, American Association, Texas and Western baseball leagues nightly at 7:30 o'clock, central time. Weather reports and stages on the Mississippi and Arkansas rivers, together with brief important news bulletins are sent out at this hour. A phonograph record is played before the announcing begins to enable listeners to tune in. Musical programs by local orchestras and artists are broadcasted from 8 to 9:30 p. m. standard time, Tuesdays and Friday nights. Services of different local churches, including the choir music, is broadcasted each Sunday morning and night, at 10:30 a. m. and 8 p. m.

Use DeForest Type

The transmitting set of the station is a DeForest, Type OT 101, ½-kilowat, using a 120-volt 9 ampere generator to light the tube filament and a ½-kilowat, 1,500-volt generator to supply current on the plate. The set has a three electron audion tube. It sends on a wave length of 360 metres and four amperes radiation. The present aerial is a four-wire T type antenna, 90 feet high. The Arkansas light and power company is now erecting a new three-story office building and in the new location, after June 1, the aerial will be raised considerably higher on steel towers placed on the roof of the building. The exact height of the new aerial has not yet been determined.

Church Service Broadcast

The local telephone company co-operates in the broadcasting of church services. Two microphones are placed in the church from which the services are to be broadcasted, one in front of the choir loft and the other in front of the pulpit. These are cut in on a telephone line which is plugged in on a line in the sending station which is connected direct to the transmitting set. The operator of the set, using a crystal detector and head phones in the sending room, listens in on the program and is able to plug out the telephone line and insert a microphone whenever necessary, to make announcements direct from the sending station.

Send Dance Music Weekly

The bi-weekly musical programs consist of 45 minutes of dance and popular music by an orchestra and 45 minutes of a program by various musical organizations of the city. Orchestras furnishing music alternately are Kueck's orchestra, Baim's Novelty Five and the Hope Orchestra. Among the musical organizations that have been co-operating in programs are the musical coterie, Etude club, Business and Professional Women's club and the choirs of Trinity Episcopal, the First Methodist, Lakeside M. E., First Presbyterian, First Baptist, First Christian and Temple Anshe Emeth churches.

FIRST BUG ON RECORD FOUND; BEGAN IN 1904

H. J. Power Made Workable Receiver Eighteen Years Ago

Harold J. Power is the "Father of Broadcasting." He is the man who brought Radio to a popular basis. His story is a modern romance.

"It was during a writing lesson in grammar school that I became interested in Radio. This was in 1904, only eighteen years ago," said Mr. Power, according to John B. Chapple in The National Magazine.

"At the top of our book was a sample specimen of handwriting to copy. The sentence 'Marconi, the inventor of the wireless telegraphy' riveted my attention. Marconi's name and wireless seemed like magic words. Electricity had always had a great attraction for me. I had used batteries and simple apparatus already. I thought if I could only send a wireless message across our back yard at home it would be wonderful.

"My first outfit consisted of a simple metal filing coherer with a relay and telegraph sounder. I put the set up in my mother's kitchen. Out of a box I built a table. Then I attached a little post to my mother's clothespole in the yard with the wires running down from it.

"It took every spare moment for a year before I received the first message, but I had decided, by gosh, that I was going to get a message if it took fifty years."

"From where did you receive your first message?"

"From the Boston Navy Yard, about five miles away. Believe me, I was a happy boy that day. It will always remain the great thrill of my life. I caught only about one-fourth of the message—just two or three lines. The instruments did not work consistently.

"Gradually the equipment was improved as new inventions were made, and in 1909, when the United States fleet returned from its trip around the world, my equipment was perfected, and my little station was one of the first to pick up the message of the incoming fleet from a distance of about one thousand miles at sea. The operator at the Boston Navy Yard, who was friendly, was surprised to learn that I had received the message before he got it. Later we confirmed this fact. He had been out at lunch when the message first came in. It seemed a wonderful thing to receive a wireless message from a distance of one thousand miles.

"In the spring of 1909 I was listening in one morning and heard the steamship Harvard calling to the Boston Navy Yard. The Navy Yard station was not operating or the operator was not on watch, for the ship received no response. They had many important messages, as they were anchored down the harbor in a heavy fog. I called the Harvard and offered to deliver them to the local office in Everett and dispatch them. He gave them to me and I sent them off." The outcome of this was that the company owning the equipment on the Harvard offered him a position the following summer as commercial operator on the steamship Yale, running between Boston and New York. He was then sixteen years old.

Station WOK, operated by Arkansas Light and Power Company. Miss Leonora Sparks, opera singer, shown with transmitter in hand.

PARSON MARRIES 'EM BY RADIO

CHURCH BROADCASTS MARRIAGES

Rev. M. E. Dodd, Shreveport, Louisiana, to Officiate by Airphone from New Station

SHREVEPORT, LA.—Special to Radio Digest.—Marriage by Radio is one of the tasks set for the powerful broadcasting station being installed in the new half million dollar building of the First Baptist Church at Shreveport, Louisiana, according to Dr. M. E. Dodd, the pastor.

Dr. Dodd says a marriage of this kind will be just as legal as any, and the ceremony can be made as solemn as if the pastor were present. This plan will permit a couple to have their wedding solemnized by the pastor of their choice who may be many hundreds of miles away. The tendency of the groom to arrive late for the wedding is the only obstacle seen by Dr. Dodd, and he believes this can be provided for.

First Church Station

This church will be the first in the world to operate in its own plant a powerful broadcasting station. The equipment is partly installed and will be in operation probably early in May.

The station will have a normal radius of 1,500 miles, but under favorable weather conditions can be picked up from coast to coast, and by ships many hundred miles at sea. It will use a 200 watt set, sending on a 360 meter wave length. The call number has not yet been assigned.

Suspend Lofty Antenna

The antenna will be suspended between the 10-story tower of the church and a steel tower built on an office building nearby. It will consist of four copper wires and the necessary spreaders, and will be 125 feet long and 100 feet above the ground.

The receiver will be inconspicuously located in the pulpit, and will be connected with the motor generator on the eighth floor of the tower and the antenna by wires running under the flood and up the elevator shaft.

Broadcast Other Churches

Several hundred churches in this section that are without pastors or that have services only once or twice a month have installed or are planning to install receiving sets, to take advantage of the broadcasting of religious services from the church at Shreveport.

Many of these churches that are now opened only at the rare intervals a pastor visits them will now have services twice on Sunday, and often through the week. Instead of listening to the preacher in their own pulpit, they will hear the minister in the city church many miles away. When revival meetings are held here, churches throughout the Southwest will take part.

Mother to Hear Pastor

Mrs. Lucy Williams Dodd, mother of the pastor, will hear her son preach at her little home in Trenton, Tenn., four hundred miles away. Mrs. Dodd, nearly 80 years old and an invalid, has not heard her eloquent son in more than two years. She recently expressed the fear that she would never hear him preach again. This was the suggestion that led to the installation of the broadcasting station.

Hospitals, old people's homes, orphanages and many other institutions in Louisiana and neighboring states are installing receiving sets to take advantage of the church services.

Sermons, lectures, choir and congregational singing, organ recitals, chime concerts and daily news reports will be among the features broadcasted. The church auditorium, the largest in the city, will be used as a civic center, and the world's leading singers and lecturers will be heard there. Their concerts and lectures will be broadcasted.

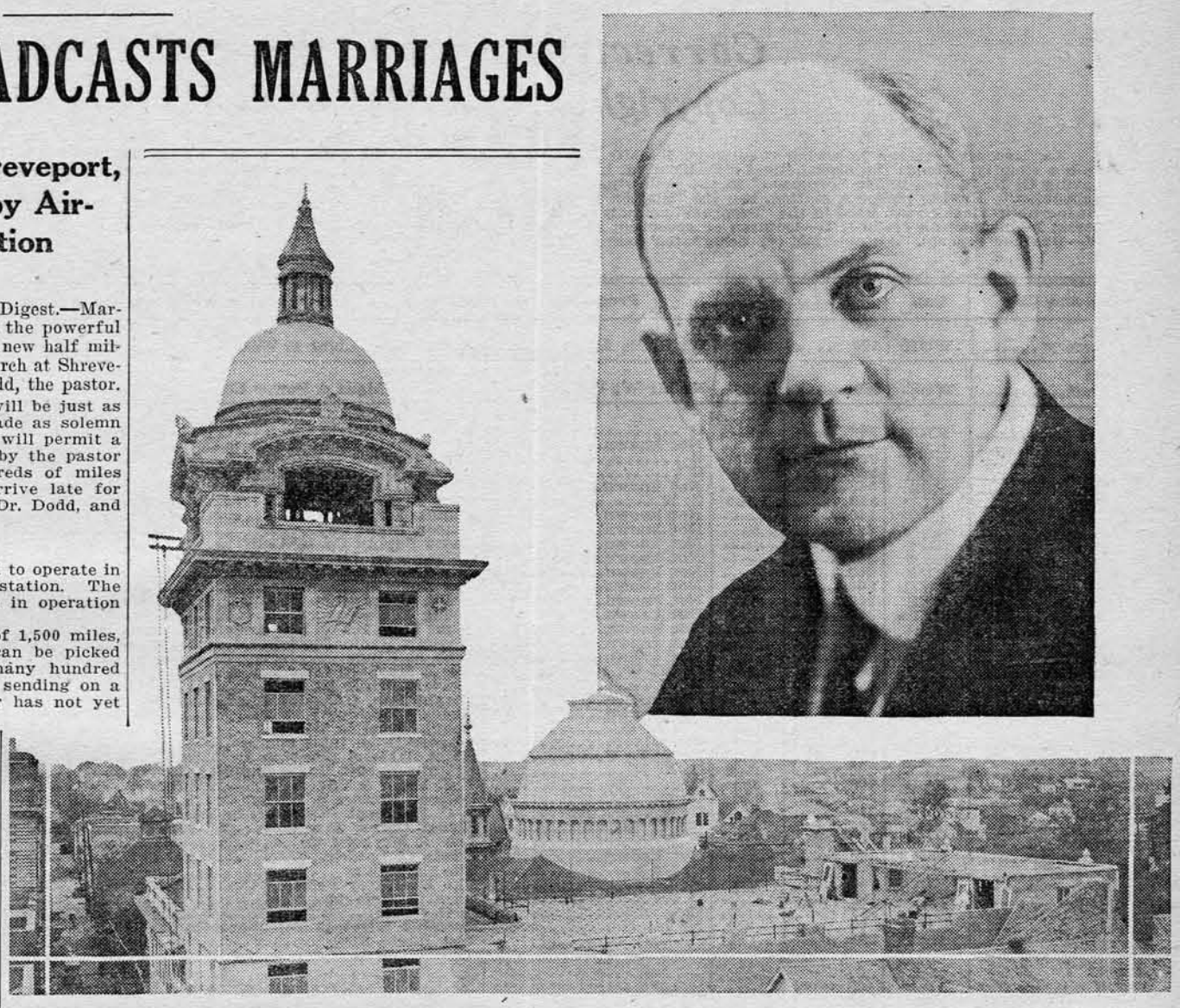
World's Largest Baptist Church

This church, one of the largest Baptist churches in the world, was dedicated Sunday, April 22. It was built at a cost of $500,000. A main building of four stories and a ten-story tower contain 51,000 square feet of floor space, with a total seating capacity of 8,000.

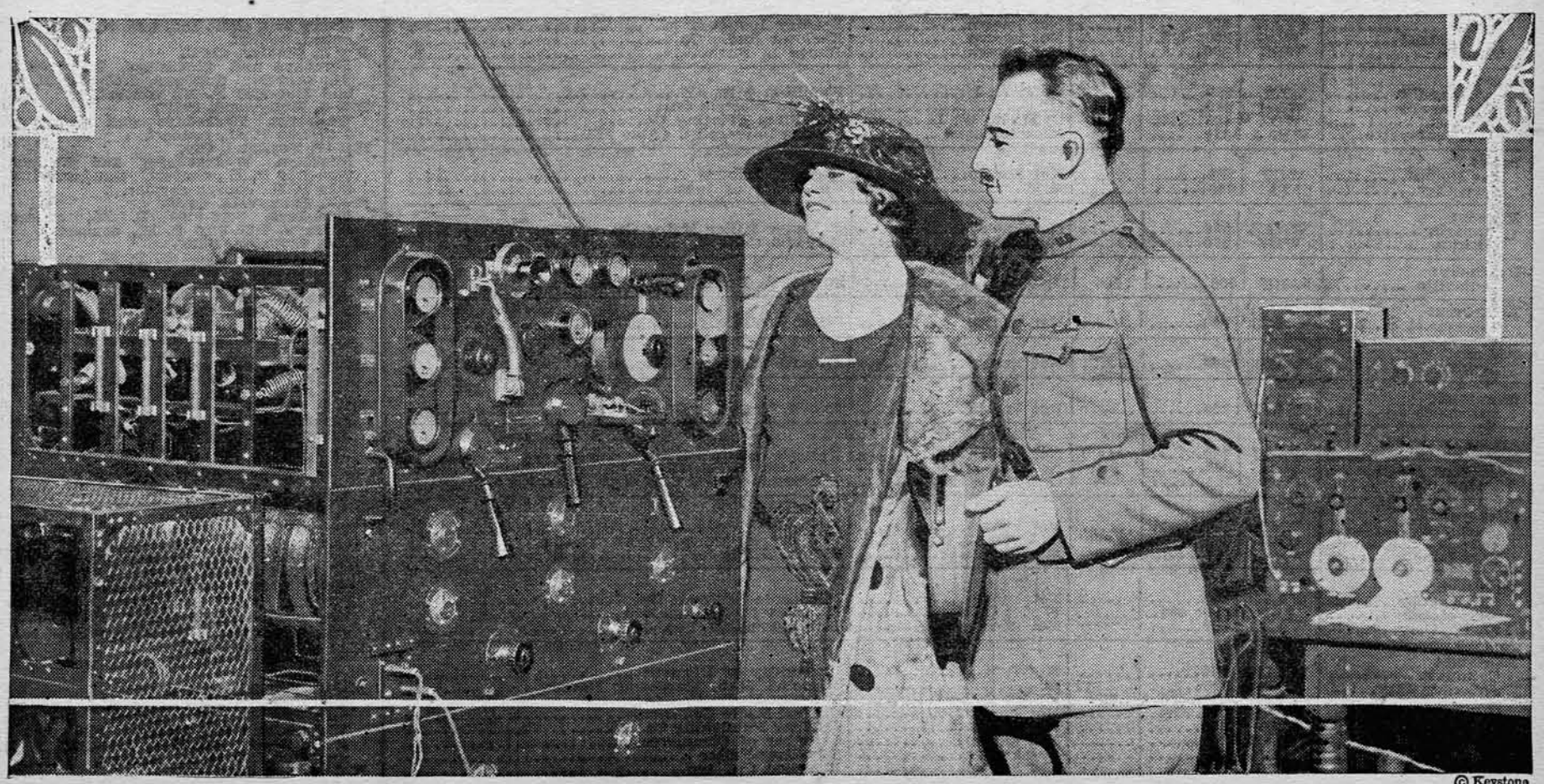
The tower provides quarters for a Sunday school of 3,000.

A roof garden accommodates 1,000 people. Outdoor services, concerts and socials will be held here during the summer.

A 13-bell chime, of which the largest bell weighs 3,000 pounds, located on the ninth floor of the tower, will furnish a daily feature of the broadcast program.



View of tower First Baptist Church at Shreveport. Roof garden to right of tower. Dr. M. E. Dodd (insert)



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Showing interior of broadcasting station at Beloe's Island, N. Y. Lieut. H. S. Paddock explaining transmitter to Miss Margurette Walz, Philadelphia Policewoman

Radiophone Broadcasting Stations

Corrected Every Week. Form Copyrighted by RADIO DIGEST, 1922

Explanatory.—In the following tabulation, RADIO DIGEST will attempt each week to make it easy for the reader to hear all the broadcasting stations in his vicinity. Hence the alphabetical classification, by states and then by cities, is used. Stations whose schedules of operating hours are known (those having C; N; R, etc., under "Program" in the following tabulation), are listed at the end of the table, alphabetically by call letters, under the head "Station Schedules." Having picked a station, use the "Station Schedule" list to learn its operating hours and what you will hear during the various hours. The following abbreviations are used in the "Program" column of the tabulation: A—agricultural bulletins, etc.; C—concerts; E—educational; F—fire; H—health reports; I—instruction (radio); L—lectures or speeches; M—market reports; N—news; P—police; R—religious; T—time signals; V—vaudeville or entertainment; W—weather reports. An asterisk (*) designates code telegraphy.

State and City	Call	Wave Lengths	Miles Range	Program	By Whom Operated
Alabama:					
Montgomery	WGH	360	1,000	W; R; E; A; M; C	Montgomery Light & Water Power Co
Arkansas:					
Pine Bluff	WOK	360	1,000	N; M; W; C; R	Arkansas Light & Power Co
California:					
Berkeley	KRE	360		C	Maxwell Electric Co
Fresno	KMJ	360		Not known	San Joaquin Light & Power Corp
Gridley	KFU	360	500	C	The Precision Shop
Hollywood	KGC	360	300	C	Electric Lighting & Supply Co
Long Beach	KSS	360		Not known	Prest & Dean Radio Research Lab
Los Altos	KLP	360	1,500	C; N	Colin B. Kennedy Co
Los Angeles	KJC	360		Not known	Standard Radio Co
Los Angeles	KNR	360		Not known	Beacon Light Co
Los Angeles	KNV	360		Not known	Radio Supply Co. of Calif
Los Angeles	KON	360		Not known	Holzwasser, Inc.
Los Angeles	KUS	360		Not known	City Dye Works & Laundry Co
Los Angeles	KWH	360		Not known	Los Angeles Examiner
Los Angeles	KXS	360		Not known	Braun Corporation
Los Angeles	KZI	360		Not known	Irving S. Cooper
Los Angeles	KJS	360		Not known	Bible Institute of Los Angeles, Inc
Los Angeles	KOG	360		Not known	Western Radio Electric Co
Los Angeles	KQL	360		Not known	Arno A. Kluge
Los Angeles	KYJ	360	1,000	C; M; W; N	Leo J. Meyberg Co
Los Angeles	KZC	360		N; C	Western Radio Electric Co
Modesto	KOQ	360		Not known	Herald Pub. Co
Modesto	KXD	360		Not known	Modesto Evening News
Monterey	KLN	360	150	W; M; C	Noggle Electric Works
Oakland	KLS	360	150	C	Warner Bros. (also operate 6XAM)
Oakland	KZM	360	200	N; C; L; V	Hotel Oakland (Preston D. Allen)
Oakland	KZY	360	1,500	C; R; N	Atlantic-Pacific Radio Supplies Co
Pasadena	KLB	360	300	C	J. J. Dunn & Co
Pomona	KGF	360	150	C; N; M	Pomona Fixture & Wiring Co
Sacramento	KVQ	360		C; N	J. C. Hobrecht (Sacramento Bee)
San Francisco	AG1	360; 1,450	50	C; I; L	Signal Corps, Presidio
San Francisco	KDN	360; 485	250	C; W	Leo J. Meyberg Co
San Francisco	KGB	360		Not known	Edwin C. Lorden
San Francisco	KSL	360	50	C; N; L	The Emporium
San Francisco	KUO	360	100	N; L	The Examiner Printing Co
San Jose	KQW	360		C	Chas. D. Herrold
Stockton	KJQ	360		C	C. O. Gould
Stockton	KWG	360	1,000	N; M; C	Portable Wireless Telephone Co
Sunnyvale	KJJ	360		C	The Radio Shop
Colorado:					
Denver	9WD	235		C	W. D. Pyle
Denver	DD-5	340	1,500	C; N; W; L	Fitzsimmons Hospital
Denver	KLZ	360; 485	1,000	N; W; C; M; R	Reynolds Radio Co. (also operate 9ZAF)
Denver	KOA	485		T; W; N	Y. M. C. A. (W. H. Smith)
Connecticut:					
Greenwich	WAAQ	360		Not known	New England Motor Sales Co
New Haven	WCJ	360		Not known	A. C. Gilbert Co
D. of C.					
Washington	WMV	360		Not known	Doubleday Hill Elec. Co
Washington	WDM	360		R; L; C	Church of the Covenant
Washington	WDW	360		Not known	Radio Construction & Electric Co
Washington	WJH	360	250	L; C; V	White & Boyer
Washington	WWX	1,160	600	W; M	Post Office Department
Washington	3YN	360		I	National Radio Institute
Georgia:					
Atlanta	WSB	360		Miscellaneous	Atlanta Journal Co
Atlanta	4CD	200; 375		N; C; L	Carter Electric Co
Illinois:					
Chicago	WGU	360		Miscellaneous	Fair Store
Chicago	KYW	360; 485	800	C; L; N; M; R	Westinghouse Electric & Mfg. Co
Chicago	WBU	360	1,000	P; F	City of Chicago
Peoria	9YAN	360		Not known	Bradley Institute
Rock Island	WOC	360; 485		Not known	Karlowa Radio Co
Tuscola	WDZ	360		Not known	James L. Bush
Indiana:					
Indianapolis	WLK	360		C; V; N; L	Hamilton Mfg. Co
Indianapolis	WOH	360	700	M; C	Hatfield Electric Co
Richmond	WOZ	485	300	C; M; N; W; L	Palladium Printing Co
West Lafayette	WBAA	370	100	Miscellaneous	Purdue University. (Also 9YB)
Iowa:					
Des Moines	WGF	360		Not known	Register-Tribune
Iowa City	9YA	360		M; N	University of Iowa
Kansas:					
Emporia	WAAZ	360		Not known	Hollister Miller Motor Co
Wichita	WEY	360		Not known	Cosradio Co.
Kentucky:					
Louisville	9ARU	200	200	N; I	Darrell A. Downard
Louisiana:					
Shreveport	WAAG	360		Not known	Elliot Elec. Co
Maine:					
Auburn	WMB	360		Not known	Auburn Electrical Co
Maryland:					
Baltimore	WKC	360		Not known	Jos. M. Zamorski Co
Massachusetts:					
Boston	WAAJ	360		Not known	Eastern Radio Institute
Medford Hillside	WGI	360	500	N; C; L; I; H; R; M	Am. Radio & Research Corp. (also 1XE)
Springfield	WBZ	360	500	C; N; L; R; M; E	Westinghouse Elec. & Mfg. Co. (also 1XAE)
Michigan:					
Dearborn	WWI	360		Not known	Ford Motor Co
Detroit	WWJ	360; 485	1,000	C; V; N; M; W; R; T	The Detroit News. (Was WBL)
East Lansing	WHW	485	150	M; W	Stuart W. Seeley
Minnesota:					
Minneapolis	WAAL	360		Not known	Minnesota Tribune Co
Minneapolis	WLB	360; 485		W; M; C; N	University of Minnesota
St. Paul	WAAH	360		Not known	Commonwealth Elec. Co
Missouri:					
Columbia	WAAN	360		M; W; N	University of Missouri
Jefferson City	WOS	485		M	Missouri State Marketing Bureau
Kansas City	WOQ	360; 485	300	M; W; C; L; R	Western Radio Co. (Also operate 9XAB)
Kansas City	WPE	360		Not known	Central Radio Co., Inc.
St. Louis	KSD	360		Not known	Pulitzer Publishing Co
St. Louis	WAAE	360		Not known	Chamber of Commerce
St. Louis	WCK	360		Not known	Stix-Baer-Fuller
St. Louis	WEB	360		Not known	Benwood Co., Inc.
St. Louis	WEW	360		W; M; C	St. Louis University

Your Directory—

To aid the beginner and to help him realize full benefits from his receiving station, RADIO DIGEST has compiled the accompanying list of radiophone broadcasting station. To use the "radiophone directory" to its maximum advantage, the reader should note the broadcasting stations nearest, and attempt to tune them in at the wave lengths given.

Broadcasting stations with regular schedules of operating hours, are given below. Doubtless a few stations have been omitted inasmuch as their schedules have not been reported to RADIO DIGEST. These will be added as reported. The kind of program broadcast by a station during its various operating hours is also given.

In fact, the reader, by means of RADIO DIGEST'S radiophone directory, can pick out his favorite program, the station he desires, or the time which he prefers to listen in. Time, in the following list of stations having schedules, is always given in the time used in the city in which the station is located, as for example "KYW, Chicago, Illinois," indicates that the schedule of KYW is given in Central Standard time, the time which is in use in Chicago.

The stations are listed alphabetically by call letters. The list, therefore, acts as an index to the foregoing table:

Station Schedule

A G 1, San Francisco, Calif.
Mondays, 7:00-9:00 P. M., concert and instruction in radio.

D D-5, Denver, Colo.
Daily except Sundays, 8:15 P. M., weather, news and concert. **Thursdays,** 8:15-9:30 P. M., special concert, and speeches additional.

K D K A, Pittsburgh, Pa.
Daily except Sundays, 10:00-10:15 A. M., 12:30-1:00 P. M., 2:00-2:20 P. M., 4:00-4:20 P. M., music; 7:30 P. M., bedtime stories; 7:45, news; 8:30-9:30, music and news. **Saturdays,** 3:00-4:00 P. M., concert. **Sundays,** 10:45 A. M., 3:00 P. M., and 7:30 P. M., church service.

K D N, San Francisco, Calif.
Daily except Sundays, 4:30-5:30 P. M., markets, news and concert; 7:10-7:30 P. M., financial news and weather; **Mondays,** 8:30-9:30 P. M., concert; **Thursdays,** 7:30-8:30 P. M., concert; **Saturdays** and **Sundays,** 8:15-9:00 P. M., concert.

K F C, Seattle, Wash.
Every day, eight hours, news, music and entertainment.

K F U, Gridley, Calif.
Mondays and Thursdays, 8:00-9:00 P. M., concert. **Sundays,** 3:00-4:00 P. M., and 8:00-9:00 P. M., concert.

K G C, Hollywood, Calif.
Tuesdays, Thursdays and Saturdays, 7:30-8:30 P. M., concert.

K G W, Portland, Ore.
Mondays, Wednesdays, and Fridays, 7:30-8:30 P. M., concert. **Sundays,** 7:30-8:30 P. M., church service.

K J J, Sunnyvale, Calif.
Tuesdays, 8:15-9:00 P. M., concert. **Fridays,** 7:30-8:15 P. M., concert.

K J Q, Stockton, Calif.
Wednesdays, 7:00-8:00 P. M., concert.

K J R, Seattle, Wash.
Daily except Sundays, 800-9:00 P. M., miscellaneous.

K L B, Pasadena, Calif.
Mondays and Fridays, 7:30-8:15 P. M., concert. **Sundays,** 3:00-4:00 P. M. and 8:00-9:00 P. M., concert.

K L N, Monterey, Calif.
Daily, 12:00-1:00 P. M., weather, markets and news; 7:00-8:00 P. M., concert.

K L P, Los Altos, Calif.
Mondays, 7:30-8:30 P. M., industrial news and concert. **Thursdays,** 8:30-9:00 P. M., concert. **Sundays,** 4:00-5:00 P. M., concert.

K L S, Oakland, Calif.
Daily, 12:00-1:00 P. M., concert. **Saturdays,** 7:30-8:15 P. M., concert.

K L Z, Denver, Colo.
Daily, 8:30 A. M., weather; 7:30 P. M., news; 9:00 P. M., weather. **Sundays,** 8:00-10:00 P. M., concert.

K N J, Roswell, N. M.
Daily except Sundays, 7:00-9:00 P. M., weather, stock and news. **Mondays, Wednesdays and Fridays,** 7:00-9:00 P. M., music. **Sundays,** church service.

K O A, Denver, Col.
Daily, 9:55-10:25, time and weather reports.

K Q V, Pittsburgh, Pa.
Daily except Saturdays and Sundays, 4:30-5:00 P. M., concert. **Mondays, Wednesdays and Fridays,** 9:30-10:30 P. M., concert. **Sundays,** 1:00-1:30 P. M. and 4:00-5:00 P. M., concert.

K Q W, San Jose, Calif.
Wednesdays, 7:30-8:15 P. M., concert. **Sundays,** 5:00-6:00 P. M., concert.

K R E, Berkeley, Calif.
Sundays, 1:00-2:00 P. M. and 6:00-7:00 P. M., concert.

K S L, San Francisco, Calif.
Daily except Sundays, 1000-11:00 A. M., concert and news; 2:00-3:00 P. M., concert and educational talk. **Sundays,** 2:00-3:00 P. M., concert and educational talk.

K U O, San Francisco, Calif.
Daily except Sundays, 3:00-3:30 P. M. and 5:30-6:45 P. M., news, etc. **Sundays,** 5:00-6:00 P. M., news, etc.

K V Q, Sacramento, Calif.
Daily except Sundays, 5:30-6:30 P. M., concert and news. **Wednesdays and Saturdays,** 8:00-9:00 P. M., concert.

K W G, Stockton, Calif.
Daily except Sundays, 4:00-5:00 P. M., news, concert and markets. **Tuesdays and Fridays,** 8:00-9:00 P. M., concert. **Sundays,** 200-3:00 P. M., concert.

K Y J, Los Angeles, Calif.
Daily except Sundays, 4:00-5:00 P. M., concert, markets, news and weather. **Mondays, Thursdays and Saturdays,** 8:00-9:00 P. M., same program.

Who Hears Broadcasting Stations Farthest?

TO STIMULATE long distance receiving, RADIO DIGEST ILLUSTRATED is starting a contest with its next number. If you can hear one of the broadcasting stations at a distance you consider remarkable, send in the evidence to this publication, care of the Broadcast Editor.

The receiving station hearing a given broadcasting station at the greatest distance, will, if ample evidence is submitted, be listed as the record holder. When another receiving station breaks the record listed, it will supercede the listing of the first station.

Caution! Don't send in your "record" unless you are fairly certain it is a real record.

—Broadcast Editor.

K Y W, Chicago, Ill.
Daily except Sundays, 9:30 A. M., 10:00 A. M., 1.20 P. M. and 2:15 P. M., stock quotations and markets; 2:15 P. M., 3:00 P. M., baseball; 4:15P. M. and 6:30 P. M., news and markets; stock report summary; 7:30 P. M., children's hour; 8:00-9:00 P. M., concert; 9:00 P. M., news. **Sundays,** 3:30 P. M., church service.

K Z C, Los Angeles, Calif.
Daily except Sundays, 5:00-5:30 P. M., news and on **Tuesdays, Wednesdays and Fridays,** same hour, concert.

K Z M, Oakland, Calif.
Daily except Sundays, 7:15-7:30 P. M., news. **Tuesdays,** 7:30-8:15 P. M., concert. **Fridays,** 8:15-9:00 P. M., concert.

K Z Y, Oakland, Calif.
Daily except Sundays, 3:30-4:30 P. M., concert; 6:45-7:00 P. M., news; **Wednesdays,** 7:30-8:15 P. M., concert. **Saturdays,** 8:15-9:00 P. M., concert. **Sundays,** 11:00 A. M. to 12:15 P. M., church service; 3:00-4:00 P. M., concert.

W B Z, Springfield, Mass.
Daily except Sundays, 7:30 P. M., childrens' hour; 7:45 P. M., market, weather, lecture; 8:00-9:00 P. M., concert. **Sundays,** 3:00 P. M., and 8:00 P. M., church service.

W D M, Washington, D. C.
Sundays, 10:30 A. M., church service; 3:00 P. M., lecture; 7:30 P. M., church service.

W F O, Dayton, O.
Daily, 9:00-9:30 A. M., concert and news; 11:00-12:00 A. M., music, news, markets, weather; 4:00-5:00 P. M., music, news, markets, agriculture, weather. **Mondays, Wednesdays and Fridays,** 7:00-8:30 P. M., music and lecture. **Sundays,** 11:00-12:00 A. M., church.

W G H, Montgomery, Ala.
Daily, 11:05 A. M., weather; 4:05 agricultural. 8:30-9:30 P. M., educational, agricultural, stock quotations and concert. **Sundays,** 8:30-9:30 P. M., religious program.

W G I, Medford Hillside, Mass.
Mondays, 8:15 P. M., news. **Tuesdays and Thursdays,** 8:15 P. M., children's hour. **Wednesdays,** 8:15 P. M., concert. **Fridays,** 8:00 P. M., radio instruction. **Saturdays,** news.

W G Y, Schenectady, N. Y.
Daily except Saturdays and Sundays, 7:00 P. M., markets. **Tuesdays, Thursdays and Fridays,** 7:45-9:00 P. M., concert. **Fridays, 11:30 P. M.,** concert and speech.

W H A, Madison, Wis.
Daily except Sundays, 12:30-1:00 P. M., weather, markets; **Tuesdays, Thursdays, Fridays and Saturdays,** 12:00-1:00 P. M., weather, markets, time; **Tuesdays only,** 8:00-9:00 P. M., concert; **Fridays,** 8:00 P. M., news; 8:15 P. M., 9:00 P. M., concert; **Saturdays,** 1:05-1:20 P. M., lecture.

W H K, Cleveland, O.
Daily, 1:30-2:00, 3:30-4:00, 8:00-9:30 P. M., concert.

W H Q, Rochester, N. Y.
Daily except Sundays, 12:00-12:15 A. M., music and news; 7:30-8:00 P. M., markets, bedtime stories, lecture; 8:00-8:30 P. M., music. **Sundays,** 3:00 P. M. and 7:30 P. M., church service.

W H W, East Lansing, Mich.
Daily except Sundays, 11:30-12:30 A. M., weather and markets.

W I K, McKeesport, Pa.
Daily except Sundays, 6:30-7:00 P. M. **Tuesdays and Thursdays,** 9:30-10:30 P. M. **Sundays,** 1:30-2:30 P. M. and 6:30-7:00 P. M.

W J H, Washington, D. C.
Tuesdays, 7:30-10:00 P. M., lecture and concert.

State and City	Call	Wave Lengths	Miles Range	Program	By Whom Operated
Nebraska:					
Lincoln	9YY	375	300	C; N; M; W	University of Nebraska
Omaha	WOU	360; 485		Not known	Metropolitan Utilities District
Omaha	WOV	360		Not known	R. B. Howell
New Jersey:					
Deal Beach	2XJ	380		Test	Am. T. & T. Co
Jersey City	WNO	360	500	C; N; L	Wireless Tel. Co. of Hudson Cy
Jersey City	2IA	200	70	L; C; R	Jersey Review
Newark	WAAM	360		Not known	I. R. Nelson Co
Newark	WJK	360		Not known	DeForest Radio T. & T. Co
Newark	2SAI	360		Test	Westinghouse E. & Mfg. Co
Newark	WOR	360		Miscellaneous	L. Bamberger & Co
Newark	WJZ	360	2,000	N; L; C; W; A; R	Westinghouse Electric & Mfg. Co
New Mexico:					
Roswell	KNJ	360	300	M; W; N; C	Roswell Public Service Co
New York:					
Albany	WNJ	360		Not known	Shotton Radio Mfg. Co
Buffalo	WWT	360		Not known	McCarthy Bros. & Ford
New York	KDOW	360	1,000	Not regular	S. S. America, N. Y. Harbor
New York	WVP	360; 1,450		I; C; V	Signal Corps, Fort Wood
New York	WWZ	360	200	C; N; L	Wanamaker's Dept. Store
New York	WDT	360		Not known	Ship Owners' Radio Service
New York	WYCB	1,450		N; C	Amateur Radio Reserve
Rochester	WHQ	360; 485	50	L; C; M; R	Rochester Times-Union
Ridgewood	WHN	360; 485		H; C; L; I	Ridgewood Times
Schenectady	WGY	360	1,000	M; C; L	General Electric Co
Schenectady	WRL	360	800	C; R	Union College. (Also 2XQ.)
Tarrytown	WRW	360		C	Tarrytown Radio & Research Corp
Utica	WSL	360		Not known	J. & M. Electric Co
North Carolina:					
Charlotte	WBT	360		Not known	Southern Radio Corp
Ohio:					
Canton	WWB	360		Not known	Daily News Printing Co
Cincinnati	WLW	360	1,200	C; L; N; R	Crosley Mfg. Co
Cincinnati	WMH	360; 485	1,000	C; N; L; W; V; M	Precision Equipment Co. (Also 8XB.)
Cleveland	WHK	360	100	C	Warren R. Cox
Columbus	8YO	275		T; M; L; N	Ohio State University
Dayton	WFO	360; 485	300	M; N; C; W; L; R; A	Rike-Kumler Co.
Dayton	WA-1	360		Not known	U. S. Army
Fairfield	WL-2	360		Not known	U. S. Army
Hamilton	WRK	360	1,000	C; R; T	Doron Bros. Electrical Co
Lebanon	WPG	360		Not known	Nushawg Poultry Farm
Toledo	WHU	360		Not known	Wm. B. Duck Co
Toledo	WJK	360	300	C; L; R	Service Radio Equipment Co
Toledo	WDZ	360; 485		Not known	Marshall-Gerken Co.
Youngstown	WMC	360		Not known	Columbia Radio Co
Oklahoma:					
Oklahoma City	WKY	360	500	W; V; M; N; L	Oklahoma Radio Shop
Oklahoma City	5XT	360		N	E. R. Hull
Oregon:					
Hood River	KQP	360		Not known	Blue Diamond Elec. Co
Portland	KQY	360	50	Miscellaneous	Stubb's Electric Co
Portland	KYG	360	500	Miscellaneous	Willard P. Hawley, Jr.
Portland	KGW	360	200	C; R	Ship Owners' Radio Service
Portland	KGG	360	500	N; M; L; I	Hallock & Watkins
Portland	KGN	360	50	Not known	Northwestern Radio Mfg. Co
Pennsylvania:					
McKeesport	WIK	360	500	C; L; R	K. & L. Electric Co
Philadelphia	WFI	360		N; C; I; L	Strawbridge & Clothier
Philadelphia	WIP	360		N; C; I; L	Gimbel Bros. Dept. Store
Philadelphia	WGL	360		Not known	Thos. F. J. Howlett. (Also 3AWI.)
Pittsburgh	KDKA	360	1,000	N; C; L; R; V; T; M	Westinghouse Electric & Mfg. Co.
Pittsburgh	KQV	360	750	C	Doubleday-Hill Electric Co.
Rhode Island:					
Pawtucket	1OJ	200		Not known	Raymond F. Farnham
Pawtucket	1XAD	200		Not known	Thomas Gibline
Tennessee:					
Memphis	WKN	360; 485		M; W	Riechman-Crosby Co
Memphis	WPO	360		N; C; L; T	News Scimitar
Texas:					
Austin	WCM	360		N; W; M	University of Texas
Dallas	WRR	360; 485	200	W; M; N; C; R	City of Dallas
Houston	WEV	360		M	Hurlburt-Still Elec. Co
Washington:					
Seattle	KFC	360	700	N; C; V; H; L; R	Northern Radio & Electric Co
Seattle	KHQ	360		Not known	Louis Wasmer
Seattle	KJR	360	200	C; L; N	Northwest Radio Service Co
Spokane	KFZ	360		Not known	Doer-Mitchell Elec. Co
Spokane	KOE	360		Not known	Spokane Chronicle
Tacoma	WAAG	360		Not known	Mullins Elec. Co
Yakima	KFV	360		Not known	Foster-Bradbury Radio Store
Yakima	KQT	360		Not known	Electric Power & Appliance Co
West Virginia:					
Charleston	WAAO	360		Not known	Radio Service Co
Huntington	WAAR	360		Not known	Groves-Thornton Hdwe. Co
Wisconsin:					
Milwaukee	WAAK	360	600	Not known	Gimbel Bros. Dept. Store
Madison	WHA	360; 485		W; C; N; M; L	University of Wisconsin
Canada:					
Montreal		1,200	200	C; N; L	Marconi Telegraph Co. of Canada, Ltd
Toronto		450		Not known	Canadian Independent Telephone Co
Toronto		1,200		Not known	Marconi Telegraph Co. of Canada, Ltd

W J K, Toledo, O.
Daily except Sundays, 3:00-4:00 P. M., concert. **Mondays, Wednesdays and Fridays,** 7:30-9:00 P. M., concert, lecture, etc. **Sundays,** 7:30-9:00 P. M., sermon and concert.

W J Z, Newark, N. J.
Daily except Sundays, hourly from 11:00 A. M. to 6:00 P. M., music; 11:00 A. M., 12:00 M., 5:00 P. M. and 10:00 P. M., weather; 2:05 P. M. (except Saturdays), shipping news; 12:00 M. and 6:00 P. M. agricultural; 9:52 P. M., Arlington time signals. **Tuesdays,** 7:00 P. M., children's hour; 8:20-10:00 P. M., concert. **Thursdays and Saturdays,** 8:20-10:00 P. M., concert. **Sundays,** 3:00 P. M., church service; 8:20-10:00 P. M., concert.

W L B, Minneapolis, Minn.
Daily, 12:00 M., weather and stock quotations; 7:30 P. M., markets. **Wednesdays,** 8:00 P. M., concert.

W L K, Indianapolis, Ind.
Tuesdays, 8:00-8:55 P. M., concert; 9:00-10:00 P. M., vaudeville and news. **Thursdays,** 8:00-8:55 P. M., concert, lecture and news. **Sundays,** 8:00-8:55 P. M., concert, religious.

W L W, Cincinnati, O.
Tuesdays, Thursdays and Fridays, 8:00 P. M., music, news and lecture. **Sundays,** 8:00 P. M., church services.

W M H, Cincinnati, O.
Daily except Sundays, 11:00 A. M. and 4:00 P. M., weather and markets. **Monday, Wednesday and Saturdays,** 8:15-10:00 P. M., concert, lecture, vaudeville and news.

W N O, Jersey City, N. J.
Daily, 10:01 P. M., news, concert.

W O H, Indianapolis, Ind.
Daily except Sundays, 10:00-11:00 A. M., 4:00-5:00 P. M., stock reports and music; 8:30-10:00 P. M., music. **Saturdays,** 1:00-2:00 P. M., stock reports and music. **Sundays,** 10:00-11:00 A. M., music.

W O Q, Kansas City, Mo.
Daily except Sundays, 9:30 A. M., to 1:15 P. M., every half hour, markets; 11:30 A. M., 2:00 P. M. and 7:30 P. M., markets, weather and road conditions; 7:45-9:00 P. M., concert and vaudeville. **Sundays,** 7:00 P. M., church service.

W O R, Newark, N. J.
Daily except Sundays, 9:00 A. M., 5:00 P. M., hourly program.

W O Z, Richmond, Ind.
Daily except Sundays, 12:00-12:15 P. M., markets; 4:00-5:00 P. M., music, news, markets; 6:3017:00 P. M., music, news weather and lecture.

WRK, Hamilton, O.
Mondays, Wednesdays and Saturdays, 8:30-10:30 P. M., music and news. **Fridays,** 7:30-9:30 P. M., music. **Sundays,** 10:45 A. M. and 7:30 P. M., church service.

W R L Schenectady, N. Y.
Irregular programme.

W R R, Dallas, Texas.
Daily, 7:00 P. M., police news, sports, weather; 8:30-9:30 P. M., concert. **Sundays,** 11:00 A. M. and 7:30 P. M., church service.

W W J, Detroit, Mich.
Daily except Sundays, 11:30-11:55 A. M. and 3:30-4:00 P. M., music; 7:00-8:30 P. M., concert, etc.

W W X, Washington, D. C.
Daily, 10:00 A. M., weather; 10:30 A. M., markets; 5:00 P. M., markets 7:30 P. M. and 8:00 P. M., markets; 9:50 P. M., weather.

2 I A, Jersey City, N. J.
Wednesdays, 7:00-8:00 P. M., concert and lecture. **Sundays,** 7:00-8:00 P. M., church service and concert.

3 Y N, Washington, D. C.
Daily, 6:30-7:30 P. M., radio instruction (code and radiophone).

4 C D, Atlanta, Ga.
Tuesdays, Thursdays and Sundays, 7:30-8:00 P. M., news and concert.

8 Y O, Columbus, O.
Irregular, time signals, news, markets, etc.

9 A R U, Louisville, Ky.
Mondays, and Wednesdays, in evening, police news. balance of week irregular.

9 Y A, Iowa City.
Irregular, markets, news, etc.

9 Y Y, Lincoln, Neb.
Daily except Sundays, 10:10 A. M., markets and weather; 7:30 P. M. irregularly, music.

Montreal, Canada (Marconi Station).
Tuesdays, 8:00-9:30 P. M., concert, news.

Hoover Committee to Report

WASHINGTON.—Special to the Radio Digest.—It is understood on very good authority that the National Radio Committee appointed by Secretary of Commerce Hoover has completed the technical section of its report, but the legal section is still under discussion. The completed report is expected to be made public in the next few days.

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In a new scientific field where many writers are contributing articles there will arise some controversy over the expressions of opinions and statements made from time to time. Some of these controversies may be taken into the courts for settlement. The priority of inventions may be claimed as well as the merits of some part entering into the construction of the radio apparatus. The Radio Digest is an outlet for these expressions and the publisher disclaims any responsibility for opinions or statements made in connection with radio apparatus. The news will be printed as it comes to us.

Vol. 1 Chicago, Saturday, May 6, 1922 No. 4

Difference Between Amateur and Novice

Misunderstandings Concerning the Word Amateur

RADIO presents a new phase to the word "amateur." The professional seems to be a back number in the new art. There are many amateur Radio experts who could instruct many of the so-called professionals. However, there are no small number of dabblers who think they know something about Radio and have been misnamed "amateurs."

There is a line to be drawn between novices and amateurs; an amateur should have a good, solid knowledge of the fundamentals of the art.

Organization a Great Factor for Radio Fans

Form a Society and Aid Radiophony

SOME of the larger cities where there are many persons interested in Radio, are realizing the need for clubs and societies. These organizations are giving their members an opportunity to learn through technical discussions from which all can benefit and accomplish more than any other one thing toward the elimination of interference by observance of the society rules and regulations.

The amateur transmitters should show a willingness to co-operate with the receiving stations around them, inasmuch as the investment represented by these receiving stations is tremendous and because they have privileges the same as the transmitter. Radio is becoming one of the biggest factors in the country and it will require a great deal of co-operation between the various users to avoid serious complications. That is one reason why the government requires licenses for transmitting stations.

The sky is already filled with signals and from present indications the crowding will be kept up for an indefinite period. For this reason an organization can do much to relieve the congestion of the air and bring about an understanding between senders and receivers, quiet hours, interference and like problems.

Town Council Using Radiophone

Ohio City Installs Transmitting Instrument

IN A LEADING city of Ohio a councilman proposes to install a sending outfit to broadcast the council's proceedings.

This is an excellent idea, too, for state legislatures and congress. Open the sessions to the public; let anybody with a receiving set listen in. This would promote public interest, and would have considerable effect on the lawmakers.

Community Sets Reduce Expense

Club Members Buy Set and Rent Hall

ONE of the latest innovations in Radiophony is a "community set." It has found great favor in some localities and wherein few people are able to own a set in their homes. A club is organized and the members contribute to a fund for the purchase of a good receiving set. A small room or hall is rented and a membership card entitles the holder and his family to the evening reception of broadcasting.

Non-members to the club are assessed or charged an admission fee. In this way the organization pays its expenses, affords a fine entertainment and also develops a community spirit.

Radiophony Travels on Speedily

The Advancement of Radiophony as Others See It

EVEN though Radiophony is still in its infancy, what has already been accomplished must be considered. The effect it has on home entertainment has been wonderful and the Journal (Providence, R. I.) mentions this side line to Radiophony as follows:

"Will it not prove to be one of the modern factors that will tend to restore home life to something like its traditional place in this country? Something of the sort is intimated by the writer in the comment that, while most modern entertainments are calculated to take the young people away from home in the evening, Radio keeps them in."

Again Radiophony reaches into other walks of life, but the peculiar part about it is the fad does not always go singly, it takes the crowds. Collectively speaking the News (Denver) makes this statement:

"Radio will exert a powerful influence on the press, the pulpit, the schools and the theater, but it will not supplant them. Public taste will be educated and it will be more critical. It will demand higher standards. There will be a beneficial evolution of the press, pulpit, school and theater in which the inferior and the mediocre will be eliminated. Radio broadcasting carries with it responsibility. It is to be hoped and expected that the power to say something loud enough to be heard by thousands will give rise to a desire to say something worth while and to say it well."

More than a quarter century ago a fascinating prophecy was written of "Looking Backward from the Year 2000." In one chapter of the book the "Rip Van Winkle" of the narrative is taken to the music room where he is asked to make known his choice from a very long 24-hour program. The Times (Cumberland, Md.) goes on to say:

"The hostess indicated an organ piece and made me sit down comfortably, and, crossing the room he merely touched one or two screws and at once the room was filled with the music of a grand organ anthem. It was such an incredible prophecy that the book was classified in the libraries as fiction, and so speedily has scientific development occurred that in many libraries it still is fiction. Yet this is only 1922, not 2000, and by the time the era of prediction is reached, who dares to foretell the achievements of man?"

To what extent Radiophony will reach in the commercial fields and how it will be used in the transmission of power the Chicago Journal expresses its opinion in these words:

"The layman feels that the possibilities of Radio are all but limitless, and no expert has arisen to prove him wrong. All Radio work means the transmission of power. At present that power is broadcasted, so to speak; thrown out in all directions, to be picked up by whoever is tuned in to receive the waves. But why, reasons the observer, cannot this power be sent in a given direction, instead of scattered to the winds? Is it not possible to develop a sending apparatus which will permit electric current to be thrown directly from one station to another?

"If this can be done, it will work a revolution in human affairs perhaps greater than any yet achieved. It will mean that power can be developed at any favorable site, and sent where needed without the expense of wiring. Perfect such an arrangement, and the man no longer will be compelled to cluster in the vicinity of coal mines. He will live where he pleases, and have the power on which his industries are based brought to him through the 'viewless air'."

Also along the same lines the Daily Ledger (Tacoma, Wash.) says:

"Just what the limit of Radio may be there is no one brave enough to hazard an opinion. Today it is possible to talk to ships at sea and to far off cities across continents and oceans. Will it be possible to some day talk to neighboring planets? Would that be any more impossible than what the Radiophone of today would have been considered a few years ago? It is predicted that the time is coming when electric power will be transmitted by Radio."

Regarding the speed with which Radiophony has taken its place in the world, the News (Newburyport, Mass.) makes this statement:

"The country is taking up Radiophony with a whoop. The enthusiasm for this invention reminds us of the furor for the bicycle in the olden days. Everybody is doing it, that is, installing a receiving set and listening into concerts. We are going to buy stock in some manufacturing company immediately. There is going to be money in it."

Thought and expression are a result of the new science Radiophony. Along these lines Chas. F. Kittering in the Dayton News, says:

"Practically all transmission is done today by waves of Radiation. There are waves of light, heat and sound. Of these of Radiation we see about 10 per cent. Our Radiophone is based upon waves of Radiation. The Radio is doing more than creating amusement for the people of the country. It has set thousands of people's minds to thinking about scientific things and this will be an immense benefit. Radio broadcasting makes us believe that there is perhaps something in the world which we cannot see. In fact, there are many of the wonders of nature we cannot see. The people say that they would like to go back to the good old days. Who would want to go back to the days of the horse? We are going into the new age. We must forget the past. One of the best ways to get the country back to a normal condition is to quit waiting for it to go back."

RADIO INDI-GEST

A Ground That Was Not a Ground

My first bad mistake was when I tried to use a ground that was not a "ground." I had seen many illustrations of how a set was to be connected to the ground, but the drawings generally showed but a small length of piping and wire wound around it. I therefore took a two-inch piece of lead pipe and strung it up from a wire from the ceiling. This ground, I discovered did not work.

Secrets Through the Keyhole

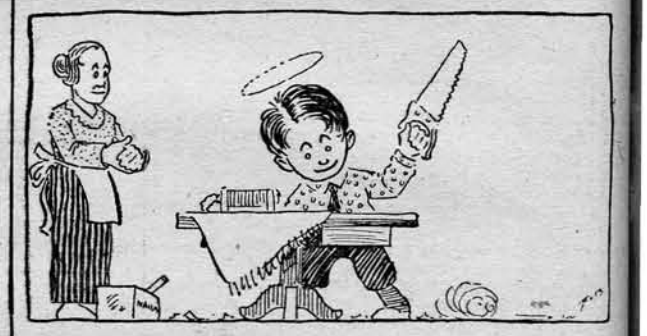
Knicker—"The Radio 'phone is getting very popular."
Bocker—"Yes, the air is one vast keyhole."—*New York Herald.*

Now the House Is Upside Down

By Mary Barton Smith

Our boy has made a wireless,
I tell you I am glad,
The thing is done and all set up:
For sometimes I got mad.
He talked about it all the time,
morning noon and night—

He'd plane and hammer, saw and file,
And scatter things about;
Then he'd make a break for school and—
"Don't touch things," he'd shout.



And when we put the aerial up,
I froze myself 'most blue;
But I had helped him all along
And had to see it thru.

Tuning Fork Gets in on House and Senate

Representative Brennan, Detroit, has aimless wireless idea. Wants to set breach-loading Radio broadcaster in House and Senate so anybody with tuning fork can horn into nation-saving conversation. As if the unemployment situation wasn't bad enough as it is.

When the Call Comes "E. A. T."

Supper time. Corner grocer installs magnavox and says it draws more useless wireless trade than old-time free cracker barrel. Beer-and-light-wine advocates draft educational bill to establish poor men's clubs equipped with amplifier, horns and biggest-in-city schooners. Anti-Saloon League favors amplifiers but against schooners. Congressmen talk so much about it that Cincinnati, St. Louis and Milwaukee aerial proprietors start back-to-Munich movement.

The Radio Ballad

By Burton Braley

Sadie O'Grady and Timothy Brady
Sure were an up-to-date pair;
She was a pretty and witty young lady,
He was a lad debonair.
They were a couple of Radio sharks,
So when they'd part for a while

Tim would impress his concluding remarks
After this manner and style:
"Sadie O'Grady, Oh
Ring me by Radio,
Call me up often, my own;
You are my lady, Oh
Sadie O'Grady, Oh
Ring me by Radiophone!"

How to Make Sixty Cent Receiving Set

A Radio receiving set for sixty cents! Yes, if you already have two 1,000-ohm head receivers and a well developed habit of thrift. If you haven't the latter it may cost you seventy-five. There will be needed some inventive genius also.

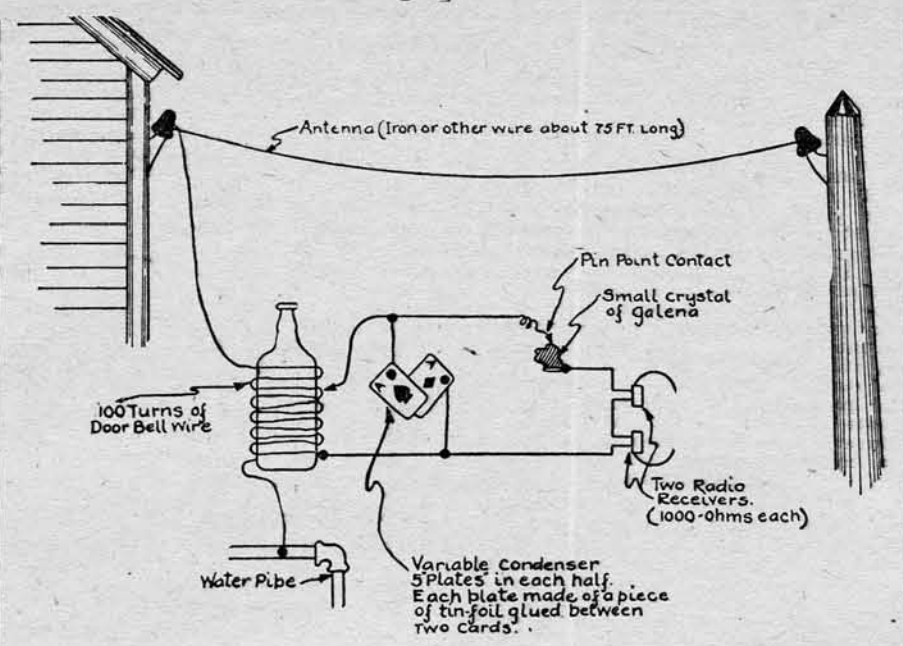
Run a wire from a pole in your back yard to your house. Use doorbell wire if your clothes line wire is too short or has been borrowed by some other Radio bug. You can now check the antenna off the list.

Procure a quart bottle from your basement, scrape off the counterfeit label and wrap about 100 turns of doorbell wire around it. Connect one end to your antenna and the other to a convenient water pipe, and your primary circuit is complete except that you may have to use more or less than 100 turns for best results.

For your condenser take an old deck of cards—one that has so many dog-ears that the aces can no longer be picked out—and make condenser "plates" as follows: Glue a piece of tinfoil between two cards as though you were making a tinfoil sandwich, and use five of these as one half of the condenser. These five are fastened together at one corner by a nail or rivet so that the nail touches all the pieces of foil in the five plates. The nail serves also as a binding post to attach a wire. Make another half condenser in the same way and "dovetail" the two halves as you do in shuffling the deck. The variable condenser is now ready for use.

For your detector you will be called upon to spend about 25 cents for a crystal of galena—not at a drug store, but at a Radio supply store. You can hold this crystal with a paper clip which will also serve as one contact or you can lay it on a piece of tinfoil for the lower contact. The other contact is a piece of fine wire touching the top of the crystal very lightly. Now, if you have your receivers ready your set is complete.

Connect the parts as in the sketch and juggle the condenser and the number of turns around the bottle until you can hear the boys in your neighborhood talking in dots and dashes with each other. If you watch the calendar for the next concert from your local broadcasting station you will hear Alma Gluck sing "Swanee River" or the Brown Brothers, Kings of Syncopation, having a three-round bout with saxophones.



Radio Kinks

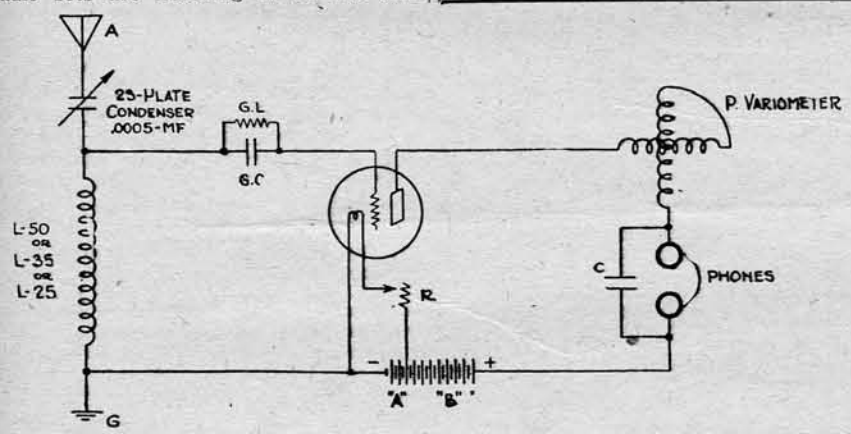
RADIO DIGEST is interested in any of those little kinks that every amateur discovers in his workshop. Sometimes it's a How to Make Article, or a little tip in operation of the set, how to use parts that are not thought of, perhaps some new hook-ups that haven't been published yet.

Send them in, with full details, sketches and diagrams if necessary. One Dollar will be paid for every one published. If a self-addressed, stamped envelope is included, rejected copy will be returned. Work must be original, however, and not copy from others.

RADIO KINKS DEPARTMENT, RADIO DIGEST
123 West Madison St., Chicago, Ill.

LONG DISTANCE RECEIVING SET

Now that many of the public having Radio sets are listening in on the concerts each night, a station usually comes in using code. It is an amateur's ambition to be able to copy the code and to receive trans-Atlantic messages. As most of the stations are now using what is known as short wave regenerative receiving sets the circuit shown, using duo-lateral coils numbered L50, L35, L25, will be found very good for long distance.



The letter A represents the aerial, G-ground, GL-grid leak, GC-grid condenser, R-resistance, "A"-"B"-batteries, C-condencer, P. Variometer-Plate variometer.

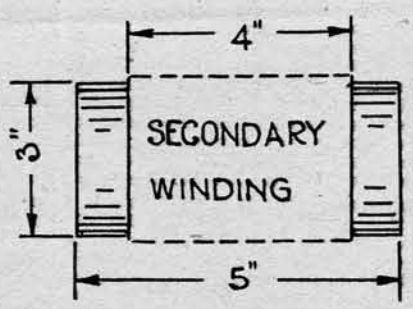
MAKE YOUR OWN LOOSE COUPLER

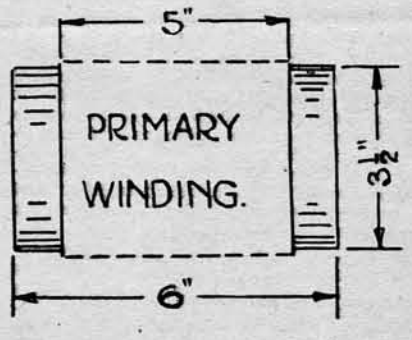
Necessary Information for Making the Parts

The loose coupler is more difficult to make yet it is far superior to the tuning coil. A much better tuning may be had with the loose coupler and there is greater selectivity and less interference from the power station. The signals will be a little stronger and broadcast news will be received without trouble. In fact, the loose coupler is an improved tuning coil. There are two windings on a loose coupler, the primary and secondary. The primary is wound on a large tube and with large wire, the secondary being wound with fine wire on a small tube. The smaller tube is made of a size that it will slip into the larger one. This is clearly shown in the illustration.

To make these coils there will be required two cardboard tubes, one large and one small. Fiber or bakelite material is much better than the cardboard, if tubes of this material can be obtained. It is not necessary to pay a fancy price for tube material. Look around and see if you can find a cardboard box in which oats for breakfast food is sold. Such a box will make a tube about 4 inches in diameter and about 8 inches long. A tube which will fit inside of it with a clearance of from one-quarter inch to one-half inch will be just the thing for the secondary. The dimensions given need not be followed out closely, just so long as they are correctly proportioned.

The primary tube should be about six inches long and it should be wound evenly for five inches of its length with one layer of single cotton covered wire. This will leave a half inch margin on each end of the tube. A thin coat of shellac will serve to hold the windings in place. Either white or orange shellac may be used, thinned down with wood alcohol. The secondary winding is a tapped winding, that is, taps are taken out at certain places, about four inches in length. Insulated wire is used, about 24 or 26 gage, and is tapped every one-half inch. The end of the winding is brought to a tap, so that there will be eight taps for the four-inch winding.





How the Taps Are Taken Off

In the construction of this coil the taps are taken off just a little different than usual. Instead of bringing the tap out on the surface of the tube a hole is punched at the point of tapping and the loop is forced inside of the tube and drawn out for about six inches. A loop is twisted in the wire and the winding continued for another half inch, when the tapping operation is repeated.

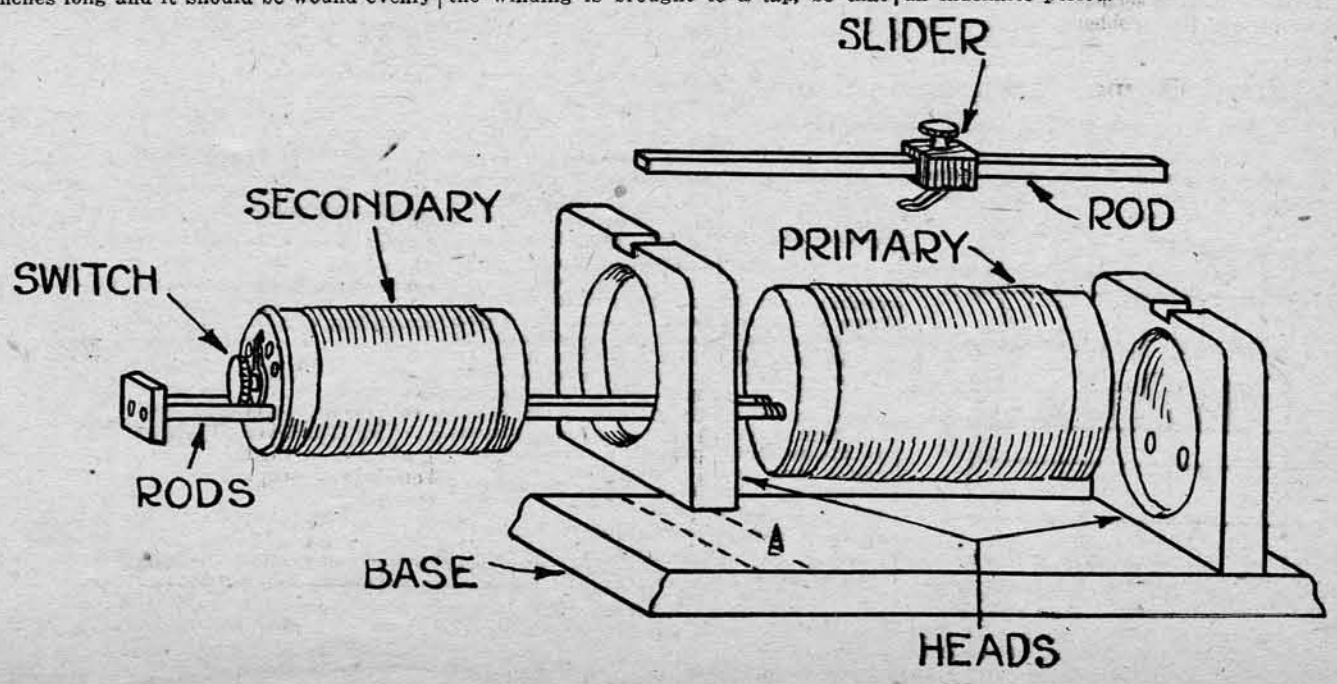
The reason for bringing the taps out on the inside of the tube is that it must slide in the primary tube and the coils must be out of the way and outside taps will not permit this being slid within the outer tube. Also the end of the secondary tube must be fitted with a wooden head carrying the knob and switch points which are connected to the tapped points of the wires or sections. It is more convenient to bring the taps from this head from the inside than from the outside of the tube. Two flexible wires conduct the winding with two binding posts on the base. There are two brass rods for the tube to slide on. The primary should be suitably mounted on end pieces and provided with a rod and slider. Two rods and sliders can be used, although there is not much advantage in that.

In the winding of the coils be careful to watch and see that both coils are wound in the same direction. That is, it should be as though the wire were wound around on one tube from end to end and cut in two later on. This way of winding is important as when the current is on one coil would be opposing the other. Another caution is to have the end of the secondary winding to be nearest the primary connected to the flexible conductor going to the binding post, while the other and furthest away from the primary is connected to a contact point.

EXPLODED SHELLS USED FOR SWITCH POINTS

The exploded shells of a 22 caliber rifle make a cheap and efficient switch point. The control panel is made of a half-inch board. Lay out the places for the switch points and bore one-quarter-inch holes. The empty shells are fitted into the holes and allowed to protrude one-sixteenth inch from the panel. The wires are coiled and shoved into the shells which are for the "off" and "on" points. This will make a good strong connection.

The reason for using the shells for the "off" and "on" points is to eliminate the confusion which sometimes result if the wires are connected to "lead in" contacts. The reason for this is that the shells do not protrude through the panel so no connection can be made from them. These switch points will give good service for an indefinite period.



Characteristics of Vacuum Tube Amplifiers

By Benjamin F. Miessner

PART III

Let us take a two electrode tube with a typical characteristic curve such as that shown in Figure 2, Part II, or Figure 7 given in this part, and connect it in a receiving circuit as a rectifier. There are numerous connection schemes for this purpose, all of which function in more or less the same manner. One of the simplest is shown in Figure 4.

This is a conventional two-circuit receiver with rectifier and telephone connected in series across the secondary circuit. Inasmuch as a general knowledge of electricity and particularly of Radio frequency currents, circuits and apparatus, has been assumed for my readers, burdensome details of this nature will be omitted and all attention concentrated upon the operation of the purely electron tube devices and circuits.

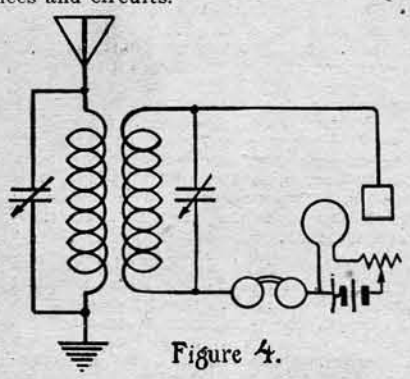


Figure 4.

Here then in Figure 4 we have, during the reception of electro-magnetic waves, a source of Radio frequency currents, i. e., the terminals of the secondary circuits and a telephone which we desire to actuate by these currents. The telephone, it must be remembered, is a device for converting audio frequency currents into sound waves of approximately corresponding wave form. Also, it must be remembered that the sound frequency range perceptible to the human ear lies between about 16 and about 20,000 vibrations per second, which is considerably below the lowest Radio frequency currents in use by long wave, high power stations.

Ear and Telephone Have Limitations

While the ear will respond to frequencies up to the vicinity of 20,000 per second, the telephone has by no means such delicate powers. Its useful frequency range does not extend beyond about 100 to 3,000 complete cycles per second. It is very inefficient at both very low and very high frequencies, while its maximum efficiency lies in the neighborhood of 1,000 cycles.

When we view the tremendous gap between the Radio frequency currents used in broadcasting, roughly about 750,000 cycles, and the highest frequencies perceptible to the telephone, say 3,000 cycles, a true idea of the value of rectification devices is obtained. These, by converting the Radio frequency currents into direct currents, permit the use of the telephone as a receiving device. Because of its almost unbelievable sensitivity to weak currents, the telephone receiver in connection with rectifying devices, has furnished one of the few great base stones in the Radio pyramid of today.

Tube Action in Circuit Explained

Referring again to Figure 4, it will be seen that the secondary circuit impresses Radio frequent potential differences between the anode and cathode of the vacuum tube, so that the anode becomes extremely positive and negative at a rate equal to the frequency of the current in the supply circuit. When the anode is positive, it will attract to its electrons from the space about the filament. This robs the cathode of some of its negative charge, upsets its potential equilibrium, and causes a flow of the electrons attached to the anode back to the cathode through the connecting wires and telephone. With respect to the telephone then, the tube acts analogous to the valve found on any automobile tire, only permitting a flow of current (air in the analogy) in one direction. Such a device is called a rectifier because it converts an alternating current into a unidirectional current.

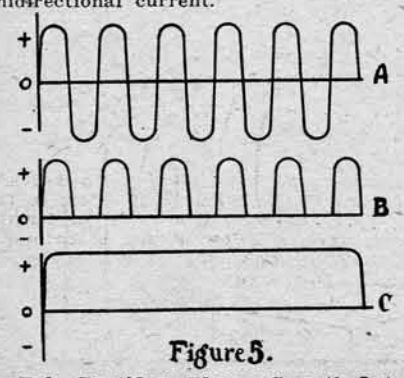


Figure 5.

Tube Rectifies—Phones Smooth Out

Figure 5 shows in graphical form the result of this rectifying action. The impressed alternating potential is given by A, where the positive and negative signs represent the potential on the anode with respect to the cathode. The current which tends to flow in the circuit is given by B. Here the wave form of the positive alternations is approximately preserved, but the negative alternations are completely cut off.

The wave form of the current which actually flows depends upon the nature of the circuit through which it must pass. If the circuit's inductive impedance is low, graph B would represent the wave form. If, however, as in the telephone, the inductive impedance for the given frequency is high, the separate high frequency pulses shown in B are smoothed down into some such form as that given by C, which represents a steady unidirectional current.

The graphs of Figure 5 represent the currents produced by an unmodulated continuous wave signal, such as that given by a continuous wave telegraph transmitter of the alternator, arc, or vacuum tube type.

What Modulation Does to Wave Form

If such a continuous wave is modulated, as in Radio telephony, by the electrical counterpart of sound waves, the wave amplitude will not remain constant as in Figure 5, but will undergo variations or modulations of some such form as that shown in Figure 6.

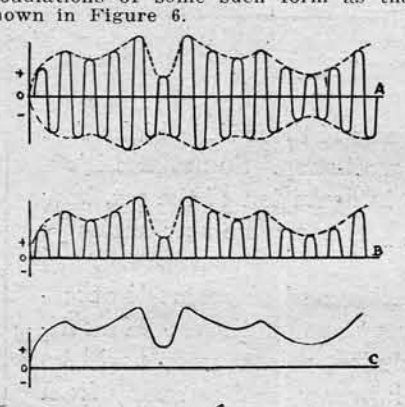


Figure 6.

Here A represents the modulated Radio frequency current, B the rectified current without inductive reactance, and C the rectified current smoothed out by the inductive reactance of the telephone. It will be seen that the action is the same as for the unmodulated currents shown in Figure 5. The dotted line connecting the peaks of the separate alternations is called the envelope of the audio frequency modulations in the Radio frequency currents. It is obvious of course, that even if the current as shown in B could flow in the telephone so that the separate current pulses were not obliterated by the telephone inductance, it would be impossible to hear them for two reasons: first, the telephone diaphragm could not possibly respond with approximate amplitude to current pulses arriving at the rate of 750,000 per second when its upper response limit is but 3,000 per second; and second, the human ear could not possibly hear these pulses even if it were possible for the telephone to transfer them into sound.

Inductance Inertia Like Thermal Capacity

The manner in which high frequency unidirectional pulses are smoothed out by the inertia effects of inductance in electrical circuits, or of vibrational impedance in physical bodies such as telephone diaphragm, may be illustrated by simple analogies.

An ordinary electrical sign of the flashing variety contains electric lamps fed by alternating current of 60 cycles per second. The thermal constants of the lamp filament are such that it possesses what might be termed a large thermal inertia for frequencies ranging from 50 to 100 per second. That is, the filament temperature cannot follow variations of its 60 cycle heating current and it therefore maintains a practically constant temperature and brightness.

If, however, the supply current is connected and disconnected slowly, say at a frequency of from one to five times per second, the filament's temperature will respond to these slow changes of heating current, and it will flash accordingly.

Analogy of Floating Block

We might take as another example a machine gun firing rapidly into a rather large block of wood floating in water. The block would not jump forward at the impact of each bullet and then stop, but the stream of bullet impacts would drive the block smoothly through the water. Again, in an automobile engine the power impulses imparted to the several pistons by the periodic explosions are converted into a practically continuous stream of steady power by the inertia of the flywheel and other moving parts.

Relation of Characteristic Curve to Signal Strength

Consider now for a moment the effect of the characteristic curve of a rectifier tube on the strength of the received signal. Suppose the peak value of the potential alternations shown in Figure 5 were one volt, and that the plate of the rectifier tube in Figure 4 were connected via the secondary winding of the coupling transformer and telephones to the negative terminal of the tube filament. The anode would then possess zero potential with respect to the negative end of the filament and a negative potential with respect to the positive end equal to the potential drop across the filament.

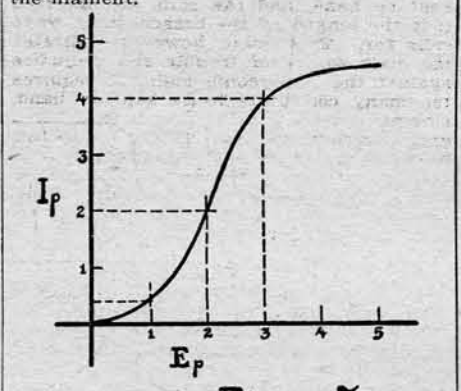


Figure 7.

Referring now to Figure 7, anode potential-anode current curve for the tube, if we apply an alternating potential difference between the anode and the cathode (plate and filament), current will flow when the anode is positive and will stop flowing when and as long as the anode is negative. This effect was shown in Figures 5 and 6.

Mathematics of Signal Intensity

The maximum amplitude of the current can be found (neglecting circuit impedance) by reference to the curve. It is seen that at a positive potential of one volt the anode current is about two-tenths on the plate current scale, that is, the current has changed from zero to 0.2. But suppose it were possible to maintain a normal operating condition wherein the anode had a continuous potential of, say one volt, applied to it, and that the alternating potential could be superposed on this uniform potential. Considering one volt then as the normal potential, the normal current is seen to be about 0.2 instead of zero as before on the anode current scale.

If now an alternating current which varies between +1 volt and —1 volt is superposed on this direct potential of 1 volt, the actual potential by algebraic addition will vary between zero and +2 volts, and the anode current will change from zero at zero volt to 2.0 at +2 volts.

What Anode Potential Does

We see by inspection of the curve, however, that for positive alternations the anode current rises from 0.2 to 2.0, or a difference of 1.8, while for a negative alternation of one volt it can only drop from 0.2 to zero, or a change of only 0.2. The net result of this action is represented approximately by the algebraic sum of these differences, i. e., 1.8 plus 0.2 equals 1.6, the real current change produced in the circuit by alternating current. Comparing this value with the preceding one of 0.2 obtained with a normal anode potential of zero, we can readily see a great improvement.

The potential and current graphs obtained by such an arrangement are shown in Figure 8.

Here A is a graph of a modulated radio frequency potential; B represents the normal positve potential of one volt applied to the anode; C represents the modulated radio frequency potential A superposed on the normal positive potential B; D represents the normal anode current without superposed alternating current; E shows the changes in anode current under the action of the potential curve given by C with a circuit of low inductance; and F represents the actual current variations in the telephone that produces sound.

Explanation of Graphs

In E is seen the large increase in anode current over the normal for the positive alternations and the relatively small decrease under the normal current for the negative alternations. The curve F shows the result of the telephone inductance in smoothing out the rapid fluctuations in current and leaving only the relatively much slower variations in amplitude.

While those graphs show, for the sake of simplicity, only a few cycles of high frequency current in each cycle of audio frequency modulation, there are actually a very large number. To be true to fact, in a 1,000 cycle audio frequency modulation of a 750,000 cycle current, each audio frequency cycle would contain 750 separate radio frequency cycles. Obviously it would be impossible to show this in such small scale drawings.

Experimental Circuit Shown

The circuit arrangements by which the increased sensitivity explained above may be secured are shown in Figure 9.

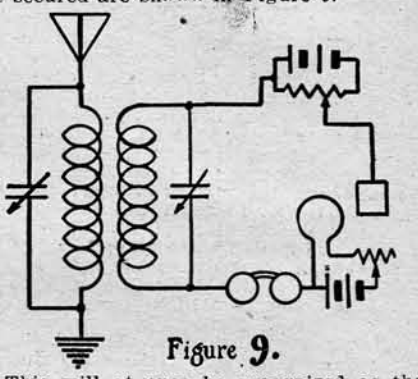


Figure 9.

This will at once be recognized as the same circuit as that shown in Figure 4, with the addition of a battery and potentiometer in the anode circuit of the vacuum tube. The potentiometer makes it possible to secure any desired normal anode potential so that this may be adjusted with precision for the loudest signal intensity in the telephones.

Using "A" Battery for Anode Potential

Another arrangement may be used to secure anode potential. Instead of using the separate anode battery, the filament heating battery may be used. If the filament requires, say, four volts potential difference across its terminal for proper action, and as is ordinarily the case, a six volt battery is used with a regulating resistance in series, this resistance should be placed in the positive leg of the battery circuit, and a potentiometer placed across the battery, as shown in Figure 10.

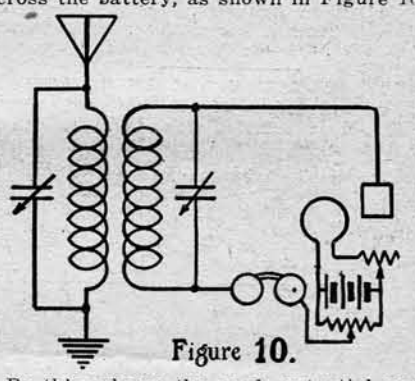


Figure 10.

By this scheme the anode potential may be adjusted from zero to 6 volts above the potential of the negative filament terminal, and from zero to 2 volts above the positive terminal.

Using Upper Rectifying Bend

The lower bend in the curve of Figure 7 is called the lower rectifying bend. It is seen that another bend occurs up higher at the saturation point. This bend may also be used for rectification by adjustment of the normal anode potential to about 3 volts. If this be done the negative alternations will produce a large decrease in the anode current, while the positve alternations will produce only a small increase, so that graphs E and F of Figure 8 would change to a form like that shown by E and F of Figure 11, respectively.

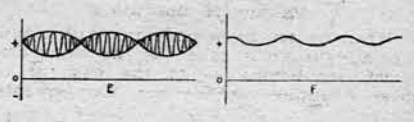


Figure 11.

Either of these rectifying bends may be used in practice. Usually one gives greater sensitivity than the other.

Editor's Note—The fourth of the series of articles by Mr. Miessner will appear in the May 13th number of RADIO DIGEST ILLUSTRATED. *In the fourth installment he has promised to discuss further the application of the vacuum tube to receiving circuits.*

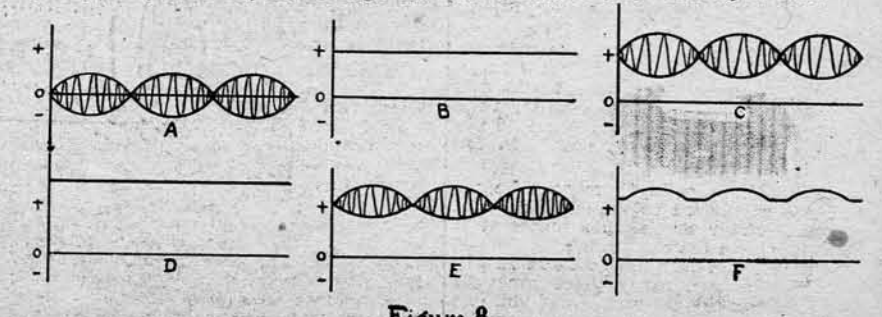


Figure 8.

Simple Instructions for the Beginner

By Harry J. Marx

The Duo-Lateral Honeycomb Coils

FIG-1.

Honeycomb Convention

Much has been said of the value of the honeycomb coil circuits. They have lost much of their popularity more due to lack of knowledge in their operation and application to Radio circuits than to any disadvantages that they possess. What other piece of apparatus is so flexible that it can be changed for a wave length range of 150 meters to 6,000 meters or more, simply by a few minutes' manipulation in inserting any set of coils that are required for reception.

The Coils

Figure 1 illustrates the symbol that is commonly used for honeycomb coils. Figure 2 is an illustration of the coil as sold with a mounting attachment. The immediate advantage of the honeycomb coil is the fact that it offers a very compact unit that can be used for tuning or loading as the case may be.

Formerly, honeycomb coils were simply wound in banks, one layer on the other; it was found, however, that this increased the distributed capacity, a condition that is undesirable for Radio work. The later development is what is now called the duo-lateral wound coil, by which is meant that the windings zigzag, back and forth, from side to side, so that each layer as it lays on the one below crosses it at an angle and does not run parallel. These coils have been standardized with the core hole of two inches in diameter and one-inch width. The outside diameter varies with the number of turns, running from 2¼ to 4½ inches. If one wants to increase the wave length, naturally it is necessary to increase the number of turns.

The Mounting

Coils can be obtained either mounted or unmounted, as desired. The method of utilizing the mounting of the coils is illustrated in Figure 4. These mountings, however, can also be obtained in a two-coil mounting. The conventional symbol used diagrams for a three-coil mounting is shown in Figure 3.

FIG-2.

Mounted Coil

Theory of Operation

When using the honeycomb coil mounting, advantage is taken of the same electrical phenomena as in the case of the loose coupler and the vario-coupler. Mainly, the oscillatory current flowing through the honeycomb coil, acting as the primary creates magnetic lines of force as shown in Figure 5-A. The magnetic lines of force flowing through the core of the honeycomb coil used as a secondary induce a current therein. Now, as the angle is changed between the two coils, as shown in Figure 5-B, the number of magnetic lines that flow through the core of the secondary is varied and, therefore, the angle varies or controls the strength of the induced current. Instead of tapping primary and secondary a number of honeycomb coils of different windings are kept on hand, and the coils are inserted that the length of the broadcasting wave calls for. This point, however, indicates the main source of trouble and prejudice against the honeycomb coil. It requires too many coil units to be kept on hand, making it an expensive proposition. If a great range in the wave length is desired, however, coil units are now available supplied with two or three taps so that greater range or adjustment is possible. This, however, makes the changing of coils require a longer length of time.

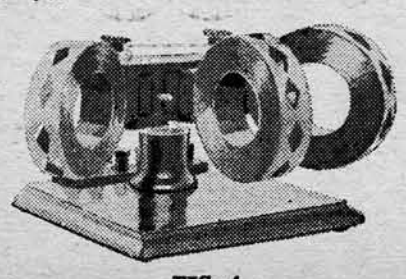


FIG. 4

Three Coil Mounting

Loading Coil

A use for the honeycomb coil that is often overlooked is the opportunity of substitution for a loading coil. In order to increase the wave length of a station, as shown in Loose Leaf Sheet No. 3 in diagram RD-1, the loading coil between the aerial and the transformer is indicated as having a slide variation. Honeycombs can be used for this purpose simply by inserting and trying various sizes until the proper wave length is obtained. Final tuning can be adjusted through the primary slide of the receiving transformer.

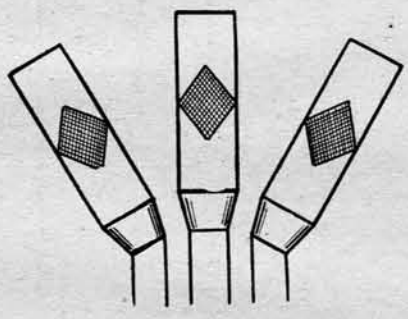


FIG-3.

Three Coil Mounting Convention

Table 1 Shows Wave Lengths

The question is often asked, "What are the best size coils to use for different wave lengths?" Table 1 gives the receiving wave length in meters and the proper coils to use in the primary, secondary, and tickler circuits.

The first column in each gives the number of turns, the second column, the approximate inductance in milheneries, the third column, the approximate wave length range of each coil. This table will help to answer many of the questions that are constantly being sent in by amateurs seeking further information on honeycomb coils.

Crystal Detector Set

Figure 6 gives the hook-up diagram of the double honeycomb coil, crystal detector set. The tuning is controlled by the variable condenser shunted across the coil and if available a variable condenser can be shunted across the secondary coil.

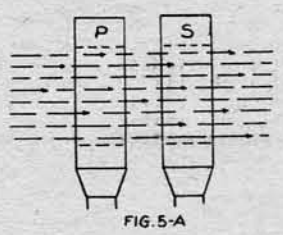


FIG.5-A

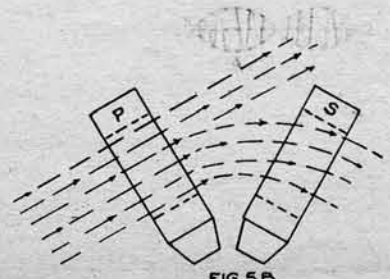


FIG.5B

Magnetic Field

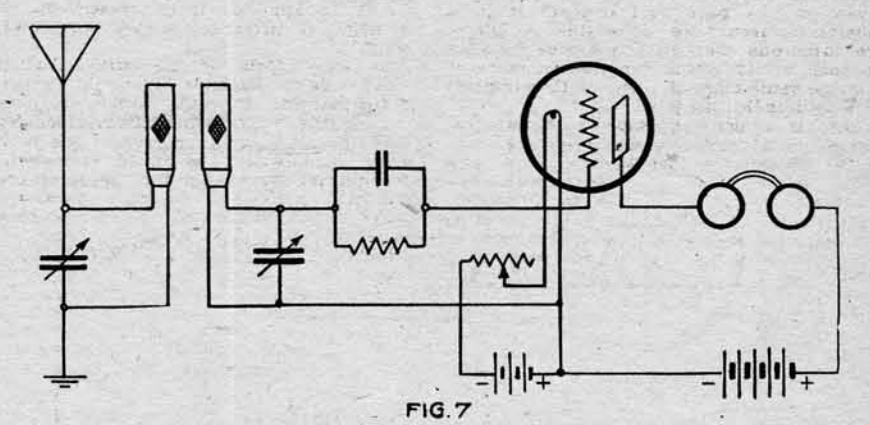


FIG.7

Two Coil Vacuum Tube Hook-up

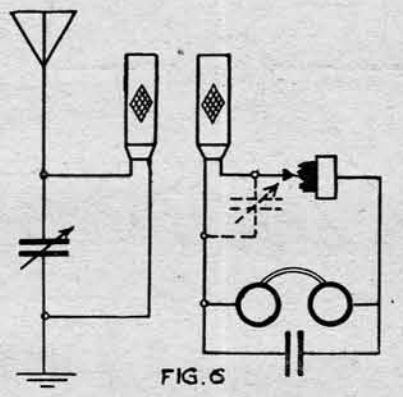


FIG.6

Two Coil Crystal Hook-up

Two Coil Tube Set

Figure 7 illustrates the use of the two honeycomb coil unit with the vacuum tube detector set. This circuit is a very sensitive one, and by the means of the wide range obtainable in the coils, has a very flexible tuning range. The use of variable condensers shunted across each coil is recommended. For short ranges the variable condenser used in the primary circuit can be inserted between the ground and the coil.

Honeycomb Amplifying Set

Figure 8 illustrates the use of a three-coil unit with one step of amplification. The question of what coils to use is easily solved by referring to Table 1.

In tuning this circuit the filament is first adjusted, then the coils are set in line, the primary coil and primary condenser are adjusted for proper reception, then the secondary condenser and the tickler coil are adjusted. It will be found that the intensity of the signals is regulated by adjustment of the tickler coil.

Table No. 1

Wave—Length—Range

Meters.	Primary Coil.			Secondary Coil.			Tickler Coil.		
150 to 350	35	.075	185 to 515	25	.14	130 to 375	35	.075	180 to 515
300 to 700	75	.03	330 to 1,030	50	.15	240 to 730	35	.075	180 to 515
600 to 1,650	150	1.3	660 to 2,200	100	.6	450 to 1,460	75	.3	330 to 1,030
850 to 1,950	200	2.3	930 to 2,850	150	1.3	660 to 2,200	100	.6	450 to 1,460
1,400 to 2,850	300	6.5	1,550 to 4,800	250	4.5	1,300 to 4,000	150	1.3	660 to 2,200
2,550 to 4,250	400	11.0	2,050 to 6,300	300	6.5	1,550 to 4,800	150	1.3	660 to 2,200
4,200 to 6,300	500	20.0	3,000 to 8,500	400	11.0	2,050 to 6,300	200	2.3	930 to 2,850

.001 Mfd. Variable Condenser in Shunt.

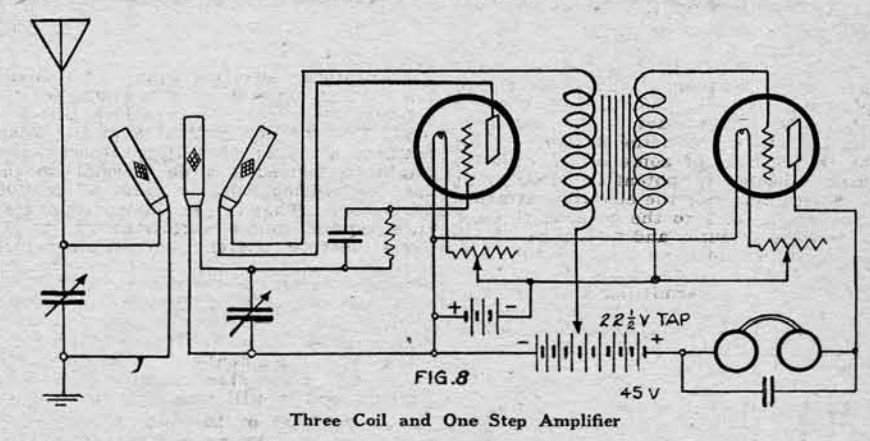


FIG.8

Three Coil and One Step Amplifier

ELECTRICAL UNITS THAT YOU MEET IN RADIO

Radio waves are always expressed in meters. A meter equals 3,291 feet.

Prefixes are used in electrical terms because many electrical quantities are either very small or very large. Thus a microfarad is 1-1,000,000 of a farad, and a megaohm is 1,000,000 ohms. Prefixes are: Milli (m), 1-1,000; centi (c), 1-100; deci (d), 1-10; deka (dk), 10; hekto (h), 100; kilo (k), 1,000.

There are four international units: The ohm, ampere, centemeter and second.

The ohm is the unit of resistance and is that resistance offered by a column of mercury of uniform cross-section, 106.3 centimeters long and 14.4521 grams mass and at the temperature of melting ice.

The ampere is the unit of current and is that current which will pass through a silver nitrate solution and deposit silver at the rate of .0001118 grams per second. A gram is about one-twenty-eighth of an ounce.

A volt is the unit of electromotive force and is that E. M. F. which will force one ampere of current through a resistance of one ohm.

A coulomb is the unit of quantity and is that quantity of electrical charge which may be stored or transferred by an ampere of current flowing one second.

A henry is the unit of inductance. The E. M. F. induced is one volt when the current varies at the rate of one ampere per second.

The watt is the unit of power. One ampere of current passing through a resistance of one ohm expends one watt of energy.

Be Careful of Your Vacuum Tubes

Be careful of your vacuum tube. It is a very delicate instrument and is also expensive, at least too expensive to break very often. An audion or in other words a detector tube is an incandescent bulb, and is more breakable than any electric light bulb, and certainly everyone knows how easy it is to break an electric light. You can judge then how easy it is to accidentally break your tube.

A blow out of the vacuum tube is the bogey that haunts many an amateur who has been out-of-luck with his VTS.

It is unwise to overload a tube continuously, as its life will be seriously curtailed. It is a much better plan and more economical to operate two tubes in parallel than it is to force one tube to deliver a greater out-put than is rated for; in fact greater economy will result from burning tubes slightly below normal brightness.

It can be shown that to double the filament emission will reduce the operating life of the tube to one-fourth, whereas, by operating the filament at 95 per cent of its rated voltage, the life will be doubled.

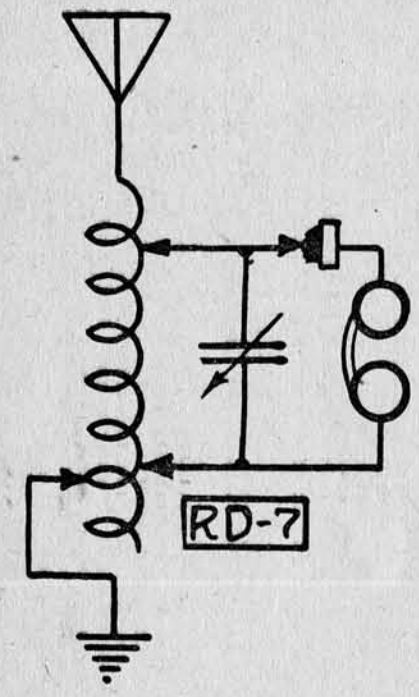
When first testing the circuit, or when the set has not been operated for some time, it is wise to cut down all voltage to one-third of the normal voltage. This will reduce the possibility of burning out the tube through a wrong connection which has been overlooked, as a fault will be detected before the damage is done.

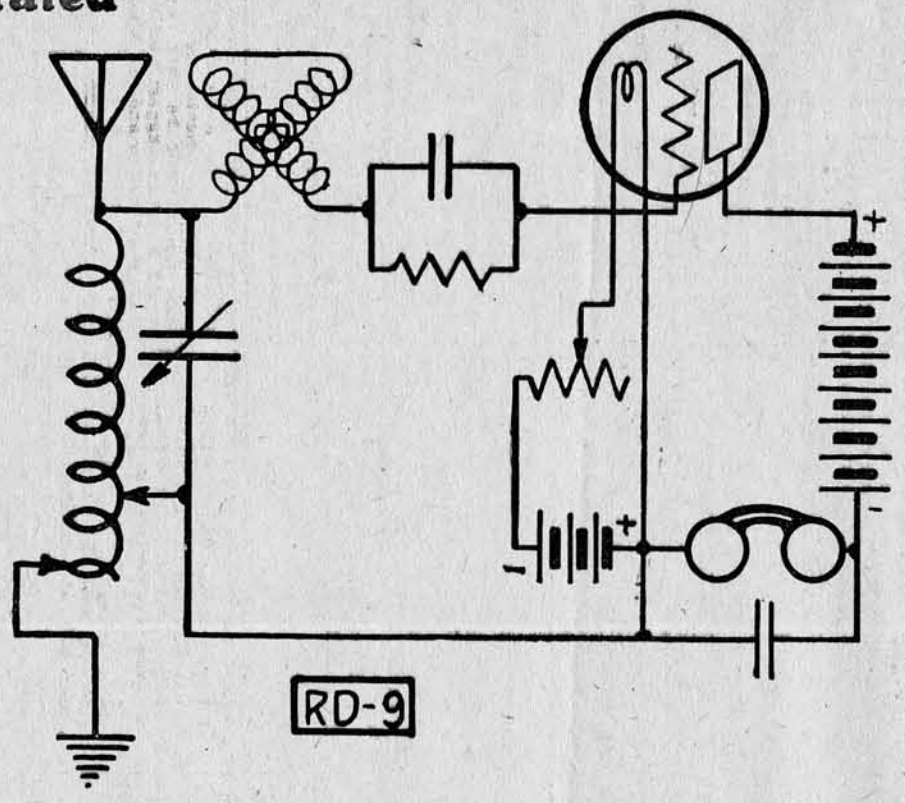
Radio Digest
Illustrated

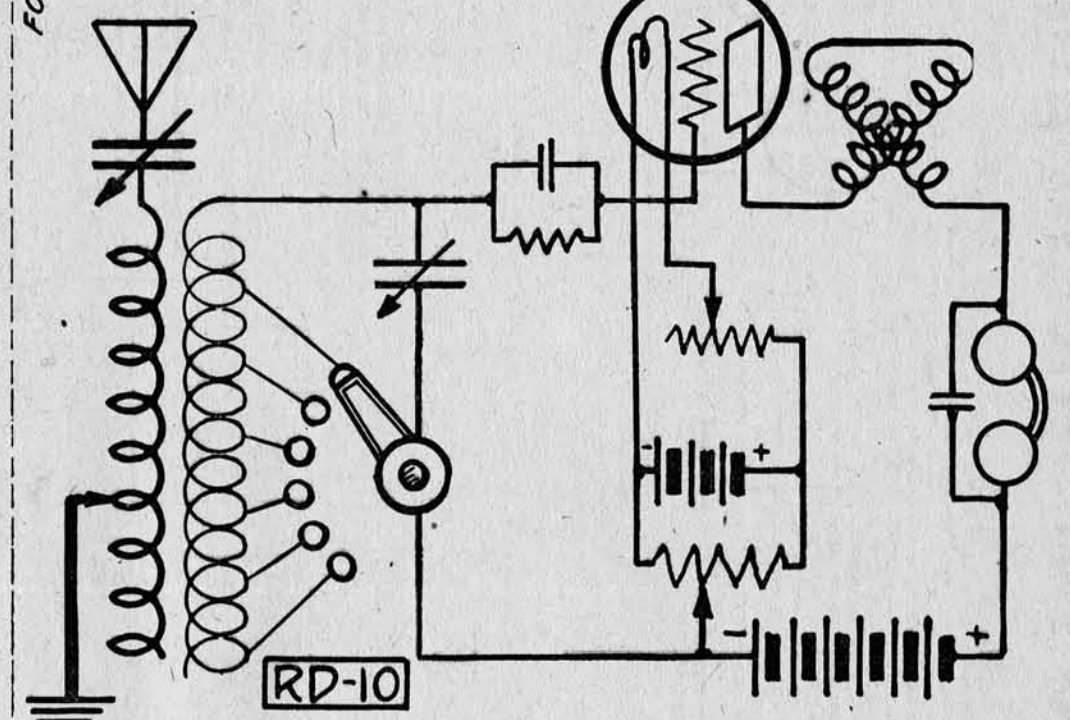
No. 4.

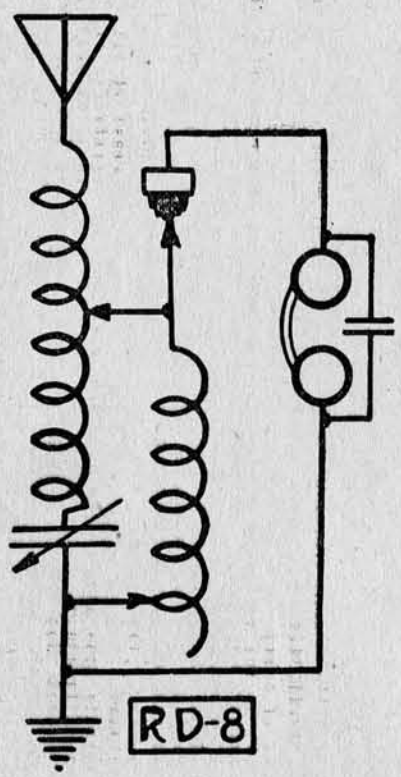
by Harry J. Marx.

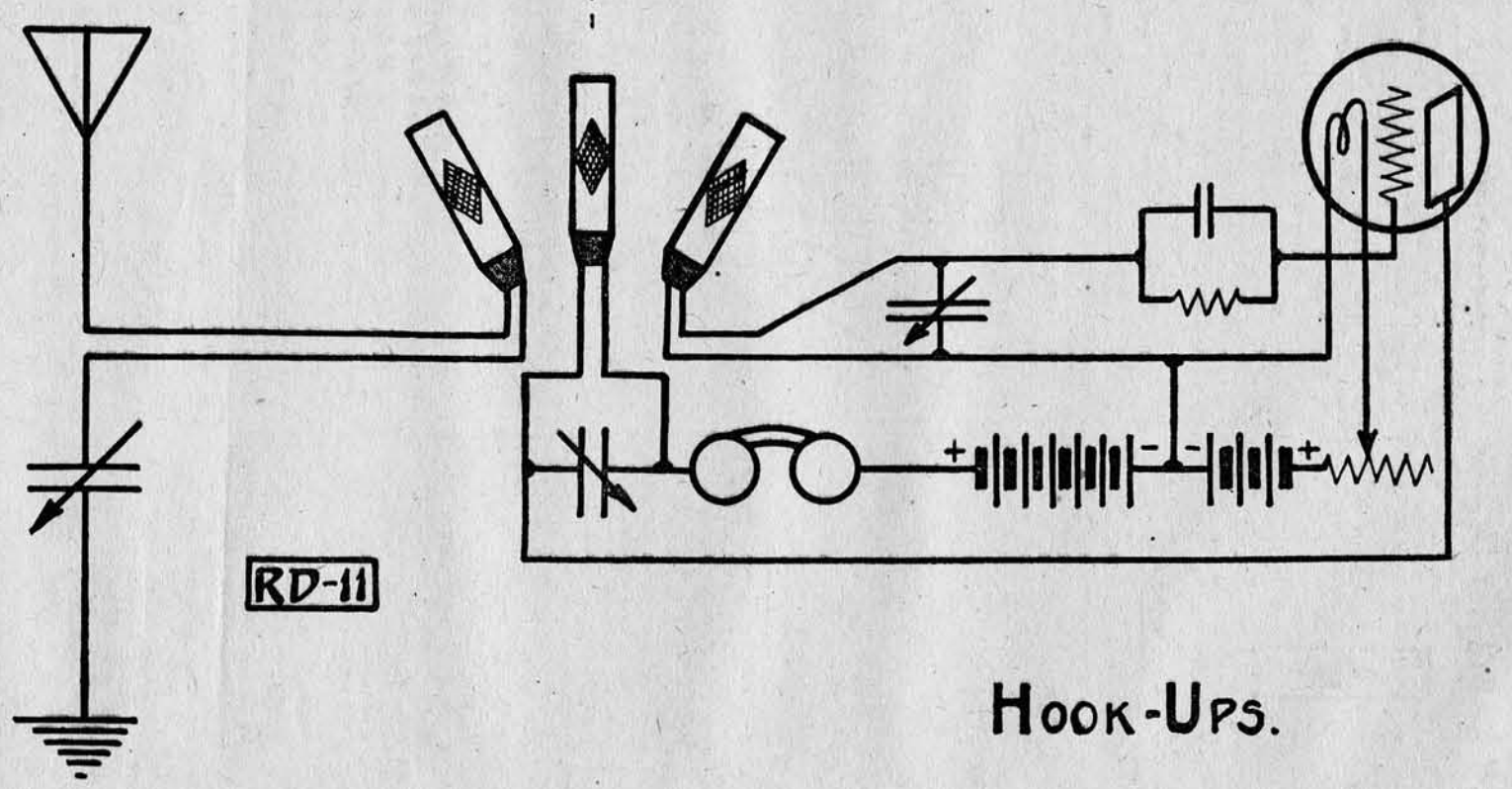
FOLD.











Hook-Ups.

Questions and Answers

Radio and Audio Frequency Amplification

J. M. B.—Enclosed find a drawing of a regenerative set using a one stage radio amplifier and one stage audio amplifier. Please inform me if this circuit is correct and what range could be gotten. At the present time I am using a regerative set with one stage of audio amplification but am unable to hear stations outside of Chicago.

I am also sending another circuit using a one stage radio amplification and one stage of audio amplification. Which of the two is the better or if these are incorrect please give me a circuit which will receive stations such as KDKA, WJZ and other broadcasting stations.

A.—Your circuits 1 and 2 are all right but I don't think much of your hook-up number 3 and doubt very much whether you will get any better results if at all. From the information that you furnish I can't estimate just why you shouldn't get any better results, let me have more information about your aerial, locality, etc. There is no question but what you ought to be getting better results at least part of the time.

Hook-up In the Next Issue

C. W.—Referring to your request for a hook-up that was not included in the last number because letter was received too late, I find that a circuit covering your requirements is shown in the next week's loose leaf sheet, so I am referring you to that number.

Loose-coupler and Vario Coupler

F. D.—I would greatly appreciate an answer to the following questions, for which I enclose stamped envelope.

1. I intend erecting an aerial on the roof of my home 90 ft. long and as I live on the first floor the lead-in would have to be 60 ft. long. Will this be a good aerial?

2. Will a loose-coupler work satisfactorily with a V T set and is it as efficient as a set using two variometers and one vario-coupler?

3. Can you recommend some good books on Radio for the beginner which can be purchased in Chicago?

A.—1. The aerial with the 60 foot lead-in that you mentioned ought to give you very efficient results, provided of course, that you have not unfavorable local conditions.

2. I would suggest that you read over my articles in the April 22 and 29th numbers on Loose Couplers and the vario-coupler, and variometer combination.

3. Watch our Book Reviews started in the April 22 number.

W E Phones

G. C. J.—As it is now impossible to buy a set of Baldwin Mica phones, I have been told that the phones made by the Western Electric Company are the next best substitute in the making of a loud speaker. Will you kindly advise me what your opinion is on the matter?

They carry but one grade or type of these phones in the Pittsburgh Radio stores. They are marked as having a resistance of 2,200 ohms per set, and also have the maker's mark of "509W". Can you say whether or not these are the only type made by that company? They sell at $15.00 per set.

A.—The phones made by the Western Electric Company are exceptionally good, and I do not hesitate in recommending them to you. They make others than the one you mentioned, but the 509W is well suited for your purposes.

Technical Books

J. R.—Kindly name a good book about Radiotelephony I would like to read, not a beginners' book, but a good technical one. I am also interested in a book about the vacuum tube in order to get full information from the technical standpoint.

A.—You are referred to our Book Review Columns for information on Text Books, covering Radio Telephony. This column was started in our third number, dated April 29th and will be continued covering a brief comment on the various books on the market.

Armstrong Patent

E. H. F.—I should like very much to be advised as to the address or addresses of the holder or holders of the Armstrong U. S. patent number 113149.

A.—Write to the U. S. Patent office and enclose 10 cents for a reply and the information will be sent to you. We haven't a patent file on hand.

Too Much to Expect

R. A. D.—Would you please answer this question?

Monmouth is about 167 miles from Chicago. Could I hear the concerts sent out by the Westinghouse Electrical Co., using a double slide tuner, fixed and variable condensers, crystal detector and 2000 ohm phones? My aerial would be 100 ft. long and 75 ft. high.

A.—You expect too much of your crystal set, under favorable conditions you would get reception but not as a usual expectation at all. Get a tube set!

Boy Scouts

B. S.—I have a troop of Boy Scouts who have about 25 dollars to put into a Radio receiving set, which may be carried on their hikes. They are considering the "De Forest-Everyman receiver." The specifications of this set give the range length as 150,800 meters, which may be increased by the addition of "due-lateral coils."

The nearest transmitting station is in San Antonio which is 90 miles distant. Will this set pick up San Antonio? Can it reach farther? What would be the average range of this receiver? The wave length range seems to be good, but do you think it will receive over any practical distance?

A.—I am afraid you are expecting too much with the Crystal set that you mention, although under good conditions you may receive that distance but you could not get regular reception at all. I fear that you will have to get a tube set if you want reliable reception over that distance.

Vacuum Tube Socket

V. B.—Please tell me how to connect a vacuum tube socket which has four terminals marked +, —, g, and w.

Will a sal ammoniac or gravity battery work on a vacuum tube, if they will how many batteries will it take?

A.—The + and — signs indicate the positive and negative terminals of the "A" Battery, the "g" is the grid shown by the zigzag line in the vacuum tube conventional symbol, while the "w" can mean nothing else but the plate terminal. The connections to the balance of the apparatus can be made through any hookup diagram.

No, the batteries that you mention are not practical for the Vacuum Tube work.

Voltage for the Vacuum Tube

L. L.—As a reader of the Radio Digest I am taking the liberty by writing and ask for some explanations in regard to Radio.

I have an Arlington type loose coupler, a vacuum tube detector but do not know the proper way of connecting it. The main things I want to know is the proper voltage and current used for the vacuum tube and how I can hook it up in order to get the best results.

I also have got two variable condensers and am not certain of their proper places.

A.—The April 22d issue has a hook-up on Page 13, Fig. 3, that covers your equipment and at the same time shows you where to place your two variable condensers.

Regarding the proper voltage, your "A" battery feeding the filament should be six volts, while the "B" battery in the plate circuit should be 22½ volts.

Ballroom Concerts

F. E. C.—I am planning to give Radio concerts in connection with my ballroom but do not know what kind of a set would answer my purpose. If you can send me the names of the firms that are reliable, also the kind of apparatus to order I will be greatly obliged.

My ballroom is about 130 feet long and 80 feet wide. I have room to put up an aerial 100 feet long and about 75 feet in the air. I understand there is a loud talker which will enable me to give the concert to a large audience at the same time.

Am I located too far from the Broadcasting stations to receive the concerts, etc.?

What kind of a set should I get and who are the best firms to write to?

A.—We cannot recommend you to any one concern, it would be contrary to the policy of Radio Digest. However, any reliable house in your vicinity will obtain the equipment for you.

You will require several Loud Speakers placed in various parts of your ballroom in order to get clear reception throughout the room.

No you are not located too far away, but you will require an expensive receiving set. I would recommend two steps of Radio Frequency Amplification, Detector and two steps Audio Frequency Amplification. Less than that will not give you satisfactory results.

Condenser Too Sensitive

C. W. S.—Enclosed you will find hook-up of my set; I receive concerts from all points within a radius of 500 miles with Red Head phone and no amplification but it is hard tuning on account of variable condenser being so sensitive $\frac{1}{32}$ of an inch will throw me away from my point. Can I overcome this by using a Vernier 3 plate condenser with my 36 plate condenser? If so will you tell me how to hook it on in connection with my set? Will a variable condenser improve my set in series with my ground or antenna and how many plates should be used? Will a potentiometer help and how should it be hooked on?

I have tried an 18 plate condenser on my secondary instead of 36 plate but could only get K. D. K. A., which is 30 miles from me.

I will appreciate it very much if you will answer these questions for me.

A.—Yes, hook the Vernier three plate condenser in parallel with your present variable.

Yes, a variable condenser either in series or shunted across the Primary Coil will help you in range and tuning.

Your 18 plate condenser was the wrong one for the winding on your honeycomb coil.

Honeycomb Coils

W. H. B.—Would a set of three honeycomb coils give good results for both concert and time signal reception? What size coils would you advise me to buy?

A.—Yes, a three honeycomb coil circuit ought to give you good reception for both concert and time signals. My article in this number on Honeycomb Coils will help you in this respect.

Receiving Transformer

D. L.—I want a Loose Coupler Receiving Transformer (200-400 meters). Will any Receiving Transformer tune out stations not wanted? Can I make one? If so what are dimensions and particulars?

Is it desirable to use a grid leak when no grid condenser is used?

Are all three VTs in the diagram enclosed detector tubes or are the last two amplifiers?

A.—The receiving transformer will be of considerable assistance in developing your set. I am at the present time working on an article covering the construction of one which will be published in two or three weeks. Would suggest that you wait for that as space is not available in this column to give full information.

Why try to omit the grid condenser since the price is such a small item. The hook-up given in your letter indicates the use of the 3 Vts as detector, and I don't think your results will be very favorable. I would certainly suggest that you convert them into detector and two steps of amplification.

An Invitation—

WHEN "stumped" write the Question and Answer Department, RADIO DIGEST, 123 West Madison Street, Chicago, Ill. A self-addressed envelope should be enclosed ALWAYS, as not all answers can be published. Only those of general interest will be printed in these columns. Other questions will be answered by mail.

When your question is of a highly technical nature and cannot be readily explained, send sketches and diagrams with it. Don't hesitate to give us full details and information, as many questions cannot be answered simply because of insufficient data. All letters should be addressed to the Question and Answer Department and should pertain to nothing but questions on RADIO. HAVE PATIENCE, your letter will be answered in the order that it is received, unless it requires special research on the part of our engineers.

The services of a trained staff of Radio Engineers are at the command of every reader of RADIO DIGEST. Don't hesitate to send in your troubles and let RADIO DIGEST worry about them. RADIO DIGEST, however, reserves the right to refuse to answer any question which might lead to litigation.

Potentiometer

O. A. M.—Will you please show me the best way to connect a Potentiometer in the following hook up?

I have enclosed a stamped addressed envelope for your reply.

A.—Loose Leaf Number Four, in this issue gives RD-10 which shows a Potentiometer across the "A" Battery. Would suggest using this circuit making any slight changes that your apparatus might call for.

Instructions Wanted

H. G.—Could you please tell me how to build a good Radio receiving set using two Variometers and a Vario-Coupler and other necessary parts to complete the set, also instructions on how to build as many parts of the set as can be built good.

I prefer a set costing a few dollars more than a cheap set at a cheap price, also could you give any information on the Vactuphone as described in the newspaper clipping that I have enclosed with my letter, this information is for a friend of mine who has trouble hearing Radiophone concerts.

A.—We have started our pages on How to Make your own Parts and would suggest that you follow those articles as all the parts in a set that can be made at home will be covered.

We can give you no information on the Vactuphone as it is unknown to us. Will be glad to furnish you details if we can get any, it is out of our field and it may take a little time to look it up.

Step Down Transformer

A. W. C.—Will you please tell me if a step down 110 volt transformer can be used in connection with a Rheostat for lighting the filament of a vacuum tube detector or amplifier, or are dry cells required?

Can the city direct current of 110 volt be used in connection with plate voltage?

A.—Yes, the step down transformer can be used but be careful that your voltage is not over six, or you will have some Burnt VTs. Yes, the D. C. 110 Volt current can be used, but see that you get the proper rheostat for that purpose.

HOW TO WORK WITH BAKELITE

Use a piece of bristol board for laying out a diagram for the location of instruments on bakelite or formica. Make dots for every hole to be drilled and label them for the size of the hole to be drilled. When this diagram is made it is placed over the panel and the marks punched through with the sharp point of a tool or nail to make dots on the panel.

The drilling is done slowly from the front so that if there is any surface chips that break through they will be on the back side of the panel. If holes are to be made more than one-eighth of an inch in diameter it is best to start with a smaller hole. The holes are then slightly countersunk.

The surface may be finished with a medium sandpaper first then with a finer grade. Make all strokes the full length of the panel. Finish with a cloth moistened with linseed oil.

YOU DON'T HAVE TO BE EXPERIENCED!

If you are interested in Radiotelephony and want to receive concerts, don't let lack of knowledge stop you. The most recent development has been in furnishing receiving sets which anybody can operate by following simple directions. Operating a receiving set is no more difficult than operating a talking machine and can easily be added to any home.

Don't hesitate to get a receiving set for fear of lightning. All commercial receiving sets today comply with fire underwriter regulations and include simple devices which make it impossible for lightning to enter your home through Radio aerials. Injury of a receiving set by lightning is unheard of.

Fear of electric shock, as often expressed, is based on lack of information. The electric current necessary for the reception of sound waves sent through the air is very small. It could not injure, even if it were not properly insulated, as it must be in any workable receiving set. You have more cause to guard against shock when cranking up your automobile, or putting in new spark plugs with the motor running.

Radio Illustrated

This two and a half year old tot helps daddy construct an aerial, then listens in.
© K. & H.

Switches, tuning coil and all carried within a cane.
© P. & A.

The Radio valise. Neatly packed in the cover part is a loud speaker and a loop aerial of small wire.
© U. & U.

"Shades of Darwin," what have we here? A monkey Radio fan. "Jocko" listening to his master's voice.
© U. & U.

Wounded soldiers find by Radio that they are not forgotten. Listening in on concert music.
© Int.

Three opera stars with Signor Scotti reading the score of Tosca while listening in to grand opera.
© U. & U.