Flewelling Tells "How"; Q. & A. on Reinartz

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

TRADE-MARK

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SEE TOLL PLANT CHAIN

POPULAR ARTISTS BEFORE WJZ MICROPHONE

Ada Mae Weeks, who plays the leading role in "The O'Brien Girl," is shown here singing "Learn to Smile" at WJZ, in Newark

PLANS FOLLOW $25,000 TEST OF SIMULTANEOUS BROADCASTING SERVICE

American Telephone and Telegraph to Establish First Station in Boston—Two Plants Send Same Program at One Time During Tryout

(By F. N. Hollingsworth, Special Correspondent)

NEW YORK.—An experiment in Radiophone broadcasting, the first of its kind ever attempted, has resulted successfully—so successfully, in fact, that the world's greatest telephone corporation is about to launch the establishment of a chain of Radio test laboratories and Radio toll stations that will extend from the Atlantic to the Pacific coasts, both north and south in two

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HEAR PHILADELPHIA STATION IN HAWAII

SENSITIVE RECEIVING SET BRIDGES 5,100-MILE GAP

Government Operator at Pearl Harbor Picks Up "Laughing Record" from WIP Plant

PHILADELPHIA, PA.—Using super-sensitive receiving set, H. B. Smith, a government Radio operator stationed at Pearl Harbor, Hawaiian Islands, while "listening in" October 18, picked up Station WIP, Philadelphia, approximately 5,100 miles distant, making a world record for long-distance receiving. Word has just been received here of the feat. Station WIP is located in the Gimbel Brothers' store here.

"I heard what sounded like someone laughing," said Mr. Smith in reporting the reception, "and thought at first that an operator in some broadcasting station nearby had made some kind of a blunder, for the sound came in clear and strong. Then, to my astonishment, I heard the sign-off, 'This is station WIP, Gimbel Brothers, Philadelphia,' At another time I heard the 'bedtime stories' broadcast by this station.

Heard "Laughing Record"

Station WIP checked up the various items of musical programs broadcast the day preceding that named by Mr. Smith and found that at 3:25 P. M., Eastern

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PA TO BE RADIOED TO RADIO SON CASH

PRINCETON.—Princeton undergraduates may send home for money via Radio at no cost to either them or "the governor," according to a recent announcement by the Princeton Radio club. It has arranged with amateur Radio operators throughout the United States and Canada to relay messages from Princeton to their destinations free of charge.

"Gentleman Jim" Corbett Tells of New "Pug" Rules

NEWARK, N. J.—The first public reading of the new Roosevelt boxing Rules were given from Station WOR by James J. Corbett on January 9. A special committee of noted sporting editors and ring celebrities was on hand at the Radio station to hear "Gentleman Jim's" proposed code and several recognized boxing experts expressed opinion of the rules, broadcasting these immediately after the sending.

WJZ Crosses Ocean Again

NEWARK, N. J.—Carl Rollins' voice carried across the Atlantic Ocean recently when he sang "When Knights Were Bold," at Station WJZ. He received a letter from Morgan Edwards, amateur of Southampton, England, stating that his solo was picked up there.

Mona Morgan, Shakespearean reader, whose recitals have been broadcast by WJZ. Miss Morgan's short snatches from the master's plays are aimed to show that Shakespeare wrote for human beings about human beings

SEE TOLL PLANT CHAIN

(Continued from page 1)

lines. This experiment, preparations for which covered several months, was that of simultaneously broadcasting from a New York station on a 400-meter wave length and from a Boston station on a 360-meter wave length. The results are declared by experts to have been flawless.

WEAF-WNAC Program Three Hours Long

The New York station was WEAF, of the American Telephone & Telegraph Company at 14 Walker street, New York city, and the Boston station was WNAC, of the Shepard Stores, on Winter street, Boston. The program was three hours long, and comprised a number of orchestral selections, saxophone and cello solos, contralto and varitone vocalists, and most unusual of all, a bird mimic, whose imitations of bird songs and notes were as clearly and flawlessly heard as though he were in the same room with the listeners.

From the New York station was run a long distance telephone circuit of approximately 300 miles, equipped at intervals with repeaters or amplifiers and special filters, which equalized the circuit so that the sound came into the Boston station as clearly as it entered at the New York end. To equalize a telephone circuit means that whatever goes into it at one end comes out exactly the same at the other end, or wherever it might be tapped.

If the lines had not been equalized, the high notes of the saxophone or the low tones of the piano might have been the only ones heard distinctly at the Boston end when broadcast.

Problem Delicate; Four Circuits Used

From a technical standpoint, the control of a broadcasting station 300 miles from New York by means of telephone lines is a most delicate problem. Four circuits were used to stage this feat. The first was the "regular" circuit, which carried the broadcast program. The second was an emergency circuit, which could be plugged in should the regular one fail through storm or other interference. The third was a local circuit, used in Boston, for a big side issue program, which will be touched upon later in this article. The fourth was the "order circuit," by which the telephone and Radio engineers in New York and Boston kept in touch with each other and noted progress of the experiment. There were fifteen experts handling the matter at the Boston end.

Four of these experts were stationed at the Copley-Plaza hotel, about a mile from Station WNAC. Here, in the big ballroom, was installed a "public address system," consisting of four huge loud speaker horns with 50-watt tubes as power amplifiers. A bankers' convention was being held there at the time, and this evening program was rendered to them by combined Radio and telephone as a special entertainment.

100,000 Radiophans Listen in

Owing to the care exercised in adjusting the filters and repeaters, there was no distortion; every note coming over as clear as the original. At least a hundred thousand Radiophans, throughout New England and along the Atlantic seaboard, listened in on this remarkable program. Station WNAC has records of being heard as far south as Porto Rico, and Commerce, Texas, as far east as the Azores, and as far west as Montana. Therefore one can imagine the possibilities of this combined broadcasting.

The expense of the test was $25,000, but telephone officials say it would have been well worth double that to get the results they obtained.

A. T. & T. Co. Plan First Link

Within a very short time it is expected that the American Telephone & Telegraph Company will establish in Boston their own test laboratory and Radio toll station. With the New York station it will constitute the first link in a chain that will be established very soon west, north and south along lines in big cities to the Pacific Coast.

Nothing definite had been decided until the big test of January 4, but immediately thereafter word came from New York that the Boston station will be established within a few months. The project will not stop in Boston, however, but the chain will be gradually pushed westward. Already hundreds of letters and telegrams have been received at Station WNAC telling of picking up the New York concert, which was duly announced as a simultaneous broadcast, in the usual matter-of-fact way that the Shepard station has. The letters also mentioned the broadcast's remarkable clearness.

What System Holds for Future

In time, say experts, the country will be covered with Radio toll stations, so that a big concert in New York, or the inaugural address of a President, or the speech of some silver-tongued orator may be broadcast by contract to any part of the country. Arrangements can then be made for loud speakers installed in some big auditorium where the audience can sit and listen to an evening's program without ever seeing the participants. San Francisco will be able to hear the Metropolitan opera, by contract with the company itself and the telephone company with its Radio toll stations as the intermediary and transmitting agents.

Political parties can have the greatest campaign orators in the country speak to hundred audiences simultaneously, at perhaps no more expenditure than would be involved in their traveling expenses, and at a great saving of his time and nervous energy.

$100 FLEWELLING PRIZE CONTEST RULES

1. Contest is open to all Radiophans, whether or not they are subscribers to Radio Digest, Illustrated. The contest is open now and will close February 24 at midnight. Awards will be announced in the March 17 issue of this publication.

2. The object is to locate and award prizes on a competitive basis for the best Flewelling circuit receiving set entered.

3. Prizes are: First, $40.00; Second, $25.00; Third, $10.00; Fourth to Eighth (five prizes) inclusive, $5.00 each.

4. In event of a tie, equal prizes will be awarded each tying contestant.

5. Judges will be the Technical Staff of Radio Digest.

6. To enter the contest send working drawings and diagrams together with an article of from 1,500 to 2,500 words in length describing the making and operation of an actual Flewelling circuit receiving set. The article should tell: (a) how to make the set, (b) how to operate it, (c) helpful suggestions for getting maximum results, (d) actual airline broadcasting station receiving range using only one tube, first employing only an indoor aerial but no ground, second, using a ground but no aerial, and third, if available, using only a loop aerial. Other combinations and notations on the antenna system used will be considered in the award of prizes.

7. In sending material for consideration in the contest, exclusive publication rights are automatically given to Radio Digest, Illustrated. All articles published, but not awarded prizes, will be paid for at regular space rates. Unused manuscripts will be returned to contestants on request.

8. In deciding the winners of the contest the judges reserve the right to call for any set entered to be sent in for examination and test. Tubes, A and B batteries and phones will not be required in sets sent in for testing.

9. Manuscripts will be judged from the standpoints of neatness, clarity of expression, completeness, and actual tried success of the set described.

10. Originality in the use of various parts of apparatus other than shown by Radio Digest in the Flewelling circuit heretofore, is encouraged and even recommended. See Rule 6, however, for method to be used in determining the range.

Tufts Students Broadcast Songs and Mandolin Tunes

MEDFORD HILLSIDE, MASS.—On Tuesday evening, January 23, the Tufts College Glee and Mandolin Clubs broadcast from station WGL a program of glees, mandolin numbers and readings most pleasing to the listeners in who appreciate college music. Tufts College is known throughout the East as the "Singing College," and musical organizations go far to bear out that name.

Broadcast programs sound clearer on a crystal or nonregenerative than on a regenerative set, but the latter brings them in louder.

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Looking Ahead

E. T. Flewelling, Writing Exclusively for the Digest, will tell in Part II of his series, to appear next issue, more about the successful construction and operation of his famous flivver super set. Can you receive 1,500 miles using only a wire twenty feet long laid behind the picture molding in a room? Try it with a Flewelling.

How to Make a Panel Reinartz Tuner will be told by Harry J. Marx in the next issue, February 10, of Radio Digest. Its a toss-up between Flewelling and Reinartz when it comes to popularity. Both circuits are wizards for results, however, so we will leave it to the Radiophan to choose.

Lambdin Kay and His WSB Radio Owls are in direct opposition with the ideas of Station WOAI of San Antonio, Texas. Read both sides of the story in the next Digest. Do you favor such broadcasting station organizations, or do you fall in line with WOAI and oppose them?

The Receiving Records Contest will appear in full, revised to date, in the February 10 issue. The contest has been travelling along for many months now, but still records are broken every week. When will the maximum distances be reached?

A-B-C Lessons for Radio Beginners, by Arthur G. Mohaupt, will tell next week all about the construction in general of tuning apparatus, such as loading coils, variometers and variocouplers. Turn to page 11 and read the fifth chapter now.

Part III of "Radiophone Broadcasting Stations" with the State, City Index will be found on page 8 of the February 10 issue. This original feature of the Digest is the most accurate, complete, and in fact, only reliable directory of broadcasting stations, published.

CLOSE 1ST CONTEST BUT OPEN NEW ONE

FLEWELLING FANS URGED TO RUSH PAPERS IN

Prizes Raised—Lack of Time and Contestants Cause for Closing First Contest without Awards

By the Flewelling Contest Editor

Get your Flewelling Contest manuscripts in to Radio Digest before midnight February 24! Because no papers were submitted up to the first closing date, January 27, announced for the first contest, it was erroneously extended two weeks. As such an extension is not allowable according to the postal regulations, the first contest was therefore closed on January 27 without award.

Prizes Increased

But, a second contest is now open. Increased prizes (see rules on this page) should make the efforts of the contestants more intensified.

Any manuscripts received too late for the first contest will be, if the constestant desires, considered as entered in the second contest.

Read the rules and do your best to win one of the eight prizes offered.

Awards will be announced in the March 17 issue.

BOSTON HEARS OPERA BY PHONE FIRST TIME

Chicago Singers, En Tour, Present "Aida"—Radio Digest Aids Plans for Service

BOSTON, MASS.—Grand opera was broadcast by Radio from Boston for the first time January 22, when Station WNAC, the Shepard Stores, sent out the opening opera "Aida", given by the Chicago Opera company at the Boston Opera House. The company is completing a two weeks' season in Boston. By arrangement with the Chicago management, Radio Digest cooperating in the plans, microphones were installed in the opera house and the great artists who took part were heard perfectly.

"Aida" was selected for this first experiment in opera by Radio from Boston, as it can be appreciated without the visualization afforded by the costumes and scenery, which might be necessary with some other operas. A special request was issued to Radio listeners to write to Ralph Flanders of the New England Conservatory of Music their comments on the opera and its Radio qualities, so that he can make a report which will have much to do with plans for similar projects in the future.

WIP HEARD IN HAWAII

(Continued from page 1)

time, a "laughing record" had been broadcast from a phonograph. Checking up the time of reception at Hawaii it was found this broadcast would have been heard in Hawaii at 9:25 A. M., the exact time reported by the Radio operator.

In other words, it is possible to broadcast music in Philadelphia at noon so that residents of Honolulu, Hawaii, can "eat their breakfast to music."

Station WIP, Philadelphia, uses a 400-meter wave length. The antenna is of the inverted L type, supported on the 100-foot towers on top of the store, and is composed of four phosphor-bronze wires of seven strands each, each 175 feet long, spaced eighteen feet apart.

The transmitting apparatus comprises four 250-watt tubes, two used as oscillators, and two as modulators.

Czechs Investigate Radio

WASHINGTON.—"Radio" development in Czechoslovakia has not yet passed the stage of infancy according to dispatches from Consul Winans, at Prague. He states, however, that the government has already taken an active interest in Radio development and in view of a more extensive and popular acceptance of this form of communication at home has sent a special commission of experts to study the progress made in other countries. Whether a transmitting station will be erected in Czechoslovakia will depend upon the findings of this commission.

Invents Radiophone Log

NEW ORLEANS, LA.—Louis J. Gallo, a young artist here, received word recently that patent papers for his invention, the "Radiophone Log," have been granted. The device enables all Radio listeners to find the exact distance of the reception of signals. It is in the form of a number of maps, made up into a pad, with all cities having broadcasting stations located, and their distances.

The listener tears off a perforated rule and lays it on the points of broadcasting and receiving, and the scale then shows the airline distance between these points.

'INDUSTRY'S FUTURE UP TO TUBE FIGHT'

SAYS OUTCOME OF SUITS TO FIX DESTINY

Chief of De Forest Company Declares Victory by R. C. A. Will Throttle Progress

(Special to RADIO DIGEST)

NEW YORK.—On the question of the De Forest Audion bulbs being used by independent manufacturers of Radio equipment, Charles Gilbert, president of the De Forest Radio Telephone & Telegraph Company, has issued the following statement:

"In response to requests for a statement regarding the outlook on the future of the Radio industry, I feel that from a trade point of view there is nothing of greater importance at this time than a consideration of the patent litigation begun by the Radio Corporation of America against J. H. Bunnell & Co., and A. H. Grebe & Co.

"The point at issue in this suit is the right of independent manufacturers to make use of the De Forest three-element vacuum tube.

De Forest Policy VS. R. C. A. Idea

"It goes without saying that if the Radio Corporation should be successful in this suit against the independent dealers the outlook for distributors, retailers and the buying public in general would be a dark one were it not for the fact that the only other concern in the United States that has the right to make and sell vacuum tubes is the De Forest Company.

"Independent dealers and manufacturers may well be interested, therefore, in the announced policy of the De Forest Company, which is that the purchaser of the De Forest tubes should not be compelled to buy complete sets in order to obtain tubes.

"R. C. A. Policy Would Throttle Progress"

" The policy of the Radio Corporation, on the other hand, if successfully carried out would, in the opinion of the De Forest Company, have a throttling effect upon the progress of the art and the industry.

"Independent distributors, retailers and the buying public naturally wield a great influence in the direction of public policy, in so far as it affects the use of vacuum tubes, and should not be at all backward in their support of the policy taken by the De Forest Company."

College "Credits" Given for "Air School" Study

Ohio Institution Plans to Offer Regular Courses

MARIETTA, O.—The Marietta College faculty has decided to make a test of broadcasting college education. A set of continuous lectures will be broadcast, each professor handling his own course and "students" will be granted regular college credit providing they cover assigned reading and furnish satisfactory reports, pass examinations and incidentally, but necessarily, pay certain fees.

Each student will be permitted to take one or as many subjects as he or she desires, but it will be necessary to get in touch with the college by correspondence, register and be supplied with certain information.

This new feature is an addition to the extension department of Marietta College and is under the supervision of Dr. A. C. Watson, head of the department of psychology. An efficient broadcasting station has been installed in the science building, the call letters of which are WBAW.

Aids Fire Fighters

PARIS, FRANCE.—In the case of a large fire in Paris recently, an airplane, equipped with Radio, circled above the flames and gave information that was valuable in extinguishing the fire.

PROBE FOR VIOLATION OF SILENT HOUR RULE

CLEVELAND, O.—It is the earnest hope that the broadcast listeners in appreciate the quiet hour recently established in Cleveland for better broadcast reception, and if any violent interference is experienced, the trouble should be immediately reported to the proper authorities, so that the interference can be investigated, according to an announcement by the Cleveland Radio association.

PERMITS TUMBLE TO LOWEST MARK EVER

CHICAGO.—The lowest number of broadcasting stations ever licensed during one week was recorded when only two Class A plants, one a college and the other a newspaper, were granted permits the week ending January 13. The two new broadcasters using the 360-meter wave length are WRAM, Lombard College, Galesburg, Ill., and WQAF, Sandusky Register, Sandusky, O.

'NIGHTIE RADIO' ENTICES SLEEP

Mme. Julia Cummings' Radio set is the "last thing" in more ways than one, for not only has she taken the lead in including it in the boudoir furnishings, but tunes in a dreamy waltz from WJZ just before retiring. And, believe Mme. Cummings, who is a New York modiste, Radio waltzes go hand in hand with Morpheus

© K. & H.

WOC Jumps Atlantic to Paris; Distance 4,700 Miles

DAVENPORT, IA.—Station WOC of this city reports having been heard in France, a distance of 4,700 miles. J. L. Luntley, an amateur, living at Colombes, department of Seine, using a homemade receiving set, heard part of a talk by Maj. Dent Atkinson, delivered Dec. 16, according to a letter which was recently received.

Supervise Road Construction from Capital Through Air

CHICAGO.—Radio is now employed to supervise highway construction. A demonstration of the method used by the North Carolina state highway department in directing road activities from the capital was one of the novel features shown at the thirteenth American Good Roads congress, held in Chicago, January 15 to 19.

DEAF "HEAR" RADIO BY TOUCH DEVICE

FEEL CONCERTS THROUGH VIBRATING BAR

Londoner's "Ossiphone" Enables Afflicted to Listen In Through Bones

The deaf will feel concerts broadcast by Radio!

That is, if the invention of a Londoner can be adapted for use in connection with the Radio receiving instrument.

This Londoner, S. G. Brown, has invented what he calls an ossiphone, a device which will enable a deaf person to hear through his bones.

The invention consists of a small rectangular box, the greater part of which is taken up by an electromagnet, with an iron bar between the poles. The bar is such that it can be made to vibrate when the slight impulses of Radio are sent through the magnet.

Extending from the magnet and bar is a key with an ebonite knob. When the instrument is connected to the phone switches of a Radio receiving set a deaf person can hear the concert merely by placing his knuckles against the knob.

Similar to Telephone

When it is desired to hear another person in the same room a transmitting instrument, called an "aural box," is used in connection with the ossiphone. The aural box is connected through a set of dry cells to the ossiphone. Speech entering the aural box can be heard in the same way broadcast sounds are heard, through the ossiphone.

There is, however, one kind of deafness which, Brown says, his ossiphone cannot overcome. That is the deafness that is due to disease of the aural nerves leading to the brain. For this, it is said, no instrument has as yet proved successful.

Transmits Through Bones

But where deafness is due to merely a physical cause, affecting only the outer or even the middle ear, the ossiphone has proved successful. Instead of merely energizing, or magnifying, sound, this instrument transmits the sound vibrations through the bones of the body to the aural nerves that have remained unharmed, and through these to the brain.

Scientists, who have put this instrument to test, say it has produced very satisfactory results.

Ask 30,000,000 Yen to Develop Jap Radio

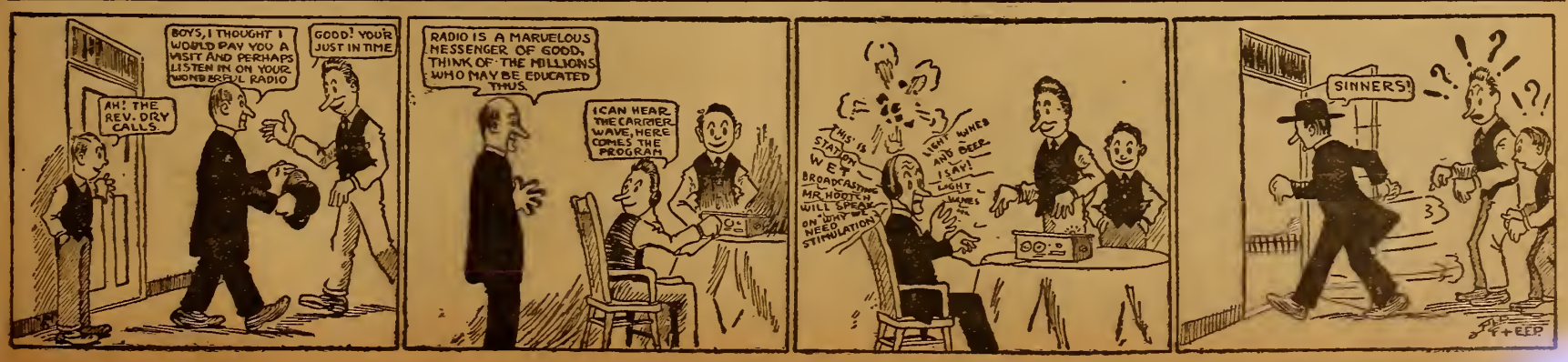
Government to Grant Request of Communications Office

WASHINGTON.—In order to develop commercial Radio on a large scale, the Japanese Department of Communications has requested an appropriation of 30,000,000 yen, which, it is said, will be granted by the Government, according to a report received by the Department of Commerce from Commercial Attache Abbott, at Tokyo. The organization of a private company to manufacture Radio apparatus, build stations, and do a general communication business, has been suspended, as it conflicts with existing Japanese law. If the appropriation is secured, the Department of Communications hopes to become a party to the agreement in regard to exchange of patents existing between the Marconi, Telefunken, Telegraphie sans Fils, and the Radio Corporation of America.

A little ammonia immediately applied to acid spots on clothes will neutralize the acid and prevent it from burning a hole in the cloth.

A single wire antenna of moderate dimensions, say, 75 feet long, is more effective in selective tuning of a receiving station.

THE ANTENNA BROTHERS — Spir L. and Lew P. — When Ether Waves Are Wet



GERMANY BUILDING VAST ETHER CHAIN

ERECTS LARGE PLANTS TO REPLACE CABLES LOST

Excellent System of Radio Communication Makes Teutons Independent of Other Methods

WASHINGTON.—While the activities of England, France and Holland in the field of Radio has been concentrated since the war on the establishment of communication with their dominions and colonies, Germany, deprived of all overseas possessions, has been building up within her own borders a system of Radiotelegraph and Radiophone stations that is second to none in the world.

The loss to Germany of her ocean cable system, built up at great cost during the fifteen years preceding the war, made her dependent on neighboring countries for all her international communications except that portion that she could handle by Radio. The logical result has been the increased use of high power Radio stations for overseas communications, especially to the United States.

Has Two Transatlantics

At present the central office of the Gesellschaft fur Drahtlose Telegraphie, located in the Oranienburgerstrasse, Berlin, controls the two great transmitting stations, Nauen and Eilvese, and the two receiving stations, Gelton and Hagen. Both the transmitting stations work on schedule, Nauen with New York, Moscow, Madrid, Rome, and Bucharest; and Eilvese with Rome and Madrid. Both have transatlantic press schedules as well.

Extensive changes are now in progress at Nauen, designed to increase its power and the flexibility of its operating plant. Separate antennae are being constructed for the American, the Asian and African, and the two European circuits; and a special arrangement is planned for the new Buenos Aires circuit which is to be opened to public correspondence within the next few months. The corresponding station at Monte Grande, near Buenos Aires, is to be maintained and operated by a combination of French, English, German and American Radio companies.

How Chain Is Organized

The German Post Office station at Koenigswusterhausen, near Berlin, transmits to London, Budapest, Sofia, and Saraijevo, and its receiving station at Zehlendorf makes up the return circuit. Norddeich, a coastal station used for hydrographic reports, shipping news, and weather reports, completes this group which is known as the Main Stations Group (Hauptfunkstellen). Although communication is maintained with the foreign cities mentioned the Main Stations group operated principally within Germany.

The feeder stations of this system, or "leading stations" (leitfunkstellen) operate an interior service as subsidiaries of Koenigswusterhausen. The stations located at Dortmund, Breslau, Duesseldorf, Frankfort on the Main, Hamburg, Hanover, Koenigsberg in Prussia, and Munich, are each equipped with two sending and two receiving installations. Dortmund operates a special service to Rotterdam as well.

Start Public Radiophony

Public Radio broadcasting was inaugurated in Germany September 1, 1922, the Post Office Department and the Express Service uniting to establish the service. Subscriptions, open to the public, are based on the extent of the service rendered, and the only additional cost is the installation charge.

The apparatus used may be employed for either telegraphic or telephonic reception, vacuum tubes being supplied. In accordance with the distance from the broadcasting station, amplification in varying stages is provided.

Koenigswusterhausen is the broadcasting station and subscribers to the service are now located in 176 cities and towns. The material furnished so far has been confined to economic news, such as bank statements, exchange quotations, stock market listings, etc.

Hidden, Radio Controlled, Man-o'-War Target for Shells in Naval Games

Battleship "Iowa" to Be Modern, Crewless Flying Dutchman in World's First Indirect Fire Practice to Be Held at Panama Bay—Radio and Planes to Assist Aiming of Guns

By Carl H. Butman

WASHINGTON.—Indirect firing of 14-inch guns from a battleship at a man-o'-war under way but out of sight over the horizon, will be undertaken for the first time in history in March at the naval maneuvers in Panama Bay. The target will be the Radio-controlled Iowa of Spanish War fame, unmanned and unarmed, but operated by an officer aboard the U. S. S. Shawmut several miles away.

Radio will bear two very important parts in the battle practice of the fleet this year. The maneuverable target ship will be sent out to sea under Radio direction, and then when she is out of sight indirect fire at her will be undertaken by the aid of Radio observation and airplane spotting.

Law Makers Plan to Attend

The Iowa is a 25-year-old warship, which has served more than her time. For the past two years she has been known as Coast Battleship No. 4 and honored here and abroad as the first Radio-controlled ship of war. Her actual bombardment with heavy gun-fire from the Mississippi, designated as the attacking vessel, has occasioned considerable interest not alone in the navy but in congress.

Secretary Denby's invitation to the members of the Senate and House naval affairs committees to witness the tests has brought a flood of requests for transportation to Panama Bay in March for the scheduled bout. A program of several varieties of battle practice gives promise of unusual spectacle, seldom witnessed except in actual warfare, and then only by officers and men in the engagement.

Iowa Is Modern "Flying Dutchman"

Literally the Iowa is a modern, steam "Flying Dutchman" without skipper or crew. Some time ago far-sighted Radio engineers of the navy developed a special method of Radio control for the Iowa, based, it is believed, on the inventions of Benjamin F. Miessner. Today this works perfectly. The ship's water and oil tanks are filled, her oil burning boilers and engines are started by a skeleton crew of caretakers. The control ship takes her over, and the crew abandons ship. By means of Radio her engines are speeded up and slowed down, her rudder is thrown to port or starboard or maintained at a desired angle, and she performs within a fraction of a second at the will of the "master mind" aboard the control ship, which may be as far as ten miles distant.

A special feature of the equipment prevents the Iowa from running away, stopping her if the control is broken or the aerials are shot away. If no Radio control signal reaches her electro-mechanical brain for so long as fifteen minutes, the fires are extinguished, the engines stopped and everything shuts down. This enables the crew to board her again, repair any defects and start her on another cruise.

Five Tests Planned at Panama

Five basic problems of gun-fire will be undertaken with the old Iowa as a moving target, in an effort to equal war-time conditions as nearly as practically possible. Towing a target for gun-fire restricts the angle of fire somewhat to avoid hitting the towing vessel. With the Iowa under Radio control, and the Shawmut a safe distance away, this objection is overcome.

As it is not desired to sink the Iowa, special projectiles will be used. They will have very thin walls and super-sensitive fuses. These shells will be filled with high explosive charges, and it is expected that when direct hits are made they will all explode on the armor plate of the vessel and break up rather than penetrate her.

If she is hit many times at weak points, she may sink, but the navy desires that the tests be made without any such mishap. The Iowa's Radio control apparatus is of considerable value, being the world's first remote-control system for a full size sea-going vessel. Then, too, future Radio-control development in the navy will undoubtedly be based upon this, the first Radio warship.

Naval Radio in New Orleans Gives Southern Sky Reports

NEW ORLEANS, LA.—The naval Radio station here is now broadcasting weather reports from the office of R. A. Dyke, assistant forecaster, to all points throughout the South. All reports are in code. Heretofore the weather bureau has taken advantage of the naval sending station only for the broadcasting of river reports. The forecasts are for Louisiana, Texas, Arkansas and Oklahoma. Reports of the stages of the Lower Red, the Ouachita and Mississippi rivers are still being sent out every night. The bulletins for marine interests which have been an institution for the last six months will be continued at two-hour intervals ending at midnight.

The bureau has announced as its schedule, 75th meridian time, wave length, 1,832 meters, spark; 10:30 A. M., state, river and weather forecasts; 11 A. M., localized bulletin for shipping interests; 5 P. M., storm, hurricane and cold wave warnings, when indicated, with general weather summary.

The weather bureau announced that the move to extend their weather report service is due to the increasing interest in Radio throughout the South, and to the success the only other forecasting station, Denver, has had with a similar service.

NEW CONCERN LISTS $1,250,000 CAPITAL

Baldwin Reorganizes with Filing of Incorporation Papers

SALT LAKE CITY.—Rumors of the reorganization of Nathaniel Baldwin, Inc., manufacturers of Radio telephone equipment, culminated recently when articles of incorporation for "Baldwin International Radio, Inc.," were filed with the county clerk here.

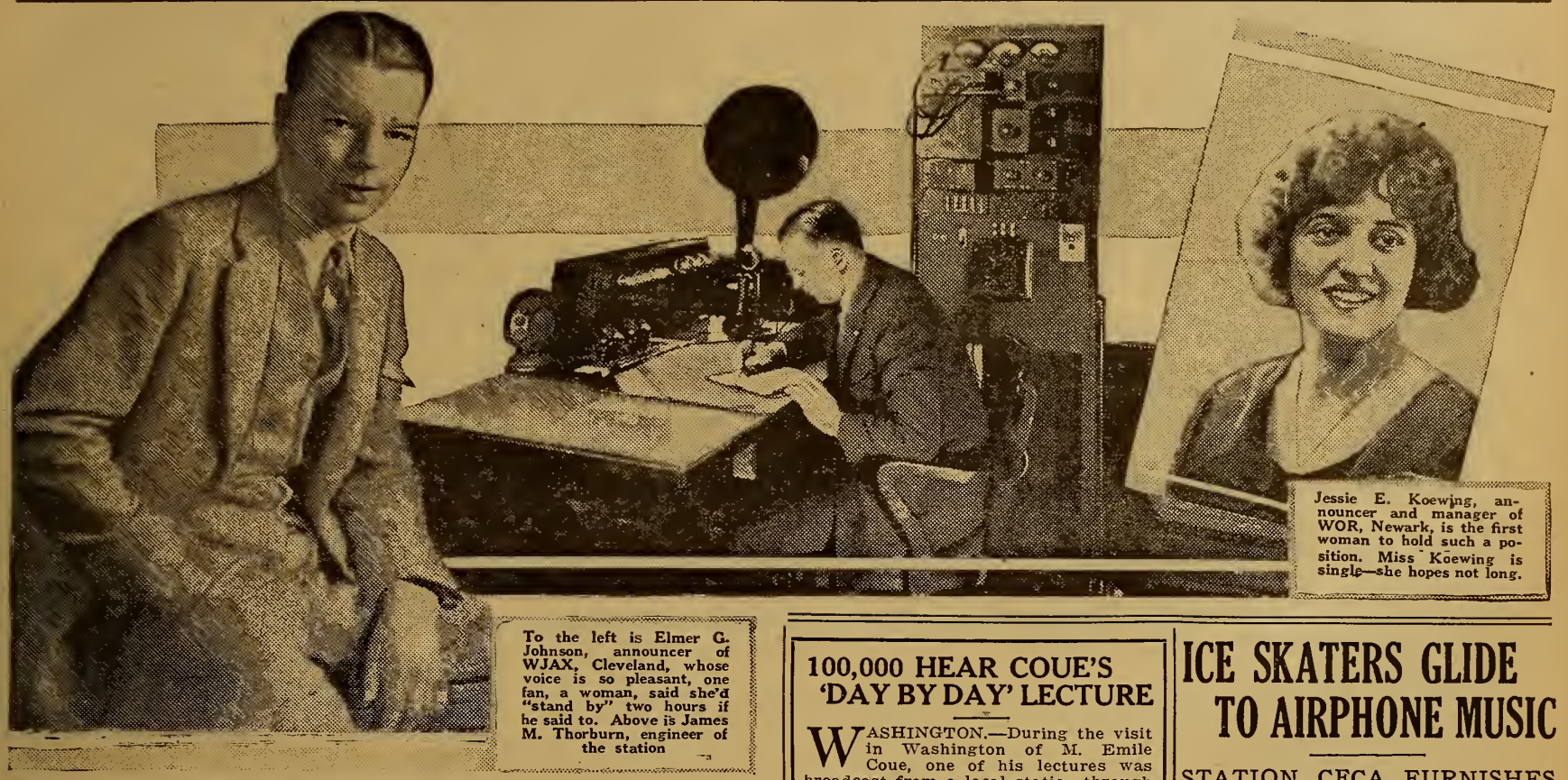
The new concern is capitalized for $1,250,000, divided into 1,000,000 shares of common and 250,000 shares of preferred stock, par in both cases being $1.

Incorporators are Nathaniel Baldwin, president; David Neff, first vice president; Thomas J. Yates, second vice president; Harden Bennion, third vice president; Lawrence Clayton, secretary-treasurer; Lester F. Fisher and George H. Budd, directors.

The purpose of the incorporation, according to the articles, is "To carry on the selling of and conducting sales agencies for the products of the Nathaniel Baldwin Incorporated in all countries of the world except the United States and its possessions, and excepting the countries of Japan, Australia, New Zealand, and all Asiatic countries south of and including China and east of and including India, including all Asiatic islands with the exception of any and all United States territory."

Business reports show that the widespread use of Radio is affecting the mining industry in certain sections of the country, the supplying of crystals alone having become a growing industry.

EVER HEARD THEM? HERE THEY ARE



To the left is Elmer G. Johnson, announcer of WJAX, Cleveland, whose voice is so pleasant, one fan, a woman, said she'd "stand by" two hours if he said to. Above is James M. Thorburn, engineer of the station

Jessie E. Koewing, announcer and manager of WOR, Newark, is the first woman to hold such a position. Miss Koewing is single—she hopes not long.

WJAX, "Wave from Lake Erie," Wins Fame for "Crack" Market Broadcasts

Voice of Elmer G. Johnson, Announcer of Cleveland Station, Familiar to Every Radiophan in America—Commercial Reports, Station's Primary Interest, Supplemented by Entertainment

By P. A. Price

"This is WJAX—the wave from Lake Erie!"

Judging from letters received by the Union Trust Company, of Cleveland, Ohio, which operates Station WJAX, the above salutation must be familiar to every Radiophan in the United States and Canada. And on this page is "WJAX," himself, in the person of Elmer G. Johnson.

He is tall, of athletic build, and good looking as you can see for yourself in the photograph taken especially for the readers of the Digest. Mr. Johnson was too modest to say very much about himself, but from one source and another it was discovered that he hails from Iron Mountain, Michigan, with Detroit as an adopted home before he came to Cleveland. He is twenty-four years of age; is fond of football and baseball; pounds a wicked key on the piano and, during the war, was Radio operator on the U. S. S. Maine, and later instructor in the government's Radio course at Harvard University.

Voice Microphones Well

Johnson's voice carries wonderfully well on the mysterious Radio waves, and it is a pleasant voice to hear. One Cleveland clubwoman was heard to remark, "When WJAX says, 'stand by for two minutes, please,' I am willing to 'stand by' for an hour!" And down in Ohio an elderly lady, who admits eighty summers, calls him "her man," and tunes in all his broadcasts. And mash notes! But Johnson is discreet as well as modest, though they do say he receives them in bunches,

The gentleman at the desk in the other photograph is James M. Thorburn, Radio engineer for the Union Trust Company, and the power behind the throne. Mr. Thorburn was Radio operator on the U. S. S. Mayrant during the war and saw service across the Atlantic. Mr. Thorburn was, at one time, operator aboard Henry Ford's private yacht Sialia. That's the name; not "Lizzie" as we started to write it.

WJAX Work Primarily Commercial

WJAX is primarily a commercial Radio station. Its most important program is the broadcasting of market quotations and financial news four times daily for the special benefit of bankers and business men of the fourth Federal Reserve district, and it was one of the first stations in the United States to realize the importance of Radio to the commercial world and to use Radio for the transmission of important business information.

WJAX capitalized upon the importance of the time element in the transaction of business, and the United States government, realizing that the Union Trust Company was pioneering in the legitimate use of Radio for business purposes, gave special permission to use a wave length of 485 meters for daily broadcasting. The concert programs are sent out upon a wave length of 360 meters.

Powerful Plant Reaches Out

This station is one of the most powerful in the United States. The output is 500 watts and the antenna current on the 360-meter wave length is 7.5 amperes and, on he 485-meter wave length, it is 10 amperes. WJAX has been heard at the four extreme corners of the United States—Maple Grove, Maine; Key West, Florida; San Diego, California, and Seattle, Washington—according to letters and postal cards received from Radiophans at these points, with reception noted from every State in the Union. Letters from points outside the United States have been received from St. Johns, Newfoundland; Island Lake, Manitoba; and Edmonton, Alberta, in the Dominion of Canada.

Others letters have been received from San Juan, Porto Rico; Havana, Cuba; The Bermuda Islands; Limon and Tampico, Costa Rica; and Nurgo Laredo, Mexico. The S. S. Heredia wrote from Costa Rica, and the S. S. Searchlight from Tampico. The operator on the Searchlight picked up WJAX first off the Great Bahamas, and listened in each day until Tampico was reached.

Broadcasts Symphonies

In response to the many calls upon WJAX for concerts and entertainments, this station is putting on two entertainment programs a week, on Tuesday and Thursday evenings. Probably the biggest item of importance in relation to the evening broadcasting is the fact that WJAX is broadcasting the entire season of symphony concerts given by the Cleveland Orchestra. It has also broadcast the Cleveland Public Auditorium organ, one of the greatest pipe organs in the United States and owned with the Public Auditorium, by the people of Cleveland, Ohio.

Two thousand letters were received from almost as many points in the United States, as a tribute and appreciation of the organ recital that was broadcast on the evening of November 28, 1922. Such letters, more than anything else, testify to the fact that good music is always appreciated, even in this day of jazz. The musical programs are not always heavy; there is a plentiful mixture of dance orchestration and everybody within the range of WJAX is perfectly satisfied.

Here's hoping that "The Wave From Lake Erie" will continue to inundate the country, and that the pleasant voice will continue to greet us with "This is WJAX."

Nearly 12,000,000,000 words flashed through the air from German Radio stations in 1921.

100,000 HEAR COUE'S 'DAY BY DAY' LECTURE

WASHINGTON.—During the visit in Washington of M. Emile Coue, one of his lectures was broadcast from a local station through the efforts of the Washington Post. It is estimated that close to 100,000 persons listened to him, making a record audience for the Frenchman. The lecture was broadcast on a 360-meter wave length.

GRANT RIGHT TO BIG PLANTS IN BRAZIL

45-Year Concession to Install and Operate World Station Goes to News Agency

WASHINGTON.—A concession to install and operate, for a period of 45 years, Radiotelegraph and Radiotelephone stations for international communication has been granted the Sociedad Anonyma Agencia Americana, a Brazilian news agency, under a decree dated November 14, according to Assistant Trade Commissioner Cremer at Rio de Janeiro. The concession includes the operation of Radiotelephone stations for communication within the national territory but excludes Radiotelegraphy in that field.

The Sociedad Anonyma Agencia Havas, by a decree dater October 9, has secured an extension until March 31, 1923, of its original concession for a Radio station, dated August 2, 1920.

The Radio Nacional Sociedad Anonyma recently elected a board of directors of five members, among whom are the society's president and secretary. This company was organized to control the international Radio service of Brazil, but the capital subscribed to date is insufficient for more than a preliminary investigation. Its existence, however, is an obstacle to the establishment of this high-power intercontinental Radio service planned by a group of foreign Radio companies.

The new station at Praia Vermelha was opened to international service on November 28, but is a receiving station only.

"Father" of Art Amazed at Gotham-London Talk

LONDON ENGLAND.—Senator Guglielmo Marconi, who was one of the listeners to a recent Radiophone talk between New York and London, said the result was one of the most remarkable in his experience. People in a room of the Western Electric company's factory in North London heard J. I. Carty, vice president of the A. T. and T. company, as distinctly as if he was only across the street, and when a Magnavox was used the voice was heard in all parts of the room. There is no installation on this side powerful enough to enable a Radiophone reply.

More Clubs Should Do This

COLUMBUS, O.—Letters commending the proposed Radio bill in congress, designed to allow broadcasting stations of different districts to transmit on varying wave lengths, were written and mailed to Senator Frank B. Willis and Congressman John C. Speaks, of Columbus, at the last meeting of the Columbus Radio club.

ICE SKATERS GLIDE TO AIRPHONE MUSIC

STATION CFCA FURNISHES TUNES FOR SPORT

Toronto Star Plant Even Supplies Mobile Receiving Car—Makes Round of City's Rinks

TORONTO, ONT., CAN.—At Withrow Park rink, here, a crowd of about one hundred skated to waltzes and fox trots broadcast by The Toronto Star's Radio station, CFCA, and received by the well-known white Radio car with the stove-pipe aerial.

"Here she comes," some boys shouted; immediately the white truck hove into sight. Everybody seemed to recognize it at once, although there had been no advance announcement that the car would be used in this way.

Help Put Car in Position

There was a great rush of voluntary assistance, when the car was being moved across the ice to what was considered the best corner. Young people who apparently were unaware of the bitterly cold wind that swept the park, made the district resound with hearty shouts as they pushed the car into the desired position.

The operator tuned in as the announcer at CFCA was calling out "Swanee River Moon." Instantly the scores of skaters had deserted the white truck. The first strain of the waltz was the signal for a flash of skates, and everybody was off on a swinging gait.

Entertainment During Intermissions

Followed other "hits" that set the crowd off to a fast pace. As at all well ordered rinks there were "intermissions," when no music was being played. But these intermissions were different. There was music, but not suitable for skating. The crowd stood around and enjoyed these "off" numbers.

The Star Radio receiving car is making a tour of the prominent rinks of the city, "playing" at one each evening.

House Loud Speakers Cost $25,000; Plan Investigation

WASHINGTON.—The rules committee of the House has ordered a favorable report on a resolution which provides for the appointment of a committee to make an investigation regarding the voice amplifier system which has been installed in the hall of the House of Representatives. It is understood that the company installing the system of loud speaking which has several times been connected up with Radio for broadcasting purposes, is asking $25,000 for the system as installed at present.

Radioman Ends Life

NEW ORLEANS, LA.—Frederick Mauberret, Radio expert and operator for the United Fruit Company, committed suicide by shooting, January 9, at his home here. No reason was assigned by relatives. Mauberret was 37 years old and unmarried.

On officer of the Portuguese army has developed a system of operating call bells by Radio which is intended to do away with prolonged watching for calls at Radio receiving stations.

CANADA'S AIR COPS CUT INTERFERENCE

1,850 STATIONS CONFLICT VERY LITTLE

Silent Period Observance Keeps Amateur Plants from Jamming Broadcast Phone Programs

(Special to RADIO DIGEST)

OTTAWA, CAN.—Canada today has 1,800 licensed amateur Radio transmitting stations in addition to the fifty licensed commercial and broadcasting stations. But with this number in the air at various times every day there is little confusion or interference, according to the officials of the Radiotelegraphy branch of the Department of Marine and Fisheries here.

Every person operating a Radio outfit in the Dominion of Canada is required to take out a license. Receiving stations are on a flat license rate of one dollar a year and these licenses are being secured through the post offices throughout the Dominion.

When sending licenses are issued the licensee is given a specified wave length on which he may transmit. Amateur transmission stations are kept down to a wave length which cannot interfere with the work of commercial and broadcasting stations.

Inspectors in Every City of 15,000

In order to check the wave length which the amateur stations are using, inspectors are being appointed in every city that has a population of 15,000 or over. These inspectors have been placed on a part time basis for a small salary and are required to spend their evenings listening in to the various signals and gauging the wave lengths on which they are sent. These inspectors have also been authorized to deal with complaints from receiving stations whose work is interfered with by any amateur sender.

Ether-Cops Keep Air Lane Clear

The first twenty-five of these ether-cops, as they are called, have already been appointed and the results have more than justified the efforts by the officials. Amateur senders have cheerfully complied with the new regulations and during the forbidden hours, 7:30 to 10:00 P. M., which are reserved for the broadcasting stations sending concerts and various reports, there has been of late little difficulty with persons who formerly delighted in jazzing up the air to the discomfiture of thousands of Radio fans.

The expense of maintaining the ether-cop brigade, which is composed chiefly of ex-service men who took up aerial communication work during the war, is more than met by the money received from license fees.

New receiving licenses are being issued every day in increasing numbers and indications are that during the last few months more people have taken to Radio than had ever thought of it previously.

Jersey "Bug" Gives House Dance with Ohio Music

COLUMBUS, O.—A cheering "pat" on the back for Columbus' newest Radio broadcasting station came recently when C. H. Lane, an amateur of Newark, N. J., called WPAL, the Superior Radio and Telephone Equipment company, Columbus, to tell the operator that a dance was being held at his home to music being broadcast from the Columbus station. He said that he had picked up stations in 14 different states that evening but that the Columbus program was coming in clearer than any of the others.

One of the stations in the East is broadcasting a portion of the works of Nathaniel Hawthorne. The readings are given by Miss Hildegarde Hawthorne, a direct descendant of the novelist.

Book Reviews

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

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

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

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

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

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

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

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

Becomes Gulf Medic Center

NEW ORLEANS, LA.—Medical service to vessels at sea will be sent by Radio from Marine Hospital Number 14, via the Algiers Naval Station. The call is NAT. This order, given by H. S. Cummings, surgeon general of the United States Public Health Service, places New Orleans in the position of medical center for Gulf seafarers. Service is free and is intended for ships carrying no ship's surgeon.

Broadcasters Delay Meeting

CHICAGO.—The meeting of the National Broadcasters league, which was to have been held here in the First Regiment armory, in January, has been indefinitely postponed. The broadcasters had planned to meet in conjunction with the Radio exposition which was scheduled for January and which was also indefinitely postponed.

HEAR DAUGHTER SING IN FAR AWAY ATLANTA

Parents of Songstress Listen in on Special Concert

NEW ORLEANS, LA.—The parents of Mrs. William H. Wrigley, Atlanta songstress, recently heard their daughter's voice borne on the air waves from the Georgia city. The New Orleans Daily States informed her parents, Mr. and Mrs. Emmett Walsh, of New Orleans, that Mrs. Wrigley and her husband, W. H. Wrigley, also a vocalist, were on the program for the evening, and that the concert was being given especially for the singer's father and mother to hear. Mr. and Mrs. Walsh went to the Daily States office, and heard the program clearly, with occasional interpolations in the voice of Mrs. Wrigley asking, "Mama, are you listening?"

Mr. Walsh wired the Atlanta Constitution station, WGM, acknowledging the success of the stunt.

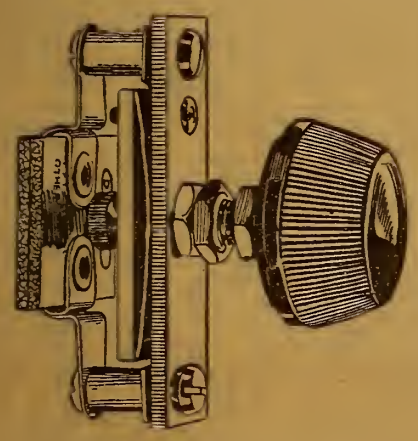
In Canada the Royal Canadian Horse Artillery has met with great success in its maneuvers by directing artillery fire from an airplane by means of Radio communication.

The Radiophonist's Mart

THE CRL adjustable grid leak is designed for mounting on the panel through a single hole. Its use permits the adjustment of the grid potential to the exact value that provides the maximum signal strength. By turning the knob the resistance of the leak can be changed gradually and smoothly to any desired value from approximately ½ to 4 megohms. Not only is this grid leak particularly well adapted for the Flewelling circuits, but it also permits the adjustment for best results in any type of circuit and tube.

It has a bakelite base on which is mounted a fabric strip, the ends of which are connected to the two binding posts. This strip is impregnated with a high resistance compound of tested permanence. The current from the grid leaks along this strip, the amount being regulated by adjusting the area of contact of the strip with a curved phosphor-bronze spring that is held in position by a compression block. This compression block is operated by a screw attached to the operating knob.

As the knob is turned to compress the spring, a larger area of the spring comes in contact with the fabric strip and the resistance between the binding posts is decreased. More current leaks across and the negative potential of the grid is decreased. Turning the knob any other direction decreases the area of contact between the spring and the strip, cuts down



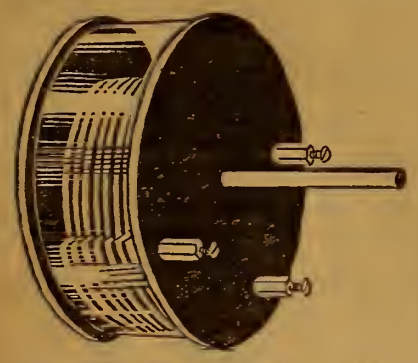
Exact Value Obtained With This Grid Leak

the current leakage and permits a higher negative potential between the grid and the filament. The potential that provides the maximum signal strength is thus obtained with ease and certainty.

These leaks can be obtained equipped with a condenser, as shown in the illustration, or without if desired. The entire instrument takes up a space on the back of a panel 2¾ inches long by ¾ inches wide. They are manufactured by the Central Radio Laboratories of Milwaukee, Wis.

VARIABLE condensers of the rotating plate type are usually too bulky for compact cabinet mounting. On that account many an amateur seeks an instrument that will fit in a space available on his panel without interference with other apparatus of the set. Another objectionable feature of the rotating plate type has been the difficulty of keeping the plates in alignment and avoiding short circuits, especially where sets are to be portable.

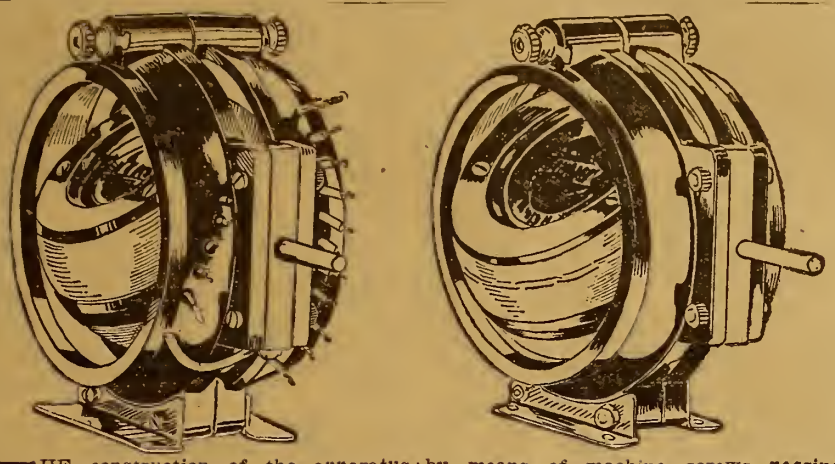
For the condenser shown in the illustration, the manufacturers claim not merely compactness and perfect insula-



Insulated Shockproof Variable Condenser

tion, but in addition, shock-proof features. The plates instead of being air-spaced, have dielectric separators between which the rotating plates slide. In addition, the necessary spacing has been reduced to a minimum. A large circular composition disk at the front and rear and a transparent celluloid covering between the disks makes the condenser dust-proof. The condensers are made in all standard capacities by the Stahl Rectifier Company of Chicago, Illinois.

Compact Variocoupler and Variometer



THE construction of the apparatus shown in the illustration presents such compactness and perfection in workmanship that it deserves special mention and recommendation to the Radiophan. Not merely these points, but also the rather unusual feature of using bank windings with its effective reduction of self-capacity, must be taken into consideration. The framework is considerably smaller than most of the molded type of instruments in spite of which both the variocoupler and variometers are very compact in form. Two metal angle plates with a highly nickel-plated finish are fastened to the base for mounting. In the event that the instrument is to be used for the panel mounting, they are easily taken off and fastened on the shaft side and will hold the instrument to the panel by means of machine screws passing through four holes in the angle plates.

The shafts have a firm natural bearing in the brass spacing plates located at each end which have a highly polished nickel-plate finish. The rotors in both instruments turn very freely without friction and are very well balanced. In the variometer the clearance between stator and rotor windings has been reduced to a minimum. The variocoupler primary is amply provided with taps permitting both rough and fine adjustment. Each tap has been tinned so that soldering presents no difficulties. In addition, a projecting tap wire has a short spaghetti sleeve protecting it and reducing the tendency of breakage to a minimum.

The Dayfan variocouplers and variometers are manufactured by the Dayton Fan and Motor Company of Dayton, Ohio.

ONE of the simplest and yet most unusual forms of new pieces of Radio apparatus that has been called to our attention is the small unit shown in the illustration. When used in connection

Makes Loud Speaker Unit from Any Phone

with a single receiver of any of the standard high grade headsets it permits its use for loud speaking purposes at absolutely minimum cost. This base or stand is set on the inside of any bowl-shaped receptacle (which can be borrowed from the kitchen) and the receiver is set upon it. The space inside of this unit then acts as a sound chamber. The bowl reflects the sound waves and sends them out in the same manner as the complete loud speaker that this company manufactures. This unit is manufactured by the States Electric Company of Newark, N. J.

Body Tuning for 10,000 Meters

I recently discovered a unique method of tuning in long wave stations such as WSO, POZ, and many others on wave lengths around 10,000 meters, by means of a standard short wave receiver with two stage amplifier and using the capacity of the body as part of the tuning. The method is simplicity itself, but a correct technical explanation of that upon which the method is based may be more difficult.

Disconnect the "B" battery-tap to the detector tube from its binding-post and hold the bare end lightly between the fingers, the tubes, of course, having been previously lighted. Immediately the bird-like tones of many long wave C.W. stations will be faintly heard, and if the current to the two amplifiers is carefully adjusted and the proper pressure applied to the "B" battery-tap, the signals will come in as clear and loud as if using a regular honey-comb set. It does not matter to what wave length the tuner is adjusted, nor whether the detector tube current is on or off; the "birdies" come in just the same.

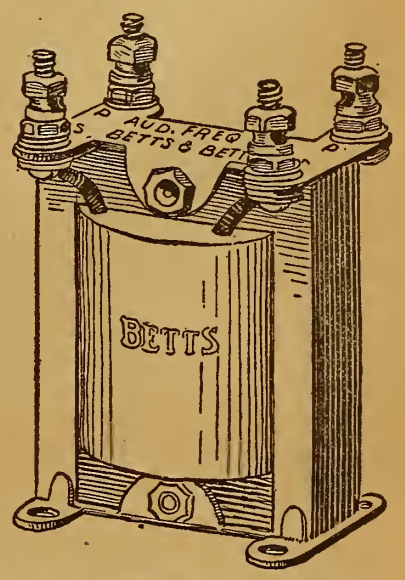
The explanation of this phenomenon is probably that the body's large capacity acts in conjunction with the large inductance furnished by the transformer windings to form a tuner corresponding to these high wave lengths, and that the amplifier tubes act as a detector.—Merrill C. Orswell, Wallaston, Mass.

Be sure and insulate your lead-in as well as your aerial.

AS A rule, the average audio frequency transformer is found to be large and clumsy in appearance. The transformer shown in the illustration is manufactured by Betts & Betts Corporation of New York city, and is manufactured in two types—W-400 and W-401. Although very small, compact and neat in appearance, still the efficiency is exceptionally high. The type W-401 has a black covering over the coil windings and possesses a higher ratio than the type W-400 which has the yellow covering. All parts have a polished nickel-plated finish. Bindings posts are provided for the four primary and secondary connections. The four lugs on the base are windings for securely fastening the transformer for either base or panel mounting.

For best results the outside of the primary winding of the transformer primary is connected to the plate of the detector tube, either directly or through the wing variometer according to the arrangements of instruments in the wing circuit. The inside end of the primary is connected directly to the positive side of the B battery.

The inside end of the secondary winding of the transformer secondary connects with the positive side of the A battery filament line leading to the amplifier tube, and the



An Efficient Transformer of Small Construction

outside end of the secondary connects directly to the grid of the amplifier tube.

If using a second stage of amplification, the same directions are followed, except, of course, that the primary outside terminal of the transformer will connect with the plate of the first amplifier tube. Third and fourth stages will be added in the same way.

Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the last part, together with the city-station index will appear next week.)

WAAX, Crafton, Pa. Radio Service Corp.

WAAY, Youngstown, O. 500 mi. Yahrling-Rayner Music Co. Tues, Thurs, Sat, 8-9 pm, music, reports. Eastern.

WAAZ, Emporia, Kans. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WAH, Eldorado, Kans. 485 only. The Midland Refining Co. Daily ex Sat, 10:30 am, 1:30 pm, markets, weather. Sat, 1 pm, same. Central.

WAJT, Marshall, Mo. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. Yankton College.

WBAA, W. Lafayette, Ind. 50 mi. Purdue University. Mon, Fri, 7:15-7:30 pm, educational lecture. Central.

WBAD, Minneapolis, Minn. Sterling Elec. Co.

WBAF, Moorestown, N. J. Fred M. Middleton.

WBAH, Minneapolis, Minn. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat, 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9:15-9:45 am, 10:30-11, 1-1:15 pm, 2:15-2:30, 4:30-5:30, music. Sat. morn. only. Eastern.

WBAO, Decatur, Ill. James Millikin Univ.

WBAP, Fort Worth, Texas. 400 and 485 only. 1,500 mi. Fort Worth Star Telegram. Daily ex Sun, 9:45-10 am, 11-11:30 am, 3-3:30 pm, 3:45-4 pm. Daily ex Sat and Sun, 7:15-8 pm, 9:30-10:30 pm, news, reports, concerts. Central.

WBAQ, Mishawaka, Ind. Lyradion Mfg. Co.

WBAU, Hamilton, O. Republican Pub. Co.

WBAV, Columbus, O. 500 mi. The Ernor Hopkins Co. Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. Marietta College.

WBAX, Wilkes-Barre, Pa. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 400 only. 1,500 mi. A. T. & T. Co. Daily, 11-12 am, 4:30-5:30 pm. Thurs, 7:30 pm on Eastern daylight saving.

WBL, Anthony, Kans. 200 mi. T & H Radio Co. Mon, Wed, Fri, 10-11 pm, concert, lecture. Sat, 11-12 pm, concert. Sun, 10 am, 4-5 pm, church service. Central.

WBS, Newark, N. J. 100 mi. D. W. May, Inc. Mon, Wed, Thur, 7:30-8:30 pm, reports, music. Sun, 9-10:30 am, 1-3 pm, church service. Eastern.

WBT, Charlotte, N. C. 485 also. 1200 mi. Southern Radio Corp. Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, Fri, 8:30 pm, music. Sun, 7:30 pm, church services. Eastern.

WBU, Chicago, Ill. City of Chicago.

WBZ, Springfield, Mass. 400 only. 500 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 3 and 8, church service. Eastern.

WCAB, Newburgh, N. Y. 150 mi. Newburgh Daily News. Daily ex Sun, 1 pm, 2, 3, 7. Mon, Fri, 10:30 pm. Eastern.

WCAC, Fort Smith, Ark. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 200, 480 also. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 400 only. Kaufman & Baer Co.

WCAF, Bodgers, Mich. Michigan Limestone & Chem. Co.

WCAG, New Orleans, La. 200 mi. Clyde R. Randall. Daily ex Sun, 6:45-7 pm, news, time. Thur, 8:30-10 pm, concert. Sun, 2-4 pm music. Central.

WCAH, Columbus, O. 500 mi. Entrekin Elec. Co. Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central.

WCAI, San Antonio, Tex. Southern Equipment Co.

WCAJ, Univ. Place, Neb. 100 mi. Wesleyan University, Wed, 7 pm, bedtime stories. Thurs, 9 pm, music, lectures. Central.

WCAK, Houston, Tex. 100 mi. Alfred P. Daniel. Daily ex Sun, 7-7:15 pm, music. Wed, 8-9:15, concert. Sun, 3-4:30 pm, concert. Central.

WCAL, Northfield, Minn. 500 mi. St. Olaf College. Thur, 11 pm, music. Sun, 8:30 pm, music, concert, lecture. Central.

WCAM, Villanova, Pa. Villanova College.

WCAO, Baltimore, Md. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20. Mon, Wed, 8-9 pm. Eastern.

WCAP, Decatur, Ill. Central Radio Service.

WCAQ, Defiance, O. 200 mi. Tri-State Radio Mfg. Co. Daily, 11:30-12:30 pm, 3, baseball; 6-6:30, baseball, concert; 8, special program. Central.

WCAR, San Antonio, Tex. 200 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Sun, 11 am, church service. Central.

WCAS, Minneapolis, Minn. 200 mi. Wm. H. Dunwoody Industrial Inst. Mon, 8-8:45 pm, music, lectures Central.

WCAT, Rapid City, S. D. 485 only. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 m, 3 pm, weather, reports. Mountain.

WCAU, Philadelphia, Pa. 485 also. 500 mi. Durham & Company, Inc. Daily ex Sun, 11:30 am, 2:30 pm, 6:30, reports, music. Tues, Fri, 10-12 pm, concert. Sun, 2-4 pm, music. Eastern.

WCAV, Little Rock, Ark. J. C, Dice Elec. Co.

WCAW, Quincy, Ill. 300 mi. Quincy Elec. Supply Co. (Quincy Herald). Daily ex Sun, 5 pm, music. Wed, 7-8:30 pm, concert. Sun, 11 am, church services, 2:45 pm, special programs. Central.

WCAX, Burlington, Vt. Univ. of Vt.

WCAY, Milwaukee, Wis. 485 also. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Sun, 7:30-8:30 pm, church services. Central.

WCE, Minneapolis, Minn. Findley Elec. Co.

WCK, St. Louis, Mo. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm. Tues, Thurs, 3-3:30 pm, music, news. Mon, Wed, Fri, 6:45-8 pm, concert, lecture, Central.

WCM, Austin, Tex. Univ. of Tex.

WCN, Worcester, Mass. 485 also. 100 mi. Clark Univ. Daily, 11:15 am, 5:15 pm, weather. Evening program irregular. Eastern.

WCX, Detroit, Mich. 400 and 485 only. 1,000 mi. The Detroit Free Press. Daily ex Sun, 10:35 am, WCX Woman's Club; 2 pm, news; 2:15, stock reports; 2:50, weather markets; 4:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert; 7-8:30 pm, week starting Dec. 18 and alternate weeks thereafter, concert. Sun, 2:30 pm, 4 pm, church services. Central.

WDAC, Springfield, Ill. Illinois Watch Co. Time and weather, spark only.

WDAE, Tampa, Fla. 485 also. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 400 and 485 only. 2,000 mi. Kansas City Star. Daily ex Sun, 3:30-4:30 pm, reports, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. J. Laurance Martin.

WDAH, El Paso, Texas. 485 also. 300 mi. Mine & Smelter Supply Co. Daily ex Sun, 10 am, news, reports. Tues, Thurs, Sat, 7:30-8:30 pm, music. Mountain.

WDAI, Syracuse, N. Y. 485 also. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Wed, Sat, evening concert.

WDAJ, College Park, Ga. 485 also. 2,000 mi. A. & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Central.

WDAK, Hartford, Conn. 150 mi. Hartford Courant. Daily ex Sun, 2:30 pm, 3:30, 4:30, 5:30, music; 7:40, bedtime story; 8:15, concert. Eastern.

WDAL, Jacksonville, Fla. 485 also. 250 mi. Florida Times Union. Daily, 11 am, time, weather; 4-4:30 pm, 8-9, music; 10:05, reports. Eastern.

WDAO, Dallas, Tex. Automotive Elec. Co.

WDAP, Chicago, Ill. 2,000 mi. Drake Hotel. Tues, Thur, 11:45 am, 1:45 pm, 6 pm, 10 pm, dance music. Sat, 10 pm, 2 am, dance music. Sun, 8:30 pm, 9 pm, 10 pm, concert. Central.

WDAQ, Brownsville, Pa. 200 mi. Hartman-Riker Elec. & Mach. Co. Daily ex Sun, 10:30-10:50 am, music; 12:50-1:10 pm, music, news, weather; 5:05-5:30 [illegible] music. Tues, Thurs, Fri, 9:15-10 pm, concert. Sun, [illegible] el. Eastern.

[illegible] adelphia, Pa. Lit Bros.

WDAS, Worcester, Mass. Samuel A. Waite.

WDAU, New Bedford, Mass. 500 mi. A. H. Smith. Wed, Fri, 7:45-10 pm, music. Sun, 10:30-12 m, 5-6 pm, church services. Eastern.

WDAV, Muskogee, Okla. Daily Phoenix.

WDAX, Centerville, Iowa. 500 mi. First Nat'l. Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert.

WDAY, Fargo, N. D. 485 also. 300 mi. Kenneth M. Hance. Daily ex Sun, 12:15-12:30 pm. Tues, Thurs, Sat, 7:30-8:15, reports, news, music. Central.

WDM, Washington, D. C. 50 mi. Church of the Covenant. Sun, 10:30 am, church service; 3 pm, lecture; 7:30, church service. Eastern.

WDT, New York, N. Y. Ship Owners Radio Service.

WDV, Omaha, Neb. 160 mi. John O. Yeiser, Jr. Daily 7-8 pm. Tues, Sat, 12-1 am. Fri, 10-10:45 pm. Sun, 2-4 pm. Music. Central.

WDY, Roselle Park, N. J. Radio Corp. of America.

WDZ, Tuscola, Ill. 100 mi. James L. Bush. Daily ex Sun, every half hour, 9:30 am-1:15 pm, Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. Fallain & Lathrop.

WEAB, Fort Dodge, Ia. 485 also. 600 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 9:40 am-1:20 pm; 5:15 pm, 7-8, music; 8:15, bedtime story; 9:45, weather. Wed, Sat, 10-11:15 pm, dance music. Sun, 10:30 am, 4:30 pm, 7:30, church services. Central.

WEAC, Terre Haute, Ind. 485 also. 75 mi. Baines Electric Service Co. Daily ex Sun, 10:15 am, weather; 12-1 pm, 5-6, music. Central.

WEAD, Atwood, Kan. 485 also. 150 mi. N. W. Kansas Radio Supply Co. Daily ex Sun, 11-11:30 am, markets, music; 12, markets; 1:45 pm, markets; on half hour 3:15 to 5:45, news sports. Tues, Wed, Thurs, Sat, 7:30-9, concert. Sun, 11 am, church service; 3 pm, sacred music; 7:30, church service. Central.

WEAE, Blacksburg, Va. Polytechnic Inst.

WEAF, New York City, N. Y. 400 only. 1,500 mi. Western Elec. Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Thur, Sat, 7:30-10 pm. Tues, Fri, 7:30-8 pm. Eastern.

WEAG, Edgewood, R. I. Nichols-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 485 also 500 mi. Lander Radio Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:30 pm, 1:30, 3:15, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. Cornell Univ.

WEAJ, Vermillion, S. D. 300 mi. Univ. of S. D. Mon, Wed, Fri, Sat, 7:30 pm, music, lectures. Central.

WEAK, St. Joseph, Mo. 100 mi. Julius B. Abercrombie. Thur, 8-9:45 pm, concert. Central.

WEAM, North Plainfield, N. J. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 485 also. 50 mi. The Shepard Co. Daily ex Sun, 12-1 pm, 4-5, 6-7, music, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern.

WEAO, Columbus, Ohio. Ohio State Univ.

WEAP, Mobile, Ala. 485 also. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. Central.

WEAR, Baltimore, Md. 485 also. 200 mi. News & American Pub. Co. Daily ex Sun, 2-2:30 pm, 6:30-7, weather, music, news. Thur, Sat, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAT, Tampa, Fla. John J. Fogarty.

WEAU, Sioux City, Ia. 200 mi. Davidson Bros. Co. Daily ex Sun, 10 am, 11, 2 pm, reports, markets, news. Mon, Wed, Fri, 8:30 pm, concert. Sun eve, church service. Central.

WEAV, Rushville, Nebr. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm, concert, news, etc. Mountain.

WEAW, Anderson, Ind. 25 mi. Arrow Radio Lab. Mon, Wed, Fri, 7:30-8:30 pm, concert, news, etc. Central.

WEAX, Little Rock, Ark. T. J. M. Daly.

WEAY, Houston, Tex. Will Horwitz, Jr.

WEB, St. Louis, Mo. 800 mi. The Benwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4. Wed, 7-9 pm. Central.

WEH, Tulsa, Okla. (300 S. Main St., Eldorado, Kans.) Midland Refining Co.

WEV, Houston, Tex. 485 also. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 485 also. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2 pm, reports. Central.

WEY, Wichita, Kan. 485 also. 500 mi. Cosradio Co. (Wichita Beacon.) Daily ex Sun, hourly, 8:40 am-12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.

WFAA, Dallas, Tex. 400 and 485 only. 1,500 mi. Dallas News and Dallas Journal. Daily, 10 am, reports; 12:30-1 pm, address; 6:30-7, bedtime story; 8:30-9:30, music. Tues, Thurs, Sat, 11-12 pm, music. Sun, 2:30-3 pm, bible class; 9:30-10:30 pm, music. Central.

WFAB, Syracuse, N. Y. 100 mi. C. F. Woese. No definite schedule.

WFAC, Superior, Wis. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.

WFAD, Salina, Kan. 250 mi. Watson Weldon Motor Supply Co. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45. 1:30 pm, reports. Tues, Thur, Fri, 8 pm, concert. Sun, 11 am, church service; 8 pm, concert. Central.

WFAF, Poughkeepsie, N. Y. 200 mi. H. C. Spratley Radio Co. Daily ex Sun, 10-10:30 am, 11:30-11:45, 1:30-2 pm, 4-4:15. Tues, Thurs, Sat, feature program, 8:15-9:15 pm. Eastern.

WFAG, Waterford, N. Y. 340 only. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Port Arthur, Tex. Elec. Supply Co.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAM, St. Cloud, Minn. 485 also. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAN, Hutchinson, Minn. 485 also. 500 mi. Hutchinson Elec. Service Co. Daily ex Sun, 1 pm, markets etc. Central.

WFAQ, Cameron, Mo. Cameron Radio Co. and Mo. Wesleyan College.

WFAS, Fort Wayne, Ind. United Radio Corp.

WFAT, Sioux Falls, S. D. 485 also. 400 mi. Argus Leader. Daily ex Sun, 10:15 am, 1:15 pm, 3:15, 7:30, reports, music. Tues, Thurs, Sat, 8-9 pm, concert. Central.

WFAU, Boston, Mass. Edwin C. Lewis.

WFAV, Lincoln, Nehr. 485 also. 300 mi. Univ. of Nehr. Daily ex Sun, 12:40 pm, markets. Wed, 8:30 pm, concert. Wed, Sat, 11 pm, concert. Central.

WFAW, Miami, Fla. Daily Metropolis.

WFAY, Independence, Kan. 500 mi. Daniels Radio Supply Co. Daily ex Sun, 12 m, 4 pm, news. Mon, Tues, Wed, 7:30-8 pm, entertainment. Thur, Fri, 7-8:30 pm. Sat, 7-9 pm, music. Sun, 11 am, church services. Central.

WFAZ, Charleston, S. C. 400 mi. S. C. Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thur, 8-10 pm. Eastern.

WFI, Philadelphia, Pa. 400 and 485 only. 1,000 mi. Daily ex Sun, 10 am, reports; 1:16 pm, news; 2, reports; 3:30-4:30, concert; 6:30-7, children's hour. Wed, Sat, evenings, concert. Wed, Fri, 10:10 pm; Sun, 3:30 pm, organ recital. Sun, 4 pm, chapel. Eastern.

WFD, Dayton, O. 485 also. 300 mi. Rike-Kumler Co. Daily ex Sun, 9 am, 11, 4 pm, music, news, reports. Mon, Wed, Fri, 8 pm, concert. Sat, 11:30 pm, concert. Central.

WGAB, Houston, Tex. 250 mi. QRV Radio Elec. Co. Daily ex Sun, 8:45-9:15 am, news. Sat, 7 pm, news; 8-9:15 pm, concert. Central.

WGAD, Ensenada, Porto Rico. 250 mi. Escuela Hispano Americana de Radio Telegrafia, Inc. Sat and Sun eve.

WGAH, New Haven, Conn. New Haven Elec. Co.

WGAJ, Shenandoah, Ia. 100 mi. W. H. Gass. Mon, Thur, 7:30-8 pm, Central.

WGAK, Macon, Ga. Macon Elec. Co.

WGAL, Lancaster, Pa. 35 mi. Lancaster Elec. Supply & Construction Co. Mon, Wed, Fri, 7-8 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAM, Orangeburg, S. C. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time; 4 pm, Radio talk, markets, baseball; 6, music, lecture; 10, time, weather, entertainment. Sun, 11 am, church service; 11:55, time; 10 pm, time, weather, music. Eastern.

WGAN, Pensacola, Fla. Cecil E. Lloyd.

WGAQ, Shreveport, La. 500 mi. Glenwood Radio Corp. Daily ex Sun, 8 pm, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. Southwest American.

WGAT, Lincoln, Nehr. 100 mi. Am. Legion, Dept. of Nebr. Mon, Wed, 9 pm, announcements. Fri, 9-10 pm, patriotic program, concert. Sun, 3-5 pm, sermon, Central.

WGAU, Wooster, O. Marcus G. Limb.

WGAW, Altoona, Pa. Ernest C. Albright.

WGAX, Washington C. H., O. 75 mi. Radio Elec. Co. Daily ex Sun, 12 m, music, news; 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGAY, Madison, Wis. 100 mi. North Western Radio Co. Daily ex Sun, 9-10 am, financial news; 11:30, news, opening markets; 4 pm, news, closing markets. Mon, Wed, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30-12 am, sermon. Central.

WGAZ, South Bend, Ind. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 485 also. 300 mi. Register and Tribune. Tues, Fri, 7:30 pm, entertainment. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 485 also. 200 mi. Am. Radio and Research Corp. Daily ex Sun, 7 am, setting up exercises; 9:30, 11:30, 3:25 pm, music; 10:30 am, 1:30 pm, 3, 6, 6:30, reports, news. Mon, Wed, 7 pm, entertainment. Tues, 8:30 pm, fashion talks, concert. Thur, Fri, 9 pm, concert. Sat, 8 pm, concert. Sun, 4 pm, concert; 6:30 pm, reports; 7:30, church service; 8:30 concert. Eastern.

WGL, Philadelphia, Pa. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern.

WGM, Atlanta, Ga. 400 only. Atlanta Constitution.

WGR, Buffalo, N. Y. 485 also. 1,000 mi. Federal Tel. & Telg. Co. Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agriograms); 2, 3, 4, 5, music, reports; 7:30, bedtime story, news. Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern.

WGV, New Orleans, La. 300 mi. Interstate Elec. Co. Mon, Tues, Wed, Sat, 8-9 pm, music, talks. Central.

WGY, Schenectady, N. Y. 400 and 485 only. 1,000 mi. General Elec. Co. Daily ex Sun, 11:55 am, 12:30 pm, 6, 10, reports, time, sports. Mon, Tues, Thur, Fri, 2-2:30 pm, 7:45, concert. Fri, 10:30 pm, special. Sun, 10:30 am, 4:30 pm, church service. Eastern.

WHA, Madison, Wis. 485 also. 600 mi. Univ. of Wis. Daily ex Sun, 11:58-12 m, time signals; 12 m, weather; 12:07 pm, agricultural bulletin; 12:20 pm, educational lecture. Tues, Fri, 8-9 pm, news, lectures, music. Central.

WHAA, Iowa City, Ia. 200 mi. Univ. of Iowa. Mon, Tues, Wed, Fri, 8:30 pm, lecture, concert, news. Sat, 9 pm, sports. Central.

WHAB, Galveston, Tex. 300, 485, 600 also. 500 mi. Clark W. Thompson Co. Daily ex Sun, 9:45 am, 3:30 pm, 5, reports, music, news. Tues, Thurs, Sat, 8 pm, entertainment. Sun, 10 am, church service. Central.

WHAC, Waterloo, Ia. 150 mi. Cole Bros. Elec. Co. Daily ex Sun, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Central.

WHAD, Milwaukee, Wis. 485 also. 100 mi. Marquette Univ. Daily ex Sun, 10:58 am, time; 11:20, weather. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAE, Sioux City, Ia. 200 mi. Automotive Elec. Service Co. Daily ex Sun, 12:30-5:30 pm, music, reports. Thur, 7:30 pm, music. Central.

WHAF, Pittsburgh, Pa. 200 mi. Radio Elec. Co. Daily ex Sun, 11:30-12 m, 3-3:30 pm, music, news, Sun, 9-10, music. Eastern.

WHAG, Cincinnati, O. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. John T. Griffin.

WHAI, Davenport, Ia. 30 mi. Radio Equip. & Mfg. Co. Daily ex Sat and Sun, 2-2:30 pm. 4:30-5-30, 10-11, Sat. 10-11 am. 2-2-:30 pm, 5-5:30, 11-11:30. Central.

WHAK, Clarksburg, W. Va. Roberts Hdwe, Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 200 mi. The Capital News. Daily ex Sun, 9:15-9:45 am, 12:30-1 pm, 3:45-4:15, 7:30-8:30. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. Univ. of Rochester.

WHAO, Savannah, Ga. 100 mi. Frederick A. Hill. Daily, 9:30-10 pm. Eastern.

WHAP, Decatur, Ill. 100 mi. Dewey L. Otta. No definite schedule.

WHAQ, Washington, D. C. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. Paramount Radio & Elec. Co.

WHAS, Louisville, Ky. 485 also. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Central.

WHAV, Wilmington, Del. 200 mi. Wilmington Elec. Spec. Co. Daily ex Sun, 12-1 pm, music. Mon, Wed, Fri, 6-8 pm, concert. Tues, Thur, Sat, 6-7 pm, music. Eastern.

WHAW, Tampa, Fla. 200 mi. Pierce Elec. Co. Daily ex Sat, Sun, 12-1 pm, 4-5, music, agriograms. Sat, 12-1 pm, music, entertainment. Eastern.

WHAY, Huntington, Ind. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m, 3 pm, music; 1:30 pm, 6, reports, sports. Mon, Wed, Sat, 8 pm, concert. Central.

WHAZ, Troy, N. Y. 400 only. 2,000 mi. Rensselaer Polytechnic Inst. Mon, 8:15-9:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 400 and 485 only. 1,000 mi. Sweeney Auto & Tractor School. Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. 100 mi. W. Va. University. Daily, 4-6, 7-7:30, news etc. Eastern.

WHK, Cleveland, O. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:30-2 pm, 4-4:30, music; 6-6:30, news; music. Wed, Sun, 8-9:45 pm, sermon, concert. Eastern.

WHN, Ridgewood, N. Y. Times Printing & Pub. Co.

WHX, Des Moines, Ia. 50 mi. Iowa Radio Corp. Daily, 5:30-6:15 pm. Wed, 8-9:30 pm. Central.

WIAB, Rockford, Ill. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm, music. Central.

WIAC, Galveston, Tex. 485 also. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAE, Vinton, Ia. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 8 pm, band concert. Sun, 2:30 pm, music. Central.

WIAF, New Orleans, La. 300 mi. G. A. DeLortin. Tues, 9-10:30 pm, Thurs, 12-1 am, music. Sun, 10-11:30 am, music. Central.

WIAH, Newton, Ia. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Mon, 7:30-8 pm. Central.

WIAI, Springfield, Mo. 100 mi. Heer Stores Co. Daily ex Sun, 10:30-11, reports, news. Tues, Thur, Sat, 7:30-8:30 pm, music. Central.

WIAJ, Neenah, Wisc. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 485 also. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:15, 12 m. 1:50 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 200 also. 100 mi. School of Engineering. Mon, Tues, Thur, Fri, 10:15-10:30 am; 11:30-11:45, news; 11:45-12:10 pm, lecture; 5-6 pm, news; 7-7:15, music; 7:15-7:30, lecture. Central.

WIAQ, Marion, Ind. Chronicle Pub. Co.

WIAR, Paducah, Ky. 150 mi. Paducah Sun. Daily ex Sun, 3:30-4 pm, reports, news, music; 8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 400 mi. Hawk-Eye Home Elec. Co. Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. Leon T. Noel.

WIAU, Le Mars, Ia. Am. Trust & Savings Bank.

WIAV, Binghampton, N. Y. N. Y. Radio Lab.

WIAW, Saginaw, Mich. Saginaw Radio & Elec. Co.

WIAY, Washington, D. C. 200 mi. Woodward & Lothrop. Daily ex Sun, 10:30-11:30 am, 2-3 pm, music. Sat, 8-10 pm, concert. Eastern.

WIAZ, Miami, Fla. Flagler St., Elec. Supply Sales Co.

WIK, McKeesport, Pa. 500 mi. K. & L. Elec. Co. Daily ex Sun, 6:30-7 pm. Tues, Thurs, 9:30-10:30 pm. Sun, 1:30-2:30 pm and 6:30-7 pm. Eastern.

WIL, Washington, D. C. 100 mi. Continental Elec. Supply Co. Daily 5:30-7 pm., music, entertainment. Eastern.

WIP, Philadelphia, Pa. 400 only. 2,000 mi. Gimbel Bros. and Public Ledger. Daily ex Sun, 2:30-3:30 pm. Daily, 1:30-2 pm, 7-7:30 pm. Tues, 7-12 pm. Fri, 7-9:55 pm. Sat, 10:10-12 m. Sun, am, pm, church service. Eastern.

WIZ, Cincinnati, O. 485 also. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central.

WJAB, Lincoln, Nebr. 200 mi. American Radio Co. Mon, Wed, 8:30-9 pm. Central.

WJAD, Waco, Tex. 485 also. 500 mi. Jackson's Radio Engrng. Lab. Daily ex Sun, 12:30-1 pm, markets, news, music; 3:30-4, news, music; 6-6:15, sports; 8:45-9:45, concert, news. Sun, 11-12 am, church service; 3:30-4 pm, music; 6-6:15, sports; 8:45-9:45, music. Central.

WJAF, Muncie, Ind. 1,200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, church services. Central.

WJAG, Norfolk, Neb. 485 also. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 3:30, 5, 5:30, reports, code school. Central.

WJAJ, Dayton, O. Y. M. C. A.

WJAK, Stockdale, O. 485 also. 250 mi. White Radio Lab. Daily ex Sun, 10:30-10:50 am, music; 11:05-11:20, reports, news; 6-6:30, music, news. Wed, 8-9 pm, concert. Sun, 2-2:45 pm, church service. Central.

WJAL, Portland, Me. Victor Radio Corp.

WJAM, Cedar Rapids, Ia. 50 mi. D. M. Perham. Mon, Wed, Fri, 7-8 pm, music. Central.

WJAN, Peoria, Ill. 300 mi. Peoria Star and Peoria Radio Sales Co. Daily ex Sun, 11:30 am, markets, weather; 1:30 pm, closing markets, agriograms, bond news; 6:15, sports. Tues, Thurs, Sat, 9:15-9:45 pm, concert. Central.

WJAP, Duluth, Minn. 200 mi. Kelley Duluth Co. Mon, Thur, 8-9:30 pm, music. Sun, 11-12 m, pipe organ, 12-1 pm, church service.

WJAQ, Topeka, Kans. Capper Publications.

WJAR, Providence, R. I. The Outlet Co.

WJAS, Pittsburgh, Pa. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Tues, Fri, 7-8 pm. Eastern.

WJAT, Marshall, Mo. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 2-2:30 pm, 5:35-6, concert. Central.

WJAX, Cleveland, O. 485 also. 1,000 mi. Union Trust Co. Daily ex Sat pm; Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7-8:30 pm; Thurs, 8:15-10:30 pm, entertainment. Eastern.

WJAZ, Chicago, Ill. Chicago Radio Lab.

WJD, Granville, O. 25 mi. Denison Univ. Tues, Thur, 5-6 pm, educational lectures. Sun, 5-6 pm, religious stories. Central.

WJH, Washington, D. C. 100 mi. White & Boyer Co. Daily ex Sun, 1-2 pm, music. Tues, 7:45-10 pm, music. Eastern.

WJK, Toledo, O. 300 mi. Service Radio Equipment Co. Daily ex Sun, 2-3 pm, reports. Mon, Wed, Fri, 7:30-9 pm, concert. Sat, 2-5 pm, sports, news. Sun 11-12:30 pm, 7:30-8:30, church services. Eastern.

WJX, New York, N. Y. De Forest Radio Telephone & Telegraph Co.

WJZ, Newark, N. J. 1,500 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 15 minutes hourly from 9 am to 6 pm; 12-12:30 pm; 7-10:15 pm. Miscellaneous program of highly varied nature. Sun, 3-10:15 pm, music. Eastern.

WKAA. Cedar Rapids, Ia. 200, 485 also. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 400 mi. Star Pub. Co. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. Charles Looff.

WKAF, Wichita Falls, Tex. W. S. Radio Supply Co.

WKAG, Louisville, Ky. Edwin T. Bruce.

WKAH, West Palm Beach, Fla. Planet Radio Co.

WKAK, Okemah, Okla. Okfuskee County News.

WKAL, Orange, Tex. Gray & Gray.

WKAN, Montgomery, Ala. 200 mi. Alabama Radio Mfg. Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Granston, R. I. Wilcox Flint.

WKAQ, San Juan, Porto Rico. Radio Corp. of Porto Rico.

WKAR, East Lansing, Mich. Mich. Agrl. College.

WKAS, Springfield, Mo. 100 mi. L. E. Lines Music Co. Daily ex Sun, 6:30-7 pm, sports. Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. Laconia Radio Club.

WKAW, Beloit, Wis. 100 mi. L. M. Turner. Daily 12-12:15 pm, 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. Brenau College.

WKAZ, Wilkes-Barre, Pa. 300 mi. Landau's Music Co. No definite schedule. Sat, 8-12 pm, dance music. Sun, 11 am, 8 pm, church service. Eastern.

WKC, Baltimore, Md. 500 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern, daylight saving.

WKN, Memphis, Tenn. Riechman-Crosby Co.

WKY, Oklahoma City, Okla. 485 also. 500 mi. Oklahoma Radio Shop (Daily Oklahoman). Daily ex Sun, 12 m, weather; 7:30 pm, sports, specials; 9 pm, weather, news. Tues, Wed, Fri, 8:30 pm, concerts. Central.

WLZ, Fairfield, O. U. S. Army.

WLAC, Raleigh, N. C. N. C. State College.

WLAF, Lincoln, Neb. Johnson Radio Co.

WLAG, Minneapolis, Minn. 400 and 485 only. 1,000 mi. Cutting & Wash. Radio Corp. Daily ex Sun, 9:30-12 am, music, market reports; 1:30-3 pm, music, farm news, styles; 3:30-4:45, markets, music; 6-7:30, farm news, children's hour. Thur, Fri, Sat, 8-9:30 pm, concert. Sun, 4:30-5:30 pm, church services. Central.

WLAH, Syracuse, N. Y. Samuel Woodworth.

WLAJ, Waco, Tex. 485 also. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, Sat, 7:45-8:45 pm, music. Sun, 3 pm, church service.

WLAK, Bellows Falls, Vt. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co, Tulsa, Okla.

WLAM, Springfield, O. 100 mi. Morrow Radio Co. Mon, Wed, Fri, 8-9:30 pm, dance music. Central.

WLAN, Houlton, Me. Putnam Hdwe. Co.

WLAO, Scranton, Pa. 100 mi. 485 also. R. C. Ehrhardt and J. H. Jones. Mon, Wed, Fri, 7:15 pm, bedtime stories, reports, 8-9:45 pm, music. Sun, 7:30 pm, music; 8:30, church services; 9:15, music. Eastern.

WLAP, Louisville, Ky. W. V. Jordan.

WLAQ, Kalamazoo, Mich, 100 mi. A. E. Schilling. Daily, 10-12 pm, music. Central.

WLAR, Marshalltown, Ia. 50 mi. Meikel Music Co. No definite schedule.

WLAS, Hutchinson, Kan. Hutchinson Grain Radio Co.

WLAT, Burlington, Ia. Radio and Specialty Co.

WLAV, Pensacola, Fla. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. New York Police Dept.

WLAX, Greencastle, Ind. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. Northern Commercial Co.

WLAZ, Warren, O. Hutton & Jones Elec. Co.

WLB, Minneapolis, Minn. Univ. of Minn. 100 mi. Daily ex Sun, 12-12:30 pm, 7:30-7:50. Central.

(The third and last part of the station schedules will appear next week. With this will appear the city-station index.)

TURN TO RADIO IN FIGHT ON "DOPE"

New York Police Broadcast Lecture on Narcotics; Advice to Addicts Listening In

NEWARK, N. J.—Deputy Commissioner Dr. Carleton Simon, head of the Narcotic Squad of the New York Police Department, delivered a lecture entitled, "Narcotics and Society," at the Bamberger broadcasting station, WOR, of this city, on the night of January 19.

Dr. Simon told of the work being accomplished by his world famous narcotic squad and he expounded a few of his original theories pertaining to the enactment of more comprehensive laws to govern the manufacture and sale of drugs of all sorts. He also explained some of his own highly successful methods of treating drug victims.

Advises Chance Addicts Listening In

The Commissioner concluded his address by offering some fatherly advice direct to the secret narcotic addicts of the eastern states. He will inform them as to where and how they may obtain effective treatment without publicly exposing their sad plight.

In an interview regarding the broadcast, Dr. Simon said:

"This is indeed an opportunity which I have long sought. For many months I have been trying to devise some practical method of soliciting the wholehearted cooperation of the good citizens of this section of the country in our all-important anti-narcotic movement and also to establish some sort of direct communication with the clandestine drug users in and around New York, and I think I have found exactly what I was looking for.

Believes Radio Talks Will Aid Move

"Unless I am badly mistaken, Radio will enable me to accomplish a vast amount of lasting good through the series of monthly broadcastings of which this was the first.

"You may be sure that many secret addicts were listening in to my first talk. The majority of these unfortunates desire to be cured but they are afraid to openly seek expert medical advice. I sincerely hope to save a great many of these poor men and women through my series of Radio talks."

The vacuum tube used in Radio is the most sensitive electrical device ever invented.

RECEIVING RECORDS? SEND 'EM IN—

NEXT week the Receiving Records Contest fans will be supplied with the revised list of record holders again. The list grows longer, as do the various mileages, with the increasing cold of winter and improving Radio reception conditions. For the uninitiated the rules will be repeated next week. Records were made or taken by the following Radiophans during the past week:

Station—Miles Away—Who Heard It

CFCB—2200, A. J. Barron, Johnson City, Tenn.
CFCF—2325, B. H. Seydel, Tacoma, Wash.
CHCA—1625, T. S. Wildman, Nichols, Ia.
CKCK—1625, L. Genack, Springfield, Mass.
KDYX—4150, W. E. Long, Sterling, Ill.
KFAD—1600, D. L. Kalter, Dayton, O.
KFBB—1050, R. Henry, Butler, Mo.
KFBQ—1025, B. H. Seydel, Tacoma, Wash.
KFCF—1775, R. A. Deger, Dayton, O.
KFDA—2250, L. Genack, Springfield, Mass.
KFDB—2400, W. H. Rhodes and Chas. Rhodes, Middleton, Pa.
KGG—1550, T. S. Wildman, Nichols, Ia.
KGW—2475, Dr. L. D. Bassett, Sidney, N. Y.
KYJ—2025, V. V. Tompkins, Cleveland, O.
PWX—2675, M. A. Jeffords, Wenatchee, Wash.
WAH—1275, A. G. Hilton, Bicknell, Calif.
WCX—2050, A. G. Hilton, Bicknell, Calif.
WDAP—1875, M. J. Bevllockway, Lomita Pk., Calif.
WFAS—1875, B. H. Seydel, Tacoma, Wash.
WHAI—1600, Dick Lawrence, Sacramento, Calif.
WLAP—1925, A. G. Hilton, Bicknell, Calif.
WMAF—1250, R. Henry, Butler, Mo.
WNJ—2375, B. H. Scydel, Tacoma, Wash.
WOAZ—1050, O. E. Frazier, Watts, Calif.
WPAB—1250, J. Skinner, Corsicana, Tex.
WQAQ—1025, R. A. Deger, Dayton, O.

Notes on Transformers

Amplifying transformers should be placed at right angles and should not be placed nearer than four inches from one another. The primary and secondary terminals should be made correctly to the plate, grid and filament leads. Otherwise the transformer will work inefficiently.

Many broadcasting stations have decided to suspend operations certain nights each week so that owners of sets may hear concerts from outside points.

Prize Girl Violinist Plays for Station WGI

MEDFORD HILLSIDE, MASS.—Carmela Ippolito, violinist, played for the Radio audience of Station WGI here, January 27. Miss Ippolito was accompanied by J. M. Sanroma, member of the faculty at the New England Conservatory of Music and concert pianist of note. Mr. Sanroma won the prize Mason and Hamlin grand piano in the annual competition at the New England Conservatory recently.

Variocoupler for Flewelling Super

Obtain or make a 180 degree type variocoupler similar to the Remler coupler but remove the rotor from its shafts and in its place insert a honeycomb coil of 75 or 90 turns. Good results may be obtained from a rotor of cardboard tubing upon which may be wound about 80 turns of D.C.C. wire, approximately number 24 B. & S. gauge.—Albert R. Miller, Jr., Spring Valley, Minn.

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Self Operating Sets a Possibility

Radical Changes in Sets Yet to Come

WITHIN a few years Radio operators as we know them today may be as scarce as horse car drivers or American bartenders. The world is rapidly drifting into the automatic age. Automatic operation has just been introduced into the telephone field and Radio is also drifting into this direction. There has been developed recently an automatic recorder which is the first step toward operatorless Radio.

The automatic transmissiou and reception of Radiotelegraph signals of importance since it points the day to greater speed. Greater speed means more traffic and cheaper transmission, which eventually will bring about a reduction in the world rate. Then, too, it will bring transatlantic Radio into more intense competition with the cable systems.

Identify Announcers' Voices

Stations Told by Mannerisms of Articulation

ONE of the interesting phases of Radio reception is the study of the voices of the various announcers on the air. The veteran fan can soon tell each station call before it is announced by the sound of the voice of the operator.

Atlanta, for instance, is a high pitched call, much as if Lambdin Kay were yelling at the top of his voice, "This is the Atlanta Journal!" Schenectady, on the other hand, is a soft, full, well-modulated voice, giving the impression that the announcer is making no special effort, but merely talking conversationally with mouth close to the transmitter.

There is hardly a fan who doesn't laugh each time to hear St. Louis announce. "This is the St. Louis Post Dispatch," is uttered by a man's voice, but in a woman's tone. Its effeminate touch is a distinguishing mark that cannot be mistaken.

In Kansas City, the Sweeney Automobile School, WHB, has an announcer with a strong voice but rather husky, and except for the relative strength of the two stations, is much like WOC at Davenport. Davenport, however, never misses a chance to keep the fans in touch with the fact that WOC is "transmitting". This is probably better appreciated by listeners at a distance than near the station.

Donald Campbell's voice at KYW comes in full and clear and is well-known to all fans, while Ralph Shugart at WDAP has a somewhat hesitating voice that at times seems to be drawled out.

Politicians Keep Out

Microphone Not Popular with Vote Solicitors

AT THE time of the 1921 elections politicians overlooked the few stations that then operated. But the sentiment that Radio stations were valuable in campaigning had been crystallizing and gaining headway month by month until the 1922 elections found all the handshakers, back-slappers and vote-seekers ready to make their debut on the air. National and local figures, great and small, beat a tattoo on broadcasting doors.

But the politicians discovered a strange thing in their first contact with Radio. The campaigners, jolly good fellows all, were rosy with smiles as they rushed to get their voices on the air. But they did not always find a willing response. "Politicians Keep Out" was the sigu to be read on almost as many studio doors instead of the "Welcome" that all had expected to find. The broadcasters neither kept all politicians at arms length, nor did they gather them fondly to their breasts. And in practically no instance was any single political party given exclusive use of the microphone.

A canvass of the situation resulted in that there was not a single instance where broadcasting has brought into being an absolute unbiased and impartial medium through which public expression may be given to subjects that have public interest, whether local, state wide, national or international.

Broadcasting a political speech on state affairs would be dry stuff for the listener in another state. There would be no need to make an appeal for votes out of his own territory.

Condensed

By DIELECTRIC

Perhaps the problems that most perplex the public are concerned with broadcasting. Some of the people, undoubtedly the larger part, are not worrying about this phase of the new mode of entertainment, preferring to leave the matter in the hands of the broadcasters.

A symphony orchestra has no peer in the music world, unless it be a stringed quartet, and either of these are faultlessly transmitted through the microphone. Stations WEAF, in New York City, and WJAX, in Cleveland, O., have broadcast programs from two of the finest orchestras in the country. I hope to see the time wheu concerts will be broadcast all over the land from symphony halls and academies of music, providing the very best musical provender to eager audiences. The United States occupies a unique position in the matter of musical talent, having within its boundaries the foremost artists in every branch of music. Unique also in the perfection of its broadcasting facilities and variety of entertainment offered, I cannot believe that we will be without easy access to the best in music for very long.

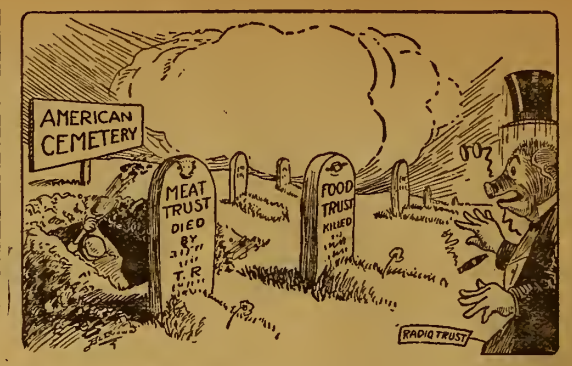
National Radio Week accomplished far more than the casual observer might think. Not only has it stimulated the slothful to partake actively of its countless benefits; stirred the fan to renewed efforts in bringing in new recruits and thus widened the circle of Radio—enlightened citizens; but it has led the broadcasting stations to strengthen and broaden their programs, so that they have included features hitherto untouched. I can picture the emotions of listeners-in who perhaps never had heard the masterpieces of oratorio composers, and several stations gave their audiences an opportunity to listen to Händel's Messiah as rendered by choruses numbering upwards of a hundred voices, nor had they had the privilege of hearing the famous ancient chimes from Old Trinity church in New York City. Such a glorious experience it is to have in your home what thousands of grateful listeners could never know without the marvelous aid of Radiophony. Don't let us forget to express appreciation to our benefactors.

At least one candy manufacturer profited by the DX owls early on the morning of January 1, when Station WDAP, Chicago, presented a five-pound box of candies to the first "owl" in each State to wire them that they were listening. I believe a certain gentleman in St. Louis, Mo., was about thirty seconds ahead of a gentlewoman, in the same State, to dispatch a telegram and thus become the winner for that State. Possibly the box was shared between them. It must have been somewhat of a wrench to a hard working DX-er to take the time necessary for wiring, when he or she was so anxious to locate a distant station and start the new year with a record. Incidentally, let me explain that a "gentlewoman" is one who is willing to listen by the hour without begrudging the time lost from conversing.

What other medium presents so perfect a means of spreading information as does Radiophony? It is unfortunately true that specious arguments may be broadcast on any subject, which to the unthinking may seem undeniable. An instance of this kind came through the air when Turkey was made to appear without blemish in the suave language of a native son, and if ever a self-respecting tube howls it must be when forced to receive such an address. It is equally true, fortunately, that useful and authentic information may find a large audience through the instrumentality of a microphone. I believe the majority of talks given over the Radio are of a helpful nature. Those responsible for the character of programs presented are often hard pressed for suitable talent. We should consider this when making our criticisms.

A great many of you readers of Radio Digest have heard grand operas through your receiving sets as broadcast by station KYW in Chicago, and for some this has been the first time performances by a leading opera company have been heard. Pictures of artists whom you have heard sing with the Chicago company have appeared each week in this paper, aiding to form a mental picture of the actors on the stage. What I am interested to know is, how many of you have attended an operatic performance, either here in Chicago or elsewhere, since listening in to these broadcasts. Will you write to me in care of the Editor, stating that after hearing operatic music by means of Radiophony you attended a performance? Such information will be very much appreciated and may be valuable in encouraging other companies to allow their performances to be broadcast.

Appeals for charitable purposes have found Radio to be a decided help in reaching a large number of interested people. A few Sundays ago, Dr. Stires, rector of Saint Thomas Episcopal Church in New York city, asked for funds to be contributed to the United Hospital fund and his request was carried by Radio to thousands outside his congregation. The response from those who were listening to the services that morning from their homes has been gratifying, I am told. Similar pleas have been made from other men in other places with equally assuring results. At another religious meeting recently, the Radio audience was asked to set aside an amount of money to be given to their local church, since they were not present to contribute to the offering then being taken. Perhaps few followed the suggestion, but nevertheless Radio made possible the spreading of the idea. The audience to which you may appeal for anything is tremendously eularged when broadcasting.



RADIO INDI-GEST

A Little Light on the Subject

Dear Indi:
Do you happen to possess a Bake-light?
ELECTRIFAN.

My friend Electri:
No, but I can furnish you with an ampli-fire.
—INDI.

Putting the Bakers Out of Business

The New York Evening Mail tells of a broadcast star who sings twenty roles. The Office Squirrel says he doesn't think it possible to sing that much pastry, although he has heard of a man who yodeled six plates of soup.

Our Q. & A. Department Will Not Tell—

If the rheostat offers resistance will the lightning arrester?

If the battery gets "charged" will the crystal detector?

If we'll all have to learn to talk French when we get iu daily communication with Parisian amateurs, or if they will have to learn English?

She Sang It Before She Even Started

Miss Henrietta Warbler, dramatic soprano, was singing from Station PDQ. Came through the ether—
"Miss Warbler's next number will be 'Last Night'."
OTTO METER.

He Wears a Silk Hat Over the Headset

"Spiffins is the most henpecked man in the world."
"How come?"
"His wife makes him put on evening clothes to sit home and listen to the Radio opera."—BUFFALO EXPRESS.

Try This on Your Antenna

The Office Squirrel says that a good safety first slogan for the Radiophan might be "Live Wire—Dead Fan!"

Fair Grounds Radio

A Washington paper asks, "What is a state fair without Radio?" Our answer is, "Only fair."

Probably Has Some High Power "Bottles"

The Office Squirrel notes that President Harding is supposed to have a secret transmitting set in the White House cellar, and hastens to query whether that is all the secret stuff to be found in the head executive's basement.

Attention, Policemen

Si (reading): "Big feat by Radio."

Hi: "We don't want none. We got all the big feet in our family now that I can buy shoes fer."

A Mixed Chorus of Radiophans

"Mr. Will Howler, tenor, will sing 'Who'll Take My Place?'" said the announcer.

(Ed. note:—After hearing a few measures, almost everyone invisibly present offered to substitute.)

A. B. C. Lessons for Radio Beginners

By Arthur G. Mohaupt

CHAPTER V

MOST people are interested in Radio to the extent of having a Radio receiving set installed in their home and being able to listen in to the concerts, speeches and other forms of entertainment that are now being broadcast from numerous stations throughout the country every evening. To obtain the best results from this outfit, the operator must know how to adjust the various parts properly; and to be able to do this intelligently, he must know what the functions of the various parts are and how they operate with respect to each other.

In this chapter we will, therefore, take up a detailed discussion of the Radio receiving station, its component parts, and how each operates. Again we will find that everything is based upon a few fundamental electrical principles; and if we recall these as explained in the previous chapters, we will see how simple it really all is.

Operation of a Set

A receiving station, as the name suggests, is a group of apparatus used for the purpose of intercepting the Radio waves sent out at a distant transmitting, and rendering them intelligible to our senses. There are thus a number of operations to be performed by the receiving station. Among these are the following: In the first place, the station must be capable of intercepting the ether waves as they pass through space and of absorbing part of their energy. Secondly, since it is generally desirable to receive only the waves from one station at a time, the receiving station must be capable of being adjusted or tuned to the wave length at which the particular station desired is operating.

Set Reduces Frequency

After the station is tuned and the oscillations are being received, these incoming oscillations are at a Radio frequency and far too rapid to be capable of being heard by the human ear. The third operation to be performed by the receiving station, is thus to reduce the Radio frequency oscillations to an audio frequency. Furthermore, this must be accomplished without in any way affecting the general nature of the oscillations, otherwise their messages cannot be interpreted by the receiving operator. After the oscillations have been reduced to an audio frequency, they are still of an electrical nature, and hence must be converted from electrical current waves to sound waves capable of affecting the human ear. This comprises the fourth function to be performed by the apparatus. Finally, the station must also be provided with some form of protective device to shield the operator from danger from lightning or other electrical sources.

Functions of Parts

A receiving station must thus perform five essential functions, besides the additional operations that may be necessary in order to be able to obtain certain special operating characteristics. For intercepting the Radio waves and absorbing part of their energy, the receiving antenna or aerial is employed. For adjusting the receiving station to the wave length of the desired station, special tuning devices are needed, such as variable inductances and variable condensers. The Radio frequency oscillations are reduced to an audible frequency by means of a special piece of apparatus known as the detector. This detector may be either of the crystal type or of the vacuum tube type. Converting the audio frequency electrical oscillations to sound waves is accomplished by means of telephone receivers. To guard the operator against harm by lightning, a device known as a lightning arrester is used. There is, however, very little danger in this respect, and it is really much less than it is thought to be generally.

We will now discuss each of these essential parts in detail and see how they are constructed and how they operate. Finally we will be ready to consider them as a group, and learn how the entire equipment is assembled, installed, and operated.

Receiving Antenna

The antenna, or aerial as it is often called, constitutes that part of a receiving station which intercepts the ether waves and absorbs part of their energy. In order that best results will be obtained, it is necessary that the utmost care be expended in the erection of the aerial; for if the aerial is defective or leaky, endless trouble will only be experienced, no matter how perfect or of what good qualities the receiving set itself may be.

The antenna of a Radio transmission station must be of special dimensions and construction in order that the station will operate at the desired wave length, but for a receiving station the exact dimensions are not so very important, although there are certain limits above or below which operation of the receiving apparatus cannot function to the best advantage.

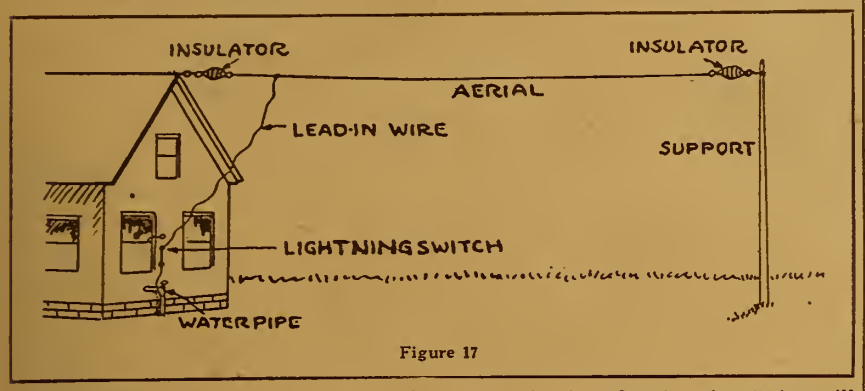


Figure 17

Best Form of Antenna

The best form of outdoor antenna to use for a receiving station is a single wire stretched between two convenient supports. This single wire antenna should be at least 40 feet long but not greater than 100 feet, for if the dimensions are above or below these values, additional apparatus must be added to the receiving apparatus, and this extra equipment will cut down the efficiency of operation.

It has been found that a single-wire antenna gives best results in that less interference need be contended with in case several transmitting stations in the same vicinity are operating at or nearly at the same wave length. Another important advantage of the single-wire aerial is that static, Radio's greatest enemy, has less chance to cause trouble. It seems that static appears to collect on the aerial, and hence the greater the network of wires comprising the aerial, the more surface is offered for static to accumulate on.

Of course, it is also true that with an aerial composed of several wires the received signals will be somewhat stronger than with a single-wire aerial, but this strength does not increase at the same rate as the number of wires is increased. However, in the long run it is generally preferable to sacrifice some of the signal strength in order to reduce the amount of interference and the intensity of static.

Material for Aerial

Since the quality and intensity of the incoming messages depend to a very great extent upon a properly constructed aerial,

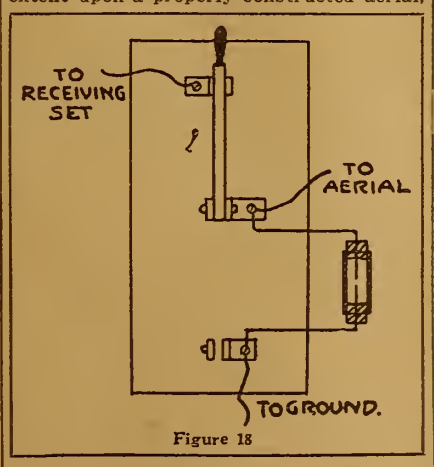


Figure 18

it is very important that only the proper materials should be used and that it be erected in a safe and well-insulated manner. The single-wire aerial as used for receiving purposes would be from 40 to 100 feet in length and supported at any convenient height—generally the higher the antenna the more effective it is. Copper or bronze wire, No. 12 or 14 in size, gives best results, although aluminum wire can also be used effectively.

Iron wire, however, is very inefficient and should be avoided if possible; for on account of its higher resistance, the electrical losses in it are greater with the result that the signals are greatly weakened. Stranded wire, it is claimed, gives somewhat better results than solid wire, for a greater amount of surface is exposed.

Supporting Aerial

The antenna wire can be stretched and supported between any two convenient points, at a height of at least 30 feet above the ground. Better results are always obtained if the aerial is stretched between a building and a pole or another building, as is shown in Figure 17, than if it is supported on a roof. The effective section of an aerial should preferably be kept from under the branches of a tree, for the leaves in swaying with the wind have a tendency to affect the wave length of the antenna and thus interfere with the tuning of the apparatus.

The ends of the antenna wire should always be well insulated from the supporting structures so as to prevent leakage to the ground. Various forms of antenna insulators can be purchased, although porcelain cleats as used for exposed wiring serve the purpose very well.

Lead-In Wire

The outdoor antenna is electrically connected to the receiving apparatus within the rooms by means of an insulated wire known as the lead-in wire. This lead-in wire is fastened to the near end of the antenna (the joint being soldered so as to insure good and permanent contact), and is run directly to a "lightning switch" located near the point at which the wire enters the house. This lightning switch serves to protect both the apparatus and the operator in case the aerial is struck by lightning. It consists of a single-pole, double-throw (S.P.D.T.) knife switch mounted in a vertical position on an insulating base, as is illustrated in Figure 18.

The wire coming from the aerial is connected to the middle clip, while to the upper clip is fastened the wire leading to the receiving apparatus, and to the lower clip the wire leading to a good ground connection. By thus throwing the switch into the upper position the aerial is connected to the receiving apparatus, and by throwing the switch into the lower position the aerial is connected directly to the ground. When the receiving apparatus is not in use, the switch should always be thrown into the lower clip so that there will be a direct metallic path from the acrial to the ground.

Use of the Ground Switch

In order to protect the operator while the switch is in the upper clip and the receiving apparatus is in action, some form of lightning arrester or protective spark gap should be connected across the middle and lower clip of the switch. Various forms of such lightning arresters are available on the market, but a very effective and simple gap or arrester can easily be built at home.

A glass or fiber tube is used, about ¾-inch in diameter and slightly shorter than the distance between the middle and lower clips of the switch. An old 60-ampere fuse cartridge, cut off to the proper length, will serve very well. Into the ends of the tube are inserted fiber or wooden plugs through the center of each of which extends a piece of No. 14 copper wire. The plugs are inserted to such a depth that the ends of the wires are separated about 1/32 of an inch. The ends of the tube are then filled with tar or sealing wax in order to exclude moisture. The outer ends of the wire are then bent at right angles and fastened under the connecting screws of the middle and lower clips. With the arrester attached and the switch thrown into the upper

(Continued on page 12)

Combination Tube and Crystal Set

Jacks Used in Set to Make a Quick Change

The accompanying illustration shows a simple hook-up in which jacks are used for switching over from a tube set to a crystal and back again. With the crystal jack the variocoupler is the only instrument in the circuit with the crystal.—Hagen Thompson, Chicago, Ill.

WORKSHOP KINKS? EARN A DOLLAR—

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

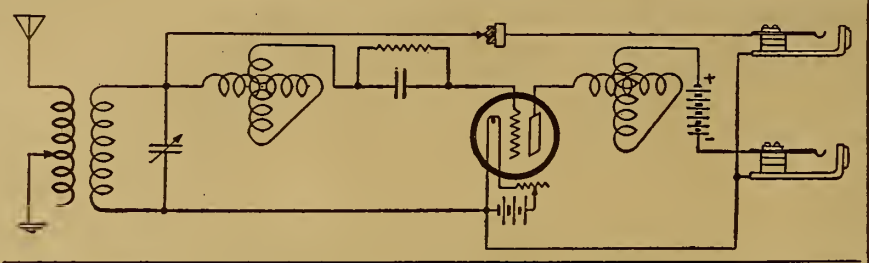
RADIO KINKS DEPARTMENT,
RADIO DIGEST,
123 West Madison St., Chicago, Ill.

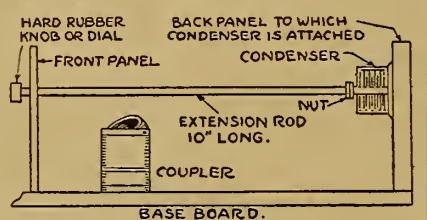
Long Shafts on Condensers

In operating a regenerative receiver any movement of the operator's hands near the variable condensers, will alter the body capacity effect and make reception difficult and sometimes impossible. To overcome this I fitted extension shafts and mounted the variable condensers as shown in the illustration.

The dial or knob is first removed from the condenser, and a long threaded nut with tight fitting thread is screwed halfway on the shaft of the condenser. A piece of brass rod long enough to extend from the condenser shaft to the outside of the panel is fitted into the nut on the condenser shaft. This connection may also be soldered, if desired, to hold it more securely. The regular dial or knob is then fitted to the front panel end of the extension rod. This method is particularly well adapted for using table type of condensers on the panel sets.—P. Stark, Sterling, Ill.

TWO CIRCUITS USED IN THIS SET





Charging the B Battery

A great many Radiophans own their own rectifiers for charging their A batteries but they do not know how to charge their B batteries with it. As the average storage B battery is of 24 volts the whole battery cannot be charged at a setting. Only three cells can be charged at a time, the remainder being charged three cells at a time in succession until all are charged.—Glen E. Gaufin, Escanaba, Mich.

Use for Phonograph Records

Any amateur attempting to listen in on long distance work finds trouble when tuning with a variable condenser. Fine adjustments cannot always be made.

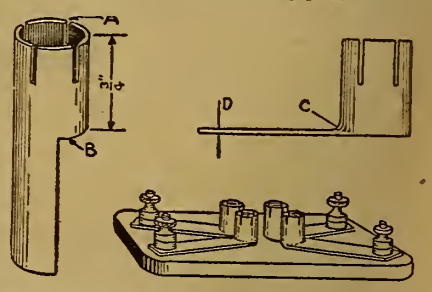
To remedy this I procured a 12-inch record and fastened it with screws on the dial of the condenser. By grasping the outside edge of the record and moving it slowly an extremely fine adjustment can be made. If desired, a graduated scale can be drawn on paper and pasted on the record. With the aid of this device found it possible to tune in stations that could not be heard before their use.—William Bobinson, Edgewood, Pa.

Keep Storage Battery Clean

Dirt and acid, which collect on the tops of storage batteries, can be wiped off with a cloth moistened with a solution of water and ammonia.

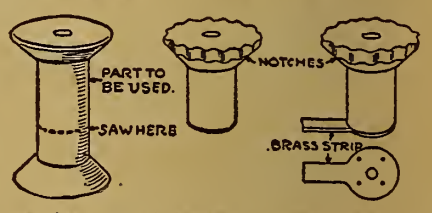
Tube Socket Made of Small Copper Tubes

The materials necessary to make the socket illustrated are 1 piece of dielectric material about 2½ inches square, 4 binding posts, or brass bolts, and 4 pieces of copper tube about ⅛ or ¼ inch in diameter. Make two cuts with a hack saw in the top of the tube at A, ⅜ of an inch long. Cut the tube half off ¾ inch from the top as at B. Cut up from the bottom to the last cut and remove half the tube. Bend the tube at C until the bottom half is at right angles to the upper part. Drill a hole at D for a bolt or binding post and assemble on the dielectric base. The piece of tubing should be about 2 inches long.—Albert R. Miller, Spring Valley, Minn.



Spools Make Switch Knobs

An ordinary thread spool makes a good knob for experimental work. Cut the spool in two, as shown in the illustration, and use the notched flange. Some spools have a knurled edge. A piece of sheet copper or brass is cut for a pointer or switch blade and used on the end.—Arthur Gaebe, Cincinnati, O.



With reasonably careful usage the life of the standard vacuum tube should be about 2000 hours or more.

A. B. C. LESSONS

(Continued from page 11)

position, should a high voltage be induced in the antenna due to some atmospheric disturbance, the electric charge would find it much easier to jump the gap of the arrester and escape into the ground than to travel through the windings of the receiving apparatus with the possibility of doing any damage.

The wire which leads from the upper terminal of the lightning switch to be receiving apparatus in the room, should be rubber-covered copper wire at least No. 14 in size, either solid or flexible stranded wire. Where it enters the building, either through the window casing or the wall, it should be protected with a porcelain tube. This insulating tube should slope downward toward the outside of the building so as to prevent rain from entering the room through the tube.

Ground Wire

The ground wire which leads from the lower clip of the lightning switch to the ground should be a No. 4 rubber-covered copper wire and should be supported on porcelain knobs in as straight a line as possible, with no sharp bends. The lower end of the wire should be connected by means of a ground clamp to a water pipe. In connecting the clamp to the pipe be sure to scrape the pipe clean where the clamp is applied, so that good metallic contact will be insured. In case no water pipe is available, a good ground connection can be established by driving an iron pipe into the ground to a depth of about six or eight feet. Such a ground connection will be most effective if the pipe is driven into the ground at some damp place, for dry earth is a fairly good insulator.

Having now considered the outdoor parts of a receiving station, we are ready to take up the apparatus indoors.

The Receiving Set

The receiving set itself comprises the apparatus installed indoors, and serves to render intelligible the signals which are received over the antenna. The receiving set really consists of two individual yet interdependent parts, each part having its own functions to perform. These parts are, respectively, the tuner and the detector. We will now review briefly the nature and operation of each.

An antenna system is in reality a form of open oscillating circuit containing both inductance and capacity. The amount of inductance depends upon the length and arrangement of the wires comprising the antenna, while the capacity depends upon the number of wires used and their height above the ground. An antenna may be looked upon as forming a large condenser, the wires forming one conducting plate and the earth beneath the other plate, while the air in between constitutes the dielectric.

Natural Wave Length

The antenna system, therefore, like every oscillating circuit, has its own oscillation frequency or wave length. This is known as the natural wave length of the system, and the receiving antenna will operate most efficiently if this natural wave length is the same as that of the incoming waves, that is, if the two are in resonance.

However, since the desired messages are not always at the same wave length as the natural wave length of the antenna, it is necessary to alter or adjust the receiving antenna in some way so that it will be in resonance with the desired transmitting station. This adjusting, or tuning, as it is called, can be accomplished in one of three ways; the length of the antenna can be altered, inductance can be added into the system, or capacity can be introduced into the system. But since it is not always convenient to alter the dimensions of an antenna that is permanently installed, the last two schemes are the ones commonly used. It is this station tuning process which constitutes the first function to be performed by the receiving set, and the apparatus of the receiving set by means of which this is accomplished is known as the tuner. The apparatus used for tuning purposes, as well as the most efficient and rapid method of tuning a station, will be taken up in the next chapter.

Detector for the Set

After the station is in tune with the waves sent out from the desired station, the next operation is to convert the Radio frequency oscillations to oscillations at an audio frequency but of the same form and quality. This is the second duty to be performed by the receiving set, and is accomplished by means of the detector. The detector really forms the most critical part of the receiving set, for upon its action depends to a very great extent the quality of the signals heard in the phones.

Various forms of detectors have been devised since the Radio art first came into existence, but of all of these only two have proven satisfactory and are being used at the present time. These are the crystal detector and the audio or vacuum tube detector, each of which has its own field of application in that it best fulfills certain requirements. The mineral detector is used extensively for field service, and for small inexpensive home receiving outfits. The vacuum tube, on the other hand, is somewhat costly and hence is used with stationary sets and where greater volume or signal strength is desired. The crystal detector and its operation will be taken up in the next chapter, together with the tuning apparatus; while the vacuum tube detector, on account of the more extensive electrical principles involved in its operation, will be postponed until some later chapter.

A third duty which is often performed by many receiving sets is that known as amplification. By amplification is meant the strengthening or increasing of the intensity. Amplification is employed when the signals are either weak or it is desired to have the signals heard in all parts of a room, and to accomplish this additional equipment known as a loud speaker is required.

Chapter Six

In Chapter Six which will appear in the next week's issue, we will take up a discussion of the construction and operation of the different devices used for tuning a receiving station to the desired wave length. Apparatus such as loading coils, tuning coils, variocouplers and variometers will be taken up in detail. All those desiring a thorough knowledge of these devices cannot afford to miss this important article.

Fading of Radio signals is caused by trees, steel buildings, rivers, electric wires, trolleys, tennis backstops and power stations.

The "How" of the Simplified Super Circuit

Part I—Setting Up the Flivver Successfully

By E. T. Flewelling

SINCE the publication of the simplified super circuit, the writer has had the opportunity to spend considerable time watching its action and building the theory of its operation.. Hundreds of letters have been received telling the trials, tribulations, and successes of those who have tried out the circuit. These things have brought together quite a few items of interest.

Follow Specifications Strictly for Success

An analysis of the letters received shows that those who have successfully built the Simplified Super have in every case followed strictly the specifications called for. No letter has yet been received relating failure that did not also contain its own answer. The experimenter did not use the apparatus especially called for, or else evidently had decided, upon a glance at the hook-up that he could by changing the circuit a little, considerably improve upon its action.

It is surprising how many letters of this type have been received. To try to improve a hook-up or to change it to meet the apparatus that one happens to have on hand without at first trying the original, is to my mind the height of foolishness, because it immediately calls for an assumption that the originator merely hit upon a new circuit, gave it to the public at once without a care that it might be improved upon and then fell asleep.

Now this little story is being written with no other idea than to help out those who wish to work with the Simplified Super, and also to add in the notes to follow a little information that perhaps is not known to everyone in the world.

Hundreds of Circuits Fail

If I said that two hundred different combinations of hook-ups, apparatus, etc., had been tried, that would be a very low estimate. All of these combinations with small exception refused to fire. Those which did go were not equal to the finally developed circuit that has been published, with the possible exception of one. This one referred to seems to accomplish about all that the flivver circuit does, but has failed so far to match quite the results given by a nicely balanced flivver circuit.

I will be pleased to show this alternative circuit with its notes in the next few issues of Radio Digest because it calls for even less apparatus and adjustment than the flivver circuit and illustrates the principle used just as well.

About the Use of Loops

Most folks seem to assume that a loop of average size will work properly, and it will doubtless be of value to them to have the following brought to their mind. First note that a receiving set depends for its audibility and distance qualities upon the effective height of the antenna. Without going into mathematics this works slightly different than at first glance might be assumed.

The answer is this. If an average three-foot loop were computed, it would be found that it possessed the ability of an open antenna approximately one foot high. A loop has the directional quality as one of its most valuable advantages, but unfortunately most of this is lost when using a super set on a loop. It is understood that any antenna system must be tuned to take care of the wave desired, but one is apt to forget entirely that a loop is nothing after all but an antenna. Therefore it too must be tuned. There are at least two ways to do this, one by connecting a variable condenser in parallel with the loop and another by building a loop that is absolutely right so far as capacity, inductance, etc., are concerned. One can see how difficult that would be for the average person.

To sum up, if your set "sings" when tried alone and goes dead when connected to an energy collector, you can be sure that a series condenser is needed.

Points About Flivver's Operation

When the set is complete it is best to adjust the leaks, etc., before being connected to any energy collector. We know that the values for the set itself are correct. Therefore, if we adjust it alone, we will have no outside influence to throw us off.

As has been stated in previous articles, when the set is correctly adjusted one can hear a little shrill whistle, and as the coupling of the coils is changed there is added the sound like the tearing of cloth. Upon approaching the wave of a broadcaster one will hear a series of small weak squawks which increase in loudness and finally spill over to become dead as the wave is tuned in correctly.

To Use Radio Digest as Forum

Inasmuch as I am unable to have a private secretary, it has become impossible for me to answer all of the letters that I receive concerning this circuit. I would indeed be glad to receive comments and results secured, but it has become a physical impossibility for me to answer personally all of the questions asked, much as I would like to do it. For this reason I will write for Radio Digest all available dope on the circuit so that further questions should be unnecessary.

From the above you can easily get, perhaps, the most important point about setting up the Flivver Circuit. It is this—don't use a single thing that is different from the articles called for unless you are prepared to fight it out yourself. Not a single set has failed to work as yet when properly set up and adjusted, so don't let the idea that there is a dark secret somewhere in it bother you, because there isn't any.

Aerial Must Preserve Balance

We will take up the matter of aerials first, because the set will be used on all kinds and varieties. The low frequency oscillation (it really is not an oscillation) that is responsible for the action of the super depends upon the set having the just correctly balanced values of inductance, capacity and resistance in the circuit. If the set itself has these values correct it will function properly, the values and hook-ups published are correct so no trouble will be experienced from this source.

Now if we put an antenna, ground, or loop, either of which may be termed an energy collector, in with the set we must be careful to preserve the correct balance. This point seems to be the one giving the most trouble and a few words concerning it will not be amiss. All grounds, loops, or antennas have different values, yet most of them, especially grounds and open antennas, average up to a value that will be workable with the set as specified.

If a particular energy collector kills your set when you connect it on, you will be able to compensate for it in most cases by the use of, preferably, a variable condenser in series. That is, run your signal through a variable condenser before it reaches the set. This condenser is adjusted to the point where the set comes to life again and is further used as an aid to tuning to the wave length desired.

The set is then quiet excepting that the whistle is still audible. The lower the tone, and the louder the whistle, the greater is the amount of amplification obtained, and the grid leak should be set for the happy medium. After which it may be left in that adjustment.

Tickler Coil Adjustment

This brings us to the tickler adjustment. If, when your set is finished, you get no sound from it, several factors must be considered. These will be taken up as we go along. The first is the polarity of the tickler coil (75 or 90-turn coil). If the magnetic field of this coil works with the first coil (50-turn) you are all right, but if the magnetic field works against the first coil, the set is dead. This condition is corrected easily by reversing the leads to the tickler coil.

If you use improper coils for these two coils (Giblin-Remler 50 and 75 or 90-turn coils are specified), you either will get no action or poor results, depending upon how closely the values of your coils approach those of the specified coils.

It seems that hundreds of Radiophans have tried variocouplers using the stator as the inductance and the rotor as the tickler. As a rule the results have been inferior. They might be improved to an acceptable point by rewinding the rotor to 75 to 125 turns instead of the number generally used.

Use of Variocoupler

If a variocoupler is used, be careful not to have too many unused turns on the stator, because the field set up as a result of these unused turns will have a tendency to upset the balance of the set. Most of the variocouplers for broadcasting now on the market have a suitable number of turns on the stator or tube, but not enough on the rotor or ball for operation on a super set. Of course the exact number of turns in either case cannot be given because of one factor at least, we do not know the diameter of the forms used to wind upon.

Inasmuch as the space available is not sufficient to cover the subject in one article it will be necessary to continue our discussion in the next issue of Radio Digest.

To secure good signals never burn vacuum tube filaments brighter than necessary.

When figuring on the wave length of your aerial, remember the lead-in counts.

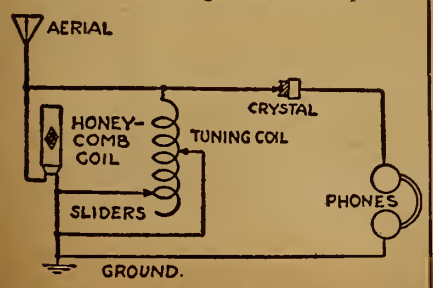
In the Digest Exclusively—

WHEN E. T. Flewelling and his set "that made good in a day" were discovered by Radio Digest, the flivver circuit was practically unknown. Its appearance in the Digest is another scoop.

MR. FLEWELLING has agreed to write exclusively for Radio Digest. The article on this page is the first of a series to appear every week which will help the Radiophan in the perfecting of his own flivver set.

Crystal Receiving Set Uses Honeycomb Coil

For the benefit of other crystal detector fans I am showing this hook-up with



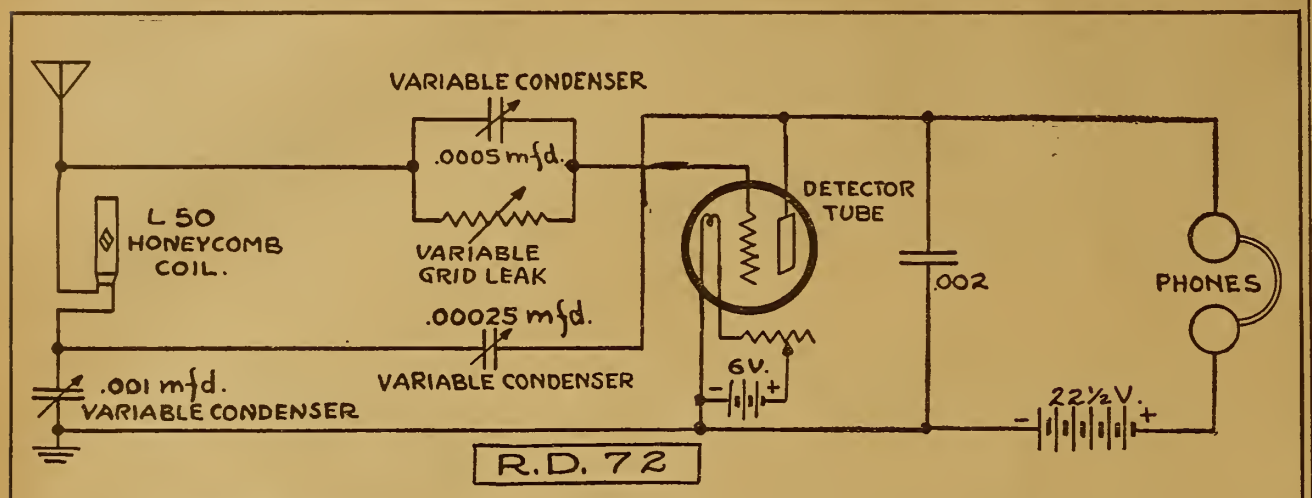
which I have received speech and music over a distance of 500 miles and code 1500 miles. It is the two slide tuner set with a 35 or 50 turn honeycomb coil as a load coil. The stations I have heard with this hook-up are KDKA, WHB, WGM, WSB, WOC, WRM, WLW and 8X1.—Raymond E. Searl, Bloomington, Ill.

Grid Condenser and Leak

To insure accessibility as well as rigidity to the grid condenser a piece of $\frac{1}{16}$-inch fibre or bakelite may be cut and drilled to correspond with the condenser terminal holes and one side of the assembly bolted together with a small bolt. The other terminal can be fastened directly to the grid terminal of the socket. This will lessen wiring complications and will place the grid leak in a position where the pencil marks can be altered if necessary.

The writer has found that the number of pencil marks does not seem to affect the tube operation to a noticeable extent. However, in a closely assembled receiver the grid leak is a rather sensitive adjustment.—H. E. Jameson, Milwaukee, Wis.

R. D. 72 IS SIMPLE ONE TUBE REGENERATOR



A FAIRLY reasonable priced, simple sort of hook-up always appeals to the average Radiophan. New circuits are his hobby, and he anticipates with relish every new method of hooking up his apparatus.

In the circuit shown, one is impressed with the fact that practically all of the tuning is accomplished by means of variable condensers, three of which are used with capacities of .001, .0005 and .00025 mfds. The primary (.001mfd.) condenser should be connected so the moving plates are on the ground side. In the plate (.00025 mfd.) condenser the rotating plates should be connected to the primary circuit.

The grid condenser (.0005 mfd.) should be connected so the movable plates are on the aerial side. In a circuit of this type a variable grid leak is advisable, especially for the proper variation of grid adjustment for different tubes that may be used. This will insure best efficiency for each tube.

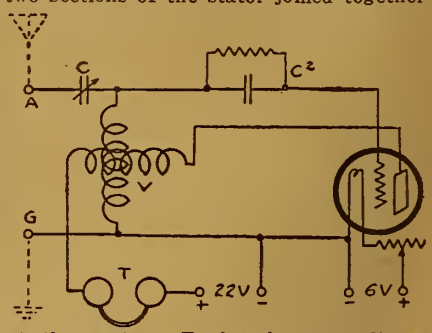
The honeycomb coil should be one with 50 turns although the antenna values may necessitate changes in the number of turns. A .002 mfd. fixed condenser is shunted across the plate battery and the phones.

The negative terminals of both batteries are grounded. In tuning, the proper wave length adjustment is effected by means of the primary condenser. Regeneration is then controlled by the plate circuit condenser. The filament rheostat will also be found very sensitive for tuning in distant stations properly.

Long Distance Stations Picked Up On This Set

The diagram shows a hook-up which has proved very good for long distance work. The apparatus consists of a variometer, variable condenser, grid condenser, rheostat socket and binding posts. Recently this outfit was tested out in a drizzling rain and I heard KFAF, which is 1,000 miles from my set.

In the illustration A represents the aerial, G the ground, C .0005 vernier condenser, C2 .0005 condenser with leak, T the phones and V the variometer. The rotor is separated from the stator and the two sections of the stator joined together



at the center. Tuning is accomplished with a variable condenser and regeneration with the rotor.—J. W. Mayfield, Cincinnati.

The desire of the engineers of various manufacturing companies to simplify the operation of receiving sets makes it quite likely that many of the apartment houses now building in New York city will have both aerial and current source installed, making it merely necessary to press a button or turn a switch to get the concerts.

The Reader's View

Likes the Flewelling

You have a valuable little paper. Can hardly wait from week to week.

You "put one over" when you gave us the Flewelling circuit. It brings in the local broadcasts fine on just a ground wire. Have had a friend try it on his antenna and he says be got Springfield, Mass., Atlanta and Kansas City. This is just the thing for the fellow without an antenna. I use a "peanut" tube.

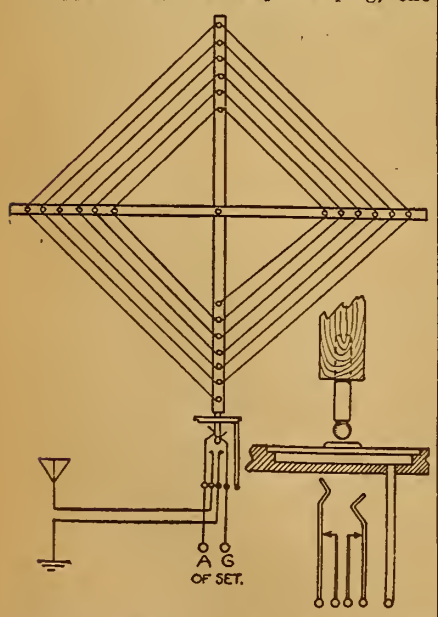
Do your readers know of any improvement in the way of tuning, hook-up, regeneration, etc.? Have them send them in. Have Dr. F. C. Locke, of Oteen, N. C. tell us how he does it.—G. B., Evanston, Ill.

Locating Places for Shafts

In the construction of Radio apparatus marking the places for the shafts on the panel is a difficult problem. The location may be found in the following manner: Procure a piece of thin paper, place a coil over it and mark the circumference. Hold the paper to the light and fold it so that the lines overlap or meet on each half, then fold again at right angles to the first fold. Where the folds meet at the center will be the point for drilling the hole. This paper placed on the panel will locate the place for the hole.—Henry A. Keys, Kinder, La.

Loop With Plug-in Attachment

The material necessary to make the loop as shown in the illustration is, four feet of 1-inch square wood, ½ pound of No. 18 copper wire, one telephone plug, one

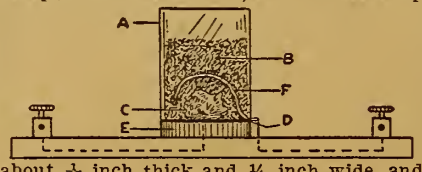


two circuit jack and some scrap insulating material. The loop will require ten turns of the wire.

The plug is attached to the lower part of the loop cross and the jack is mounted on a flat table top.—Fritz Franke, Chicago, Ill.

Crystal Mounting

The parts needed for this mounting are about two teaspoonfuls of brass filings, a piece of some sort of crystal C, some mercury and lead E, a glass case A, about a teaspoonful of shellac D, and a brass strip



about ⅜ inch thick and ¼ inch wide, and two binding posts.

Place the crystal C in the lead and mercury E, and then tack it on the wooden base. Place the brass filings B and the brass strip A into the glass case A, allowing one end of the brass strip to extend to the outside. Place the base with the crystal attached over the mouth of the bottle and seal it with wax. Wire the detector in the set in the usual manner. The brass strip takes the place of the catwhisker.—Frank Basler, Altoona, Pa.

A loop antenna works better in a wooden building than in one of steel structure.

Questions and Answers

Selected for the Reinartz Circuit Fan

Same Circuit

(1874) OLP, Osceola, Ia.

Will you please send me a wiring diagram of a receiver using a Reinartz spider web coil and the WD-11 dry cell tube?

Would this circuit be as efficient as the one described in the December 23 issue of the Digest?

Please give markings of batteries and value of grid leak resistance.

A. See page thirteen of the November 25 issue of Radio Digest for diagram of circuit asked. We believe that this will prove quite as efficient as the one appearing in December 23rd issue. Much depends upon skillful construction in any case and comparative virtues are difficult to determine to a nicety. Use a two megohm grid leak.

Peanut Tube

(9871) EFH, Jeffersonville, Ind.

In the November 25 issue you have a hook-up using spider web coils (Reinartz circuit).

Could I use the detector panel hook-up with a dry cell WD-11 tube with good results? If so how far should I receive with a 75-foot, two-wire, L-type antenna, 30 feet high, with a 50-foot lead-in?

A. The WD-11 tube may be used satisfactorily in the Reinartz circuit as suggested. The range of this receiver, under all favorable conditions of construction and location, should be approximately five hundred miles.

Patent Infringment

(1891) JPW, Oil City, Pa.

In order to settle an argument I am taking the liberty of writing you to ask if the circuit used in the Reinartz tuner described in the November 25 issue of Radio Digest by H. J. Marx is patented. In other words, if a person should build a receiving set as described to be sold, would he be infringing or violating a patent?

A. All regenerative circuits come under the Armstrong Patents and are controlled by the Westinghouse Electric and Manufacturing Co. Seventeen other companies own licenses to manufacture under these patents. The Reinartz tuner embodies the regenerative principle and so comes under this patent. Therefore to sell same without a license is an infringement and amenable to the law.

Reinartz and Honeycomb Coils

(1974) JLG, Chicago, Ill.

Will you kindly tell me through the Q. & A. columns of Radio Digest if it would be practical to use honeycomb coils as loading inductances to receive wavelengths of over 5,000 meters in connection with the Reinartz circuit explained in a recent issue?

If so how many will be necessary and where should they be placed?

This circuit certainly is a wonder on short waves and I wish to use it as a long wave receiver if possible.

A. It is not advisable to use honeycomb coils as loading inductances with Reinartz circuit. It does not load effectively. It is better to use a long wave set.

Reinartz Amplification

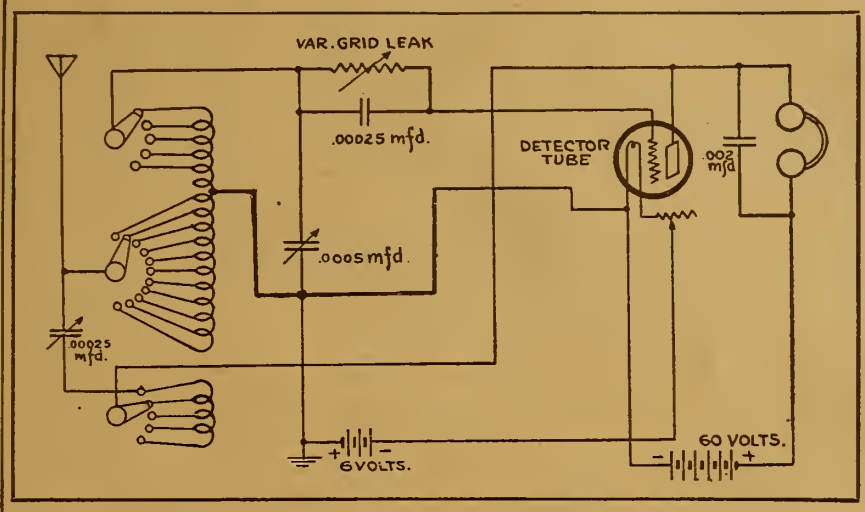
(1957) WMK, Detroit, Mich.

Owing to power lines surrounding my home, the use of any outdoor antenna causes my Reinartz set to hum. My 200-foot attic aerial will only give local reception.

Will hook-up Q. & A.-1552, page 15, January 6 issue, work as an amplifier for the Reinartz as well as for the Flewelling set, when plugged in on the phones?

Can one step of audio be added as on page 7 of the December 23 issue? Where can I get the hook-up?

THE POPULAR REINARTZ HOOK-UP



A. Hook-up Q. & A.-1552, page 15, January 6 Radio Digest will work satisfactorily if plugged in on your Reinartz set phone jack. See page 13, November 25 issue, for complete diagram of Reinartz tuner, detector, and amplifier.

Variable Condensers

(1846) AD, Highland Park, Mich.

Having a Reinartz single tube set, with which I have obtained much better results than with several other hook-ups that I have tried, I would like to ask a few questions about the Hook-up Q. & A.-1434, November 25 issue:

One variable condenser is marked .0005 mfd. What should the other one be?

What voltage should the B battery have?

What resistance should the potential have?

Has this particular set been tried out?

I am figuring on using WD-11 tubes. Would Thordarson transformers be all right for the AF and an Erla for RF?

A. With reference to the Reinartz tuner detailed in the November 25 issue of Radio Digest, the variable condensers should be of .0005 and .001 mfd. capacity. The plate battery voltage should be from forty to sixty. Resistance of potentiometer should be about two hundred ohms. The apparatus you mention will serve effectively. This circuit has been proven and is meeting with much enthusiasm wherever used.

Set Will Not Regenerate

(1275) CR, Jameson, Mo.

I would like to ask a question concerning my homemade receiving set which will not regenerate. I have tried all means of regeneration but with no success. Could there be any other reasons for this? I am using a varlocoupler, variable condenser shunted across secondary, detector, and one-stage amplifier.

In super-regeneration, does it make any particular difference about placing a detector or amplifier tube in the first tube socket?

A.—Your set, as now, is not designed regenerative. For regeneration a tickler coil is necessary. This is usually a variometer placed in the plate circuit at any convenient point.

An amplifying tube is necessary in the first tube socket of a super.

Radio Illustrated

Japanese are not slow in taking up new inventions and are keen to look into any new things that may come from the United States. The picture is that of Mrs. K. O. Gamaguchi, who arrived recently from Japan. She is the wife of a well known hotel owner of Japan. She and her husband are giving considerable of their time while in the United States to looking up Radiophones for their hotel. © Int.

The Boy Scouts are much interested in Radio. At Camp Kanohwahke, in the Interstate Park of New York, 600 boys enjoyed holiday week of real winter sport. They were "snowed in" but the son of the camp director and a fellow scout are using the Radio to get the outside news. © U. & U.

Bull Montana, former wrestler and partner of Douglas Fairbanks in the movies, has been bitten by the Radio bug. This composite picture of the "Bull" illustrates exactly the same emotions that any other human would experience, and humanly correct. Mystery, doubt and enjoyment are registered. © Wide World Photos