New One Tube Super-Regenerator—See Page 4

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

TRADE-MARK

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WILL BROADCAST OPERA

STRANGE 'WHISTLE' KEEPS SETS TUNED

WGY DEVICE SERVES AUDIENCE AS AID

Musical Note Enables Fan to Prevent "Loss" of Broadcaster Between Program Numbers

SCHENECTADY, N. Y.—Those who have listened in recently on the programs of WGY, the General Electric Company broadcasting station here, have heard a whistle in the air between numbers. Some fans have thought the whistle was due to an imperfection in their receiving outfits and others, observing that the whistle came only from WGY, were convinced that there was something wrong with the transmitting outfit. Neither theory is right.

The whistle or musical note is caused by an audio frequency oscillator used at the transmitting source for the convenience of the audience. The oscillator comes into play by means of a relay which is operated when the studio switch is thrown off. The instant a musical number is ended in the studio the whistle starts.

Keeps Receiver in Tune

The musical note or whistle will become a characteristic of WGY, an identifying mark, if the Radio audience approves. If listeners in dislike the device it will be discontinued. Many people have reported that they have lost the station between numbers and before tuning in again the next number is well under way and the announcement has been missed. There is sometimes a slight delay between selections, a delay which seems minutes to the man at the receiving set though it is actually only seconds. He thinks he is out of tune and begins to retune. The musical note persisting during the intermission enables him to know whether he is still in tune with the station.

Dance Hall to Broadcast Tunes Three Times a Week

SPRINGFIELD, O.—The management of the Avalon dancing pavilion in this city is installing a Radio broadcasting station with a sending radius of about 35 miles. It is planned to broadcast the music of the dance hall orchestra three nights each week. A receiving set is also being installed at the pavilion, and received concerts will be given two nights each week. This is one of the first dance hall broadcasting stations in the country.

RAILROADS FEATURE PHONES, NOT SCENERY

BUFFALO, N. Y.—The lure of Radio is stronger than the lure of scenery. The old-style railroad advertisement featuring the beauties of the scenery has been supplanted by announcements that Radiophone concerts and entertainment may be heard aboard the Buffalo Limited and the New York Limited. The road with the best broadcasting stations along its route will soon "tell the world."

RADIO COMPASS CALLED BEST SEA SAFEGUARD

Shipmasters Acclaim It Greatest Contribution to Safety

SAN FRANCISCO.—As a result of an official test and demonstration of the Radio compass on board the lighthouse tender Sequoia in San Francisco Bay, the American Shipmasters' Association of the Pacific Coast have stated that they "acclaim the Radio compass and position finder the greatest contribution to safety of life and property at sea that has ever been invented as an instrument for use in navigation. In its simplicity of operation, and its correct results lay its reliance and usefulness."

COLUMBUS, O.—One of the interesting things about a recent program broadcasted from Station WCAH, owned by the Entrekin Electric company of this city, was the fact that a group of songs sung for the station by Mrs. Earl McCullough were written by her husband.

Census Shows Increase in Radio Manufacturers

In Five Years Number Increases Eleven Times

CHICAGO.—In the five years from 1914 to 1919 the manufacture of Radio apparatus in the United States increased more than eleven times, according to figures reported by the Bureau of Census. The value of the apparatus made in 1919 was $7,834,698, while in 1914 the total was only $672,575. In 1909 it was a little less, being $448,262. The next census of manufactures will be taken in 1924, and it is expected to show increases many times in excess of that of 1919, inasmuch as broadcasting did not start until fall of that year.

Some authorities estimate that the value of the apparatus made during 1921 will exceed $100,000,000.

A great broadcasting station is to be erected on the top of a building on Forty-Second street, New York. When completed it will replace WJZ at Newark.

KYW MAKES FINAL PLANS FOR SERVICE

Rumors of Discontinuance of Radio Novelty Scoffed at as Groundless

First Opera November 13

Westinghouse Station Plans to Outdo Last Year's Successful Programs

CHICAGO.—Despite numerous rumors to the contrary, Chicago opera is to be broadcasted throughout the entire 1922 season by Station KYW. The first offering to Radio fans will be made on the evening of November 13, at which time "Aida," with Rosa Raisa singing the title role, will be presented in the Auditorium theater here.

This report counters those recently current that opera broadcasts would be discontinued due to protests of artists and the fear of opera managers that broadcasts would slash their audiences. That these rumors were without fact is the claim of Radio officials of the Windy City.

KYW Completes Opera Plans

"KYW has completed definite plans for opera broadcast," Morgan L. Eastman, musical director of that station, informed a representative of the RADIO DIGEST. "We have received the hearty co-operation of officials of the Chicago Opera Company and the artists."

Station KYW, operated by the Westinghouse Electric Company, initiated opera broadcasts last year when presentation of the Chicago Opera Company stars were sent over the country. "The success of last year's tests," said Mr. Eastman, "has won much favor and we are confident of repeating that success."

Scoffs at Trouble Rumor

Mr. Eastman scoffed at the suggestion that, in the face of the declaration opera would be broadcast, there might be, as rumored, friction between opera officials and the managers of KYW which would

(Continued on page 2)

SPEEDING FIRE CARTS GET ALARM BY RADIO

SAN FRANCISCO.—In order to demonstrate the possibilities of Radio as applied to fire alarm systems a demonstration was given by the San Francisco Fire Department at the recent convention of the International Association of Fire Engineers. Radio receiving sets on fire trucks in transit in the streets picked up alarms sent out from headquarters with a 200-watt Radiophone transmitter.

WILL BROADCAST OPERA

(Continued from page 1)

finally put an end to the broadcast plan. It was pointed out that Samuel Insull, who is chief of the Commonwealth Edison Company, also is a leader in the Chicago Opera Company movement, and because of his connection, refusal of broadcast privileges would not likely be forthcoming.

It also was said that KYW's apparatus for transmitting the operas, placed in the theater last year, is there now, ready for use.

Not All Operas Suitable

A KYW official informed the RADIO DIGEST that the entire season's schedule of the Chicago Opera Company would not be broadcast because certain presentations would prove ineffective without the action of the characters. In such instances, it was said, only certain parts will be selected and sent out to the fans. In most cases, however, the entire opera will be suitable for broadcasting.

This service to Radio bugs, it was explained, will not require any special effort on the part of the artists. The operas are picked up from behind the scenes while being sung to an audience in front.

At any rate, fans within the range of KYW are definitely assured that opera from Chicago will be theirs for the listening throughout the 1922 season. No other stations will be able to broadcast opera, inasmuch as the only other source, The Metropolitan Opera Company, New York City, has definitely assured RADIO DIGEST that it cannot broadcast its operas.

DEALERS SEEK TO CUT OUT OLD "SPARK HAMS"

Offer Amateurs Modern Transmitter at Wholesale Price

SAN FRANCISCO.—Radio amateurs using the old-fashioned spark sets have won a financial victory.

Radio dealers are offering to sell each of these "spark hams" a complete Radio transmitter of the modern kind, at wholesale prices!

The reason for this is that the dealers who have an interest in broadcasting want to eliminate the interference they have been getting from the spark sets of the older amateurs. There is no law against spark transmission, so the only way out of the difficulty was to propose an enticing bargain to the amateurs.

Interference from broad wave spark transmitters has been almost as bad as static in this district. To make their broadcasting program more enjoyable, dealers have decided the only way out was to induce spark amateurs to relinquish their sets for the modern and more sharply tuned tube sets. Their part in affording this change would be the sale of apparatus to such amateurs at wholesale rates.

Broadcasts Harvard's Football Play by Play

MEDFORD HILLSIDE, MASS.—Harvard football games played in the great stadium are all being broadcasted play by play. The first to go "on the air" was the Harvard-Centre game, Saturday, October 21. This was the first time that athletic events of importance have been broadcasted for the benefit of the Radio fans of New England. At the first game listeners in could hear the music of the band and the cheering of the opposing supporters.

The broadcasting is being done by station WGI located here. Microphones have been mounted in the stadium at vital points so that the cheers, band music and songs of the students can be picked up and sent broadcast as well as the announcement of the game by play. Thomas E. Burke, well known football expert is announcing the progress of the games.

The songs, cheers and music are picked up by a microphone suspended from a 16-foot pole projecting out from the top of the Stadium. Another microphone placed near the bandstand serves to pick up the music. A third microphone, installed in the press box, is used by Mr. Burke who not only follows the game but describes from sight the plays as they proceed. From the Harvard stadium where the songs, cheers and announcements have been picked up by sensitive microphones, the sounds conveyed by special wire connection four or five miles cross-country to the station WGI.

Radio Corporation Buys New Home at $1,000,000

NEW YORK.—It was announced recently that the R. C. of A. had entered into a contract to purchase the White Oil Building here at a cost of $1,000,000. The building is ten stories high and contains 43,000 square feet. It was known as the White Oil Building, but the name in all probability will be changed at a later date to "Radio House." It will also be remodeled to house the executives, sales and engineering departments.

Radora, Lifeless Crystal Gazer, Reads Humans' Thoughts by Radio

Automatic Psychic, One of New York's Radio Sensations, Answers Questions So Accurately and Makes Such Startling Revelations Several Have Swooned Before It

By Lloyd Jacquet

Can thoughts be read by Radio? Conan Doyle says it is possible and his theory would seem to be proven by Mme. Radora, a lifeless Radio psychic, at the Permanent Radio Fair in the Red Room of the Hotel Imperial, New York City. Mme. Radora is not a human being, but a life-sized automaton whose movements and thoughts are carried to her on the wings of the electromagnetic wave. No wires of any kind are attached to the table upon which she rests, and a reward of $1,000 awaits the person who can prove that this is not true.

Persons desiring to ask questions simply stand before Mme. Radora with their hands resting upon a special pedestal carrying a number of electrical contacts. Radora then bends over a crystal and answers their questions in a clear feminine voice.

Answers Prove True

Her answers have been so true and her revelations so astonishing that several women have fainted before her. Radora answers only serious questions regarding personal or business affairs.

A recent questioner asked her a question regarding property he owned in South America. She immediately told him where the property was located and that it contained 100 acres of rubber trees. These trees, she said, were rapidly becoming useless, which the questioner admitted. She then went on to tell him of trouble he had had with this property, which was all true.

Sends Cable

This man, who, happened to be one of the visiting bankers at the recent convention of the American Bankers' Association, was so impressed that he immediately went to the telegraph office in the hotel and cabled to South America ordering those in charge of his property to uproot all of the old rubber trees and plant young ones.

Those who have questioned Mme. Radora have been dumfounded by the accuracy of her replies, and all agree that they have witnessed one of the most uncanny and mysterious demonstrations of their lives. Mme. Radora has become without a doubt one of the Radio sensations of New York. She is the handiwork of R. F. Yates, Radio editor of the New York Evening Mail.

RADIO PHENOMENON IN "TRANCE"

Mme. Radora, the automatic psychic built by the Radio editor of the New York Mail, has become the sensation of New York's Radio world, answering any and all serious questions put to her—or, rather, it. The young lady above is querying the Radio actuated "medium"

Look to Inspector to Round Up "Spark Hog"

Birmingham Operators Hope for End of Nefarious Interference

BIRMINGHAM, ALA.—Radio operators of Birmingham are awaiting the coming here of Theodore G. Delier, Radio inspector of the Fifth district from New Orleans, with the hope that he will be able to apprehend the "spark hog" who has been gumming up the atmosphere here and making receiving difficult.

The nefarious operator has some kind of a device that intercepts any medium of amateurs and broadcasting station and prevents reading. At times he seems to be sending a jargon of his own and at other times it sounds as if he were holding down the key for a long period, often two minutes.

Rhodes Boykin has been interested in finding the "pest" and T. K. Lee, of the Bell Radio corporation, has offered a reward of $25 for information concerning him. Several listeners-in at outposts have made attempts to discover his plant. Many preparations have been made for an aggressive campaign when the inspector arrives.

Station WSB was the first broadcasting station in the United States to identify its call letters with three chime notes.

Radio Digest Illustrated

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CONTENTS

Looking Ahead

The tenth of the series by H. M. Towne will appear next week. Mr. Towne always constructs and tests all apparatus he describes.

There will soon appear a series of articles written by an instructor in a well known electrical school. The series will discuss all the rudiments of electricity pertaining to Radio. They will be instructive to the beginner as well as the more advanced person in the art.

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

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

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

THREE SETS WILLED BY TORONTO INVALID

FIRST TIME AIRPHONE IS BEQUEATHED

Executors Evaluate Outfits Built and Used by Paralyzed Veteran of the World War

TORONTO, CAN.—For the first time in history, so far as is known, a Radio set has been bequeathed in a will. Nothing further is required to demonstrate that Radio equipment has come into its own as a stable article of property. No longer does the term Radio outfit mean nothing but a conglomeration of wires and switches.

In a will probated here recently, James Joseph O'Heir, who died on September 27, left a "Radio set and tools, valued at $500," to his brother-in-law, William Watson.

The executors set down the value of the Radio equipment as $200. It consisted of three complete receiving outfits, one with three stages of amplification, another with bulb detector only, the third having a crystal detector with three-slide tuner.

Wounded in War

The late Mr. O'Heir was badly wounded during the war, and since demobilization had been paralyzed below the waist. All his work on Radio was done in bed, and his sister, Mrs. Watson, claims that if it had not been for his absorbing interest in the popular science, he would have died many months ago.

His designs of apparatus indicated much ingenuity. The efficiency of the three-stage set is proved by the distant stations which Mr. Watson was able to hear during the warm summer months. He brought in concerts from Atlanta, Georgia, Louisville, Kentucky, Chicago, and all the big stations on the Atlantic seaboard.

WHAS AND WSB WILL TRY 'DUET BROADCAST'

One to Send Instrumental Music and the Other Vocal

LOUISVILLE, KY.—The broadcasting stations at Louisville (WHAS) and at Atlanta (WSB) are planning an experiment in duet broadcasting. One will broadcast the instrumental music of a given program while the other will broadcast the vocal part.

Credo Harris, manager of the station at Louisville, and Major John Cohen, director of the Atlanta Journal plant, are at work on the details of the experiment. One idea suggested is that each studio install a Western Union self-setting clock adjusted so that the pendulum has a half-second swing, tune the pianos to 400 pitch, and adjust transmitters as near as practically possible to a 360 meter wave length.

If the experiment works successfully it will open up a new field of possibilities in the realm of Radio broadcasting by a number of stations in concert, each plant furnishing some specific part of the music or program.

Patents B Battery Feature Claimed to Cut Renewal Cost

REDWING, MINN.—Arthur P. Taber of the Taber Electric company of this city, has been granted a patent on a B battery for Radio receiving or sending sets which makes it possible to replace any defective cell for a dime or to renew all cells for 80 cents as against $2.50, the cost under the old system.

Two-Way Jabber Success

PORTLAND, ORE.—By operating on two different wave lengths, one 450 meters and the other 350 meters, a two-way Radio talk was successfully carried on between this city and Los Altos, Calif.

8XS HIDES KDKA FOR FANS; MANY WONDER

PITTSBURGH, PA.—Station KDKA operated on 400 meters under the experimental license call of 8XS during the week of October 16. Many fans were confused by the new call and wondered who it was. The call was used while determining data on the use of the new class B wave length at KDKA.

PRINCE BROADCASTS FROM HIS CHAMBER

LONDON, ENGLAND.—The Prince of Wales addressed the Boy Scouts of England and Scotland at the recent show and convention. Sitting in his own room, York House, St. James Palace, the Prince spoke to many scouts who were unable to come to London. The wave length used was 360 meters and the call signal 2LO.

SOME GIRLS BUILD THEIR OWN

Radio has such a strong grip on the nation that many of the girls, not satisfied with mere listening in on brother's or the neighbor's outfit, have undertaken to build their own. And the ladies are clever; our friend in the photograph has used a salt box upon which to wind the coil
Photo by Hoover Art Studio

Germans Subscribe for Sets

NEW YORK.—An example of receiving Radio broadcasting by subscription has been set by the German postoffice, which has now arranged for the circulation of market prices of stocks, materials, etc., supplying and maintaining a single-wire aerial one-tube receiver to subscribers for an inclusive annual fee. The figures given have to be decoded, and the code is only supplied to subscribers, so that other fans cannot take advantage of the service. The subscription includes news service.

JUMP OCEAN WITH SIX 20-K. W. TUBES

ALTERNATOR CUT OFF BY RADIO CENTRAL

Operate Sixteen Hours with Great Britain on 19,000 Meter Wave Length

NEW YORK.—Another scientific accomplishment looking toward trans-oceanic telephony and the use of vacuum tubes for trans-oceanic telegraphy was made very recently, when an experimental, high-powered tube set at Radio Central, Rocky Point, L. I., was operated continuously sixteen hours, handling commercial trans-Atlantic traffic with Great Britain and Germany, on a wave length of 19,000 meters.

Plans for the development of the new electron tube experimental set were completed in December, 1921, by the General Electric Company and the Radio Corporation of America, and the manufacturing of this highly delicate and specialized set was immediately started in Schenectady, N. Y.

So fast did the work progress that in May of this year the temporary installation of the set was started and when Senator Marconi visited the station in July, preliminary tests were in progress.

Uses Six 20-Kilowatt Tubes

The set is composed of three 50-kilowatt, 15,000-volt, water-cooled, metal vacuum tubes, known as kenotrons, used as rectifiers, and six 15,000-volt, 20-kilowatt, water-cooled, metal pliatrons, used as high-frequency converters. For the experiment with the tube set one of the new, mile and a half long antennae suspended from six towers 426 feet high, of the Rocky Point Station was used, and the tube set succeeded in developing and sustaining in the antenna a current strength of 350 amperes.

Operators Note No Change

So successful was the set in operation that the operators actually controlling the automatic sending keys at 64 Broad Street, New York City did not know that they were controlling a tube transmitter rather than an alternator until after the test was completed. An official of the corporation said:

"The operators on the English and German circuits if they noticed a change in the quality or the strength of the received signal did not comment on it, so we assume the signal was favorably comparable to the alternator signals. Of course, this is the first time in the history of Radio that a high-powered tube transmitting set has operated for so long a period over as great a distance as that between New York and Germany."

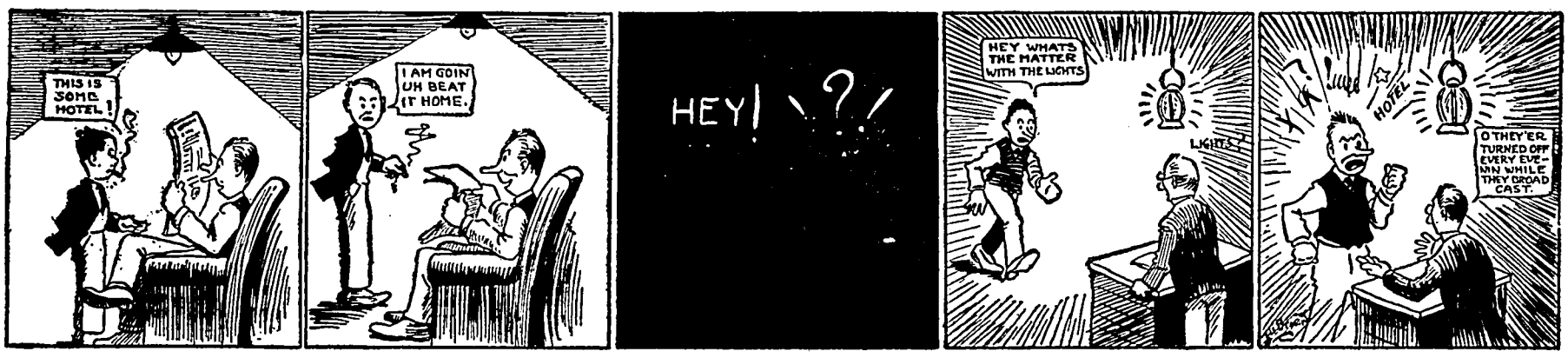
British Tube Plant in Wales

The British Marconi Company have in their station at Carnavan, Wales, a tube set made up by paralleling 60 air cooled, fragile, glass vacuum tubes, of approximately 2-kilowatt input capacity each, but as explained, the Americans have reduced the number of tubes necessary for a set from sixty to six, by increasing their capacity from two kilowatts each to twenty kilowatts each. The American metal, water-cooled tube is of great advantage because it makes it possible to develop tubes of larger capacity than is possible where it is necessary to rely upon air as the only means of cooling. The building of these partially metal tubes was only accomplished as the result of American research and inventive genius which showed the way to a successful method of welding glass and copper together.

It was said that while the set in its present stage was far from being a reliable commercial transmitter, the tests just concluded shows that an alternative type of equipment to the Alexanderson alternator is on the way to aid America in building up its world wide Radio communication system. It also further substantiates Marconi's prediction that once

(Continued on page 6)

THE ANTENNA BROTHERS — Spir L. and Lew P. — Takes a Lot of Power!



Is This Circuit Super-Regenerative?

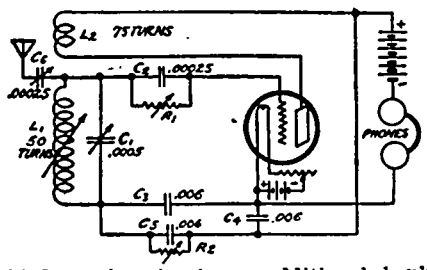
A Discussion by the Inventor

By E. T. Flewelling

THIS article will describe a new Radio receiving instrument that has proved to be perhaps the most sensitive one tube receiver that we yet have. Its ability to receive from great distances and its volume are very satisfying, to say the least.

In the diagram shown it will be seen that the circuit is practically the same as the usual regenerative type, with these differences.

The coil L2 contains considerably more inductance than is usual and there is also



added to the circuit an additional bank of three rather large fixed condensers.

In operating this receiver one will hear a small high pitched shrill whistle, showing that there is a continual train of oscillations occurring. Super-regenerative receivers have this characteristic whistle and the theory is advanced that these oscillations form a variation frequency to periodically change the condition of the circuit as regards its positive negative or zero resistance condition and thus prolong the condition that the regenerative receiver is in just before it spills over or begins to howl, after which time zero resistance of the circuit predominates.

Theory of Circuit

Is is not for me perhaps to question the theories advanced by better men than myself, but I find it so hard to adjust this theory to this receiver that I am at least opening the question for discussion. It seems to me that some other action is taking place. In this receiver one is greatly impressed by the large voltage obtained at the grid. Super circuits and the one shown here depend for their action upon supplying to the circuit a separate train of oscillations and it is only after this train is supplied to this circuit that the grid becomes so highly charged.

The idea is advanced here with due respect that possibly the effects secured do not depend upon any variation of the resistance in the circuit but upon the operation of the tube under different characteristic curve conditions, or that there is occurring a new action with which we are not familiar.

Won't Work With Plate Variometer

Another point of great interest with this circuit is, that so far it has not been possible to secure operation by using a variometer in the plate circuit to replace coil L2. In a regenerative receiver, regeneration may be secured in various ways, but the action of this circuit is such that the question has arisen as to whether or not it is a regenerative circuit. The fact that a variometer or condenser has not proved satisfactory, of course, might be explained by saying that the right values were not used, but this is not a suitable explanation because so many different values have been tried unsuccessfully.

Too, the maintenance of the low frequency oscillations depends upon the coupling of coils L1 and L2 and it may be that a condition has been set up whereby the incoming wave train is carried by the vastly more powerful low frequency oscillations tending to reach their amplitude in the same manner that a balloon is carried along by the wind and will attempt to approach the same speed.

Requires Hard Tube

A plain detector tube will not function properly in this set. It is necessary to use a hard amplifier tube that can successfully handle the increased grid charge and the large plate voltage of one hundred volts or more. Radiotron No. 202 tubes have given excellent results.

Correct results are only obtainable by a strict adherence to the layout shown, in which coils L1 and L2 are 50 and 90 turn honeycomb coils respectively (for 360 meter work), and are varied for different wave lengths. The following values are used for condensers:

C1, .0005 mfd. variable; C2, .00025 mfd.; .006 mfd. for each of the three fixed condensers C3, C4, C5; C6, .00025 mfd. variable. The grid leak R1 and condenser leak R2 are best made by pencil or ink marks across the face of the condensers between their terminals. R1 is critical, and as it is varied, the shrill whistle will change in tone, increasing in pitch as the resistance is lowered. R2 is not at all critical and is of rather low value.

Antenna System

Ground and antenna should not be used together. Either may be connected to the input point at condenser C6. The set may be used with a loop, or within, say, twenty-five miles nothing but the set itself is needed. Condenser C6 is not necessary for operation except that various grounds and antennas vary so much in their capacity value that they may tend to stop the oscillation of the set. It has been found that more satisfactory results are obtained by putting the energy into the set through this condenser which compensates for these various capacities, although the same results might be obtained by the more troublesome method of changing coils L1 and L2.

While as can be seen, the impedance contained in the phone windings is used to balance with the condensers C3, C4, and C5, yet we are not concerned with its value. Any number of phones may be used in the circuit. These phone coils may simply act to take the place of the large inductances used in other super-regenerative circuits.

Does not Howl

This circuit does not spill over and does not howl. It is very quiet in its operation, but during long distance reception it will amplify in proportion to the distance the various disturbances in the space between the sending and receiving stations such as static etc.

For this reason a distant station will be received with more or less noise depending upon the time of year and other conditions.

This receiver offers to those interested in long distance reception a very reliable, cheap and extremely sensitive receiver, and to those interested in experimental work unlimited possibilities for research.

There really is an opportunity for discussion as to how the results are obtained and while reception so far has always been at least equal to two stages of Radio frequency amplification, yet on more than one occasion the set has acted as though it had a stage or two of audio amplification. A broadcasting station ten miles distant has come in so loudly that every word and syllable was audible in a room thirty feet square.

Warren Pershing Installs Outfit on His Dad's Auto

NEW BEDFORD, MASS.—Warren Pershing, son of General Pershing, who is writing his memoirs on an island near here in a summer home loaned to him for the purpose, has installed a Radio receiving set on his father's big automobile. On top of the car is a streamer of copper wire for an aerial, and within, the receiving set which was rigged up by Warren who was assisted by his father's army sergeant chauffeur. The son uses the car more than his father, and catches music, stock market and weather reports on the fly, as it were.

Faint Radio messages received at Nome, Alaska, announced that Captain Amundsen was leaving for the Arctic.

WHK PLANT NATIONAL PIONEER

BROADCASTS HELP FIND STOLEN CARS

Cleveland Outfit's Musical Programs Rank Among Country's Best

Gypsy Orchestra Big Hit

Station Employs Best Talent in City to Entertain Fans; Gives Other Valued Service

Station WHK, Cleveland, Ohio, has several reasons to be proud. In the first place it is one of the pioneer broadcasters in the country, starting popular entertainment programs a year ago when the Radiophans were fewer in number by hundreds of thousands, than they now are. Again, this plant, operated by the Radiovox Company whose manager is Warren R. Cox, was the first phone broadcaster in Cleveland.

But WHK has other reasons to hold up its head. Its musical programs have been excellent. The best talent in Cleveland is well acquainted with its famous microphone. And another reason may be seen in the civic duty the plant is doing in broadcasting the descriptions of stolen automobiles. The latter feature of WHK is said to be greatly responsible for an appreciable decrease in the number of automobiles stolen and an increase in the number recovered.

Broadcast Gypsy Orchestra

Speaking of good programs, WHK scored an excellent evening's entertainment recently when it registered on its antenna the complete performance of Lucille Phillips and her Royal Gypsy Orchestra.

The singing voice of Miss Phillips is one that charms her hearers at once. Its rare beauty of quality and tone perfection makes it wonderfully fitted to Radiophone broadcasting. Her unusual purity of English diction in singing makes for perfect modulation in the transmitting apparatus. Miss Phillips gives her secret of articulation by saying, "It's knowing when to breathe, and how to breathe that one secures the best results."

But the group of Hungarian Gypsies Miss Phillips has gathered about her is also deserving of much praise.

Play Haunting Music

The Hungarian Gypsy is not a rover but a tiller of the soil. He has as a rule an instinctive desire, that of playing the haunting music which is to be found in the gypsy love songs and Czardas, or folk-songs.

Of such men is Miss Phillips' orchestra composed. The idyllic charm and exquisite melodies of the orchestra compelled Cleveland listeners-in to pay close attention to WHK on the night of the program. Next day the mail addressed to the Radiovox Company was crowded with requests for a return microphone engagement.

Lucille Phillips' Royal Gypsy orchestra "stopped the show" when it played for fans tuned in to Station WHK, Cleveland. The day after the concert letters were received demanding a "return engagement" of the troupe. At the right is Miss Phillips in her picturesque Hungarian gypsy costume

Helps Locate Stolen Cars

Not long ago, the Cleveland Automobile Club conceived the idea of broadcasting descriptions of stolen cars. Through the co-operation of Mr. Cox, WHK was offered. Now descriptions of cars, when other methods have failed, are broadcasted hundreds of miles in all directions. As a result the August car theft report showed a decrease of four per cent from that of July.

The stolen car reports make it possible to send information not previously reached in any other way. Many times such a community is used as a clearing house by gangs of auto thieves. The information is therefore valuable to police authorities especially in rural districts and civilians who might see the missing automobile and recognize it from the Radio description.

FANS' LETTERS PRAISE NEW PITTSBURGH PLANT

Station Becomes One of Most Popular in Two Weeks

PITTSBURGH, PA.—Station WHAF, owned and operated by the Radio Electric Company of Pittsburgh, has recently entered the field of this city's most prominent broadcasting stations. Already letters have been received that praise the work it has done toward entertaining the Radio enthusiasts during the past two weeks. The plant now broadcasts a musical program every morning from 11:30 to 12, Eastern time, and every afternoon from 3 to 3:30. On Sunday a special musical program is rendered from 9:15 till 10:15 p. m.

Last Saturday the results of the football game between Carnegie Tech and Yale were broadcasted play by play to an audience of 2,500 at Tech Field. This feat was received with much comment and plans were immediately made to broadcast some of the other prominent games in the same manner.

Station WHAF broadcasts on a wave length of 360 meters.

Broadcasting descriptions of missing persons is a new use of the art. It is suggested that the growth of Radio in the next five years will make necessary a "United States Secretary of Communications."

More Than Score of Broadcasters Cooperate on "Navy Day" Stunts

Speakers Tell History and Prowess of Sea Forces—Sailors' Bands and Vocalists Render Musical Selections as Part of Programs —WJZ Has Regular Monthly Feature

More than twenty broadcasting stations included special navy numbers in their programs on Navy Day, Friday, October 27th, in co-operation with the Navy League. At some stations speakers told of the history and the prowess of our navy while at others naval musicians or vocalists rendered musical selections. The only Government station on the list was the well-known plant, NOF at Anacostia, where most of the Governmental programs, including the famous Marine and Washington Navy Yard Band Concerts, are broadcasted.

Stations Participating

An incomplete list of the participating stations includes the Westinghouse stations, Springfield, WBZ; Newark, WJZ; Chicago, KYW; and Pittsburgh, KDKA; General Electric, Schenectady, WGY; Detroit Free Press, WCX; Southern Radio Corpn., Charlotte, WDT; Richmond-Crosby, Memphis, WKN; St. Louis Post Dispatch, KSD; Tulane Univ., New Orleans, WAAC; The Times-Union, Jacksonville, WDAL; Reynolds, Denver, KLZ; Spokane Chronicle, KOE; Deseret News, Salt Lake, KZN; Kansas City Star, WDAF; Atlanta Journal, WSB; Dallas News, WFAA; Oakland Tribune, KLX; Great Falls Tribune, KDYS, and the Honolulu Star-Bulletin, KDYX.

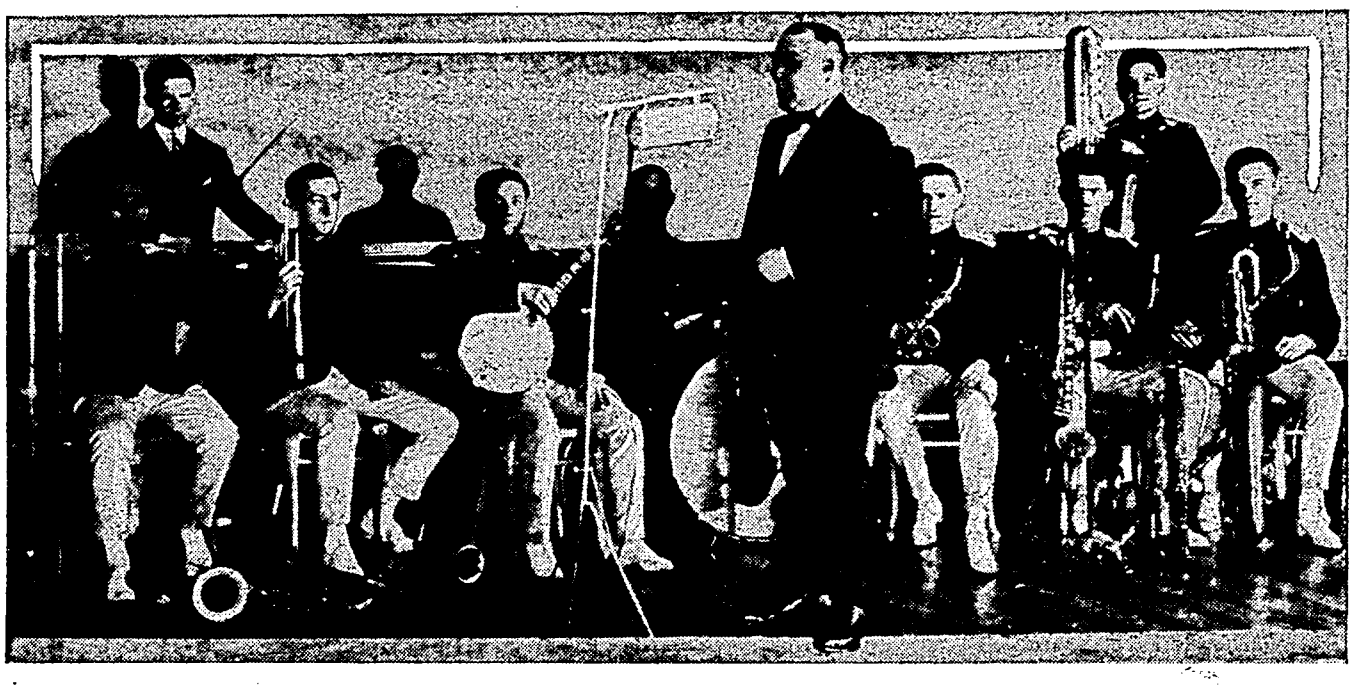
WJZ Has Program Every Month

Broadcasting station WJZ, Newark, N. J., has set aside one "Navy Night" a month as a regular feature. On this night the navy is always represented by distinguished and well-known naval officers such as Assistant Secretary of the Navy Theodore Roosevelt, Admiral W. S. Sims, and Admiral Gleaves, who commanded the transport service during the war. Plans are under way to broadcast talks by Admiral Vogelgesang, who is known in Brazil as aid to Secretary of State Hughes, and Admiral Jones, Commander-in-Chief of the Atlantic fleet.

On every "Navy Night" a concert is furnished by the Navy Band or the band of some ship that may be in port.

To Give Naval Information

The idea of having prominent naval officers speak directly to the people, by means of Radio, is to give them a better idea of the large amount of work the navy is called up to do in times of peace, as well as to establish a closer relationship between the navy and the inland centers of population. A great many families throughout the country have sons in the navy, and first hand information about the service from the men who direct the navy's activities is being greatly appreciated by them.



Harry A. Yerkes and his famous "S. S. Flotilla" Orchestra in the studio room of WJZ at Newark, on "Navy Night." WJZ has set aside one night a month when the activities of the United States Navy are told, and a musical program is always a part of the evening's offering

At a Chautauqua concert at Camden, N. Y., a large audience was so terrified by a thunderstorm received by Radio from a great distance and amplified by the apparatus, that they rushed from the tent, only to find the moon shining and no signs of a storm.

BRITAIN ALL READY FOR BROADCASTING

SIR HENRY NORMAN OPENS FIRST ENGLISH SHOW

Makes Significant Statement That the Radiophone Has Come to Stay—Tells Why

LONDON, ENGLAND.—Sir Henry Norman, member of Parliament, recently opened the first all-British Radio show and convention, at the Horticultural Hall, Westminster. At the ceremony he made the announcement that the difficulties among the companies engaged in Radio, and between the companies and the postmaster-general, had been happily set aside, and in a week or two broadcasting would be begun in London; that it would speedily be followed by broadcasting from the Manchester center and, as soon as might be, also from the other six centers into which the country was to be divided.

Speaking at a luncheon, given by the organizers of the exhibition, Sir Henry Norman said there were those who looked on broadcasting as a new fad, a passing craze that would amuse people for a month or two, and then would be dropped like ping-pong and "put and take."

Broadcasts Have Come to Stay

They were wrong. Broadcast Radio telephony was destined to become a natural part of our social life, as the ordinary wire telephony is to-day.

Sir Henry Norman predicted the time when a receiving set would be in the home of nearly every member of the community, and said that the final triumph of broadcasting would come when the King addressed the Parliaments of the Empire simultaneously by such means.

About two hundred persons, men and women, were present at Selfridge's at 6 o'clock one morning recently in the hope of hearing a Radio telephone message from station WOR, Newark, N. J. The American station had arranged to address Selfridge's by name between midnight and 1 A. M. on a wave length of 360 meters. At the corresponding hour of 6 A. M. three receiving sets were ready at Selfridge's. At five minutes after the hour a woman's voice was heard very faintly by the operators, but owing to bad jamming—by a battleship it was thought—it was not clear.

Twelve Stations Licensed; Seven Earn 400-Meter Wave

CHICAGO.—Twelve new public service broadcasting stations were licensed last week and seven other and older stations were granted the new Class B, 400-meter wave length. The new 360-meter licenses are:

WMAY, Kingshighway Presby. Church, St. Louis, Mo.; WNAT, Lennig Bros., Philadelphia, Pa.; WNAH, Manhattan Radio Supply Co., Manhattan, Kan.; WOAV, Pa. National Guard, Erie, Pa.; WMAW, Wahpeton, Elec. Co., Wahpeton, N. D.; WTAW, Agri. & Mech. College of Texas, College Station, Texas; WPAA, Anderson & Webster Elec. Co., Waco, Nebr.; WNAJ, The Benson Co., Chicago, Ill.; WMAN, Broad St. Baptist Church, Columbus, O.; KFBV, C. O. Ford, Colorado Springs, Colo.; WMAX, K. & K. Radio Supply Co., Ann Arbor, Mich.; WSAV, Clifford W. Vick, Radio Construction Co., Houston, Texas.

New Class B licenses are:

WDAF, WOC, WHB, KDKA, WSB, WFI and WBAP.

Show Apparatus 25 Years Old

LONDON, ENGLAND.—Pieces of historic Radio apparatus used by the Marconi Wireless Telegraph Company during the last 25 years were among the exhibits at the first all-British Radio show and convention at the Horticultural Hall, Westminster.

Among these exhibits were a Newton coil, used in 1898 at the Needles Station at Alum Bay, Isle of Wight; a coherer, made in 1899, of the type which was used as a Radio detector from 1899 to 1908; an early type of magnetic detector and a Fleming thermionic valve, first used in 1904.

KODAK SHOPS WEEP AS BOYS BUY RADIO

BIRMINGHAM, Ala.—Local kodak dealers are wearing wry faces these days according to A. D. Terreson, leading dealer. He states that kodaking, popular pastime among young people in the past, had decreased since the advent of Radio. "Instead of begging dad to buy a kodak, boys, now as soon as they are able to talk, want a Radio set," said Terreson.

NEW ENGLAND PLANTS PERK UP FOR CLASS B

Programs Show Improvement—Less "Canned" Music on Air

BOSTON, MASS.—Along with the news from Washington that the new 400-meter stations will not be allowed to broadcast "canned" or mechanical music of any kind, a big improvement is noticed in the programs of the stations operating this fall—at least so far as New England is concerned. High class entertainers have appeared frequently. These include performers from the Keith vaudeville circuit and entertainers from the popular "Shuffle Along" Company, now playing in Boston. The Beethoven quartet was a real treat to lovers of music.

Several college presidents have been and are "billed for the Radio circuit," and only a few days ago, Houdini, the handcuff wizard, told listeners in of his views on a "hereafter." A new series by Roger W. Babson, the wizard of statistics, famous as a business prophet, has also been started.

Large English Factory Puts in Sets to Entertain Help

LONDON, ENGLAND.—A large factory here has installed Radio apparatus with a loud speaker in the main work room, where employes at work will be able to listen in when broadcasting is in progress. Similar installations are being contemplated for the club rooms and restaurants provided by many other large establishments. If concerts are to be broadcasted at lunch time for business employes some modification of the hours so far arranged by the British postmaster general will be required.

Theater Broadcasts Acts

SAN ANTONIO, TEX.—The Majestic Theater, biggest show house in San Antonio, reports excellent results obtained after several weeks' Radio "publicity" obtained in local newspapers by allowing the star performers each week to give their acts at Stations WJAE and WOAI. Contracts with the performers for a short time threatened to prevent them from microphoning.

Number of Bugs Grows

WASHINGTON.—The interest in Radio has also been demonstrated by the applications for amateur transmitting stations, of which there were 16,467 on September 1, 1922. On June 30, 1921, there were but 10,809 amateurs authorized to transmit, but since that time, 15 months ago, 5,658 more have been added to the ranks using 200 meters.

Book Reviews

Radio Experimenter's Hand Book. By M. B. Sleeper. This book will help in the selection and the construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, $1.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfit at home. Price $1.

Armstrong's New Super-Regenerative Receiver. By Kenneth Harkness. This is an eight-page leaflet which gives six diagrams and seven halftones of the famous receiving sets and hook-up. It tells how to make and operate it. Price, 50c.

Radio for the Amateur. By A. H. Packer and R. R. H. 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.

Elements of Radio Telephony. By William C. Ballard, Jr., M. E. A reliable, authoritative discussion, in simple form, of the essential principles of Radio telephony and their application. The use of mathematics has been almost entirely avoided. Price, $1.50.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest Illustrated, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity, it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, $2.

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 payment for books not accepted. Send money order or check. Book Department, Radio Digest Illustrated, 123 W. Madison St., Chicago, Ill.

Langley Field to Get Plant

WHEELING, W. VA.—The big new Radio station to be used in connection with the operation of Langley Aviation Field will be erected and in operation by November 7, according to a statement given out recently by Capt. A. E. Simonin, of the U. S. air service, who has charge of the field. The station, when finally completed will cost the government $12,000.

Presidents Millerand and Harding exchanged Radio greetings by means of the Centre Radioelectrique de Paris de Sainte Assise, when it was officially opened for communication.

SIX TUBES JUMP OCEAN

(Continued from page 3)

reliable international telegraphy is established by using tubes, telephony must follow in its wake.

When Dr. E. F. W. Alexanderson, chief engineer of the Radio Corporation of America and inventor of the Alexanderson alternator was informed of the success of the experiment, he made the following comments over the telephone:

Predicts Feat with Single Tube

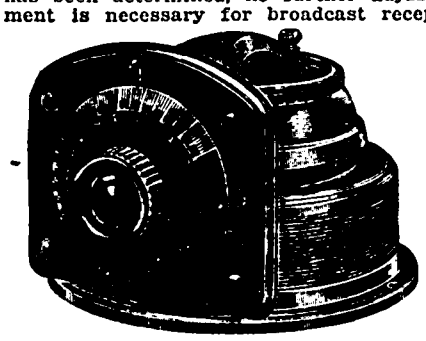
"Trans-Atlantic telegraphy has become a routine business but the importance of this demonstration is the bridging of the ocean by a few powerful vacuum tube units. In this case only six tubes were used and we can safely predict that the same feat will some day be performed by a single tube. But what is next? We have here seen a new physical principle reduced to practice on a large scale. Shall it fulfill the dreams that Edison's dynamo has not yet fulfilled, to carry Niagara's power to New York?

"Ten years ago I became acquainted with the little device known as the audion. Then it was a detector of signals and an amplifier, and the question why not amplify some more and then some more, and use it for transmitting signals as well as for receiving? Dr. Irving Langmuir gave the complete answer to this question. Although it has taken ten years to get to the point where we have today a transatlantic tube transmitter, in these ten years the energy of the vacuum tube has been increased more than a million times. A few more years of the same rate of improvement would bring us beyond our wildest dreams, but all we need to say is that science and engineering have received a new tool. It marks a turning point like the steam engine and the dynamo. It will certainly give up transatlantic telephony but it will undoubtedly give us much more".

Dr. Langmuir, when reached at his home at Bolton's Landing on Lake George, said, "I am greatly pleased but not surprised at the success of the tubes. It is a stepping stone in the progress of many years' development."

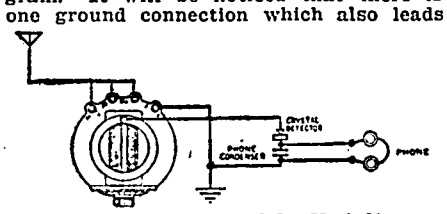
The Radiophonist's Mart

THE coupled circuit tuner shown in the illustration is a new instrument placed on the market by the Atwater Kent Manufacturing Company of Philadelphia, Pa. It is in itself a complete tuning unit taking the place of variometer and variocoupler in a coupled circuit receiver and accomplishing the same results with but one adjustment. It differs from the usual variocoupler in that no taps are used in the primary circuit, but three binding posts are provided on the back for adjusting the instrument to the particular antenna being used. Once this has been determined, no further adjustment is necessary for broadcast reception. Naturally, a greater selectivity can be obtained by the use of a 43-plate variable condenser in the primary circuit. The frame is of molded condensite and has the neatest type of workmanship throughout. Very little body capacity effect is noticeable.



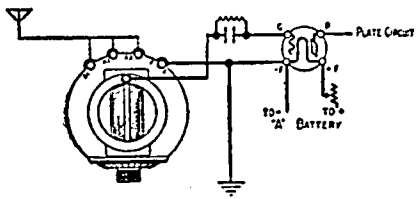
Neat Type of Complete Tuning Unit

This instrument can be used with a crystal detector as indicated in the diagram. It will be noticed that there is one ground connection which also leads



Tuning Unit in Crystal Set Hook-Up

to the phones, three binding posts for antenna connection, the proper one to be obtained by experiment, and a connection between the crystal detector and the binding post for the rotor. The crystal detector can be discarded when a more sensitive set is desired. Another diagram is shown for connecting to a tube. The variometer lead is used in the grid circuit. The ground connects to the negative side of the filament while the antenna connections are as before. The plate circuit



Tube Hook-Up With Tuning Unit

with phones and batteries are similar to the usual detector tube connections.

This unit is intended for flat base mounting when equipped with panel and dial. These can be omitted if the instrument is desired for enclosed panel use.

Manipulating Condenser Knobs

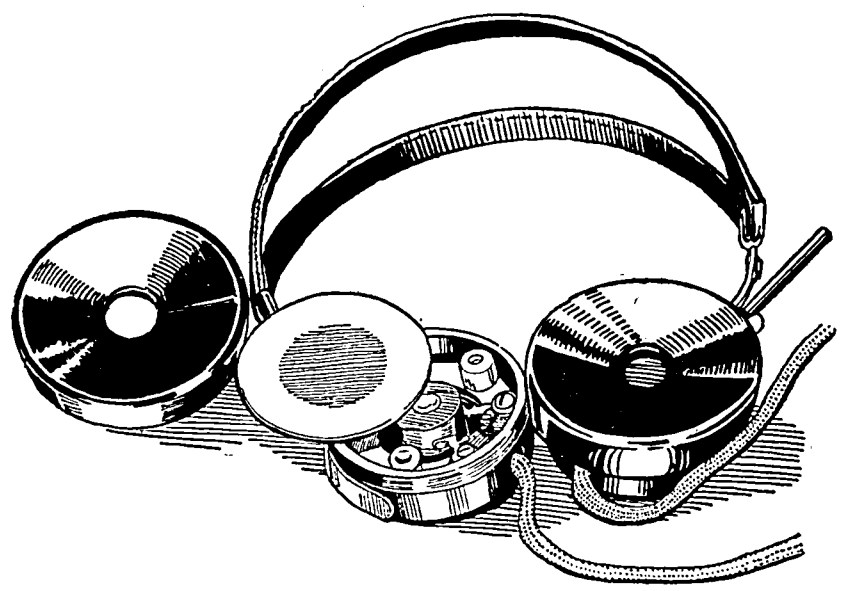
Condenser knobs and dials should always be turned slowly and, under no conditions should they be twirled. Careless manipulation of the knobs may cause the movable plates to hit against the stops at either end of the scale and result in bent plates or even short circuits.—J. M. C.

Dial Point Indicator

An excellent dial point indicator can be made quickly by cutting the gummed flap of an envelope into any shape desired and

fastening the piece in the center and just above the dial. A diamond shape, as shown, is especially recommended, as it is attractive.—A. C. Rogers and Geo. R. King, Jacksonville, Fla.

Phones with Single Center Pole



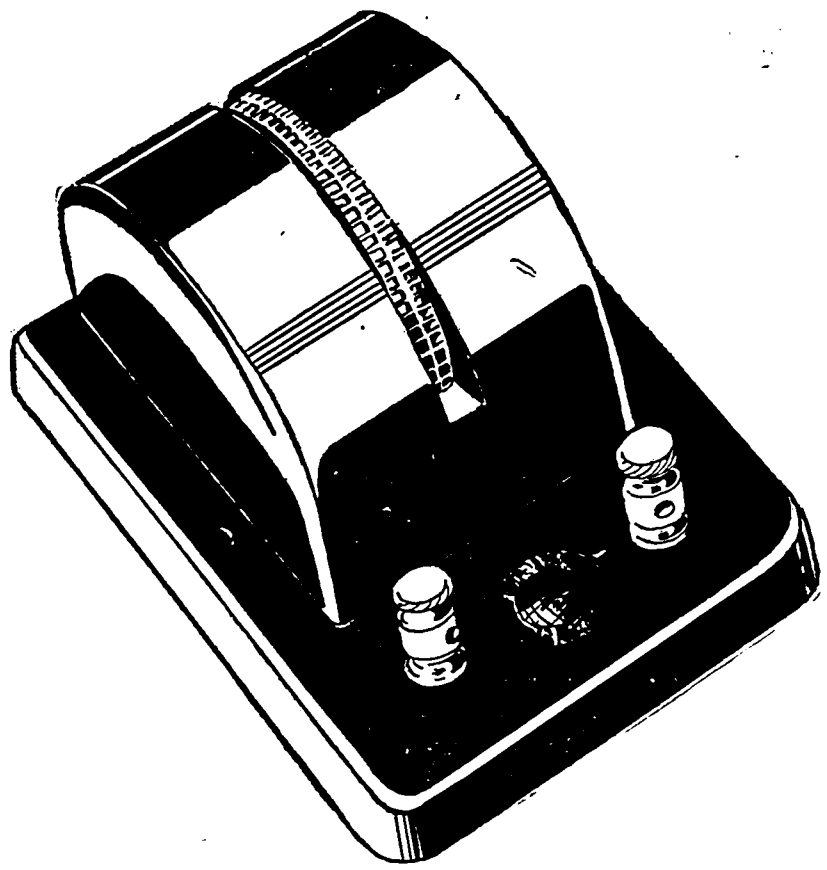
IN CONSIDERING Radio head sets it is always well to remember that their prime function is to reproduce the received music, voice or code signals with maximum loudness and at the same time, clearness. In addition, lightness, comfort and pleasing appearance remain of considerable importance. However, they must be subordinated to the former demands.

It has been claimed that when the two pole magnets are used in head receivers they act not at the exact center of the diaphragm but at two separate points and unless the two coils are well balanced and close together there appears to be a danger of the diaphragm vibrating in sections rather than as a unit with the ultimate distortion in reproduction. In the receivers shown in the illustration a single coil construction is incorporated, whereby the pull takes effect at the exact center of the diaphragm.

The question has often been asked whether a double resistance standard has any value. If the one has any marked superiority over the other, why hasn't it become standardized exclusive of the other? Actual difference in cost of manufacture is but little. It will be found that resistance is but a small factor whereas construction is much more important. A poorly constructed ten thousand-ohm receiver will not accomplish as much as a well-constructed two-thousand ohm phone. In order to reduce to a minimum the amount of iron necessary, a greater number of turns are required, naturally increasing the resistance. Taking this into consideration, it is easy to see that resistance can be increased without any appreciable gain, if well-balanced construction is left unconsidered.

It is not claimed that the receivers illustrated are perfect in fulfilling all conditions, but careful consideration has been paid to most of these requirements. They are manufactured by the Automatic Electric Company of Chicago, Ill. The headband presents a very neat appearance in a black leather finish and the mounting receiver is set that it fits well over the head and on the ears.

Rotating Disk Adjusts Crystal

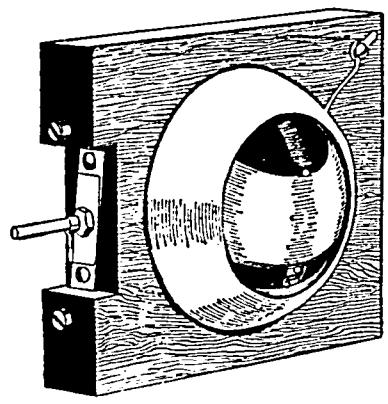


THE unit shown in the illustration is a very new type of detector produced by the Globe Art Mfg. Company of Newark, N. J. This instrument presents a somewhat unusual appearance. Its construction is such that when the rotating disk projecting through the slot on top is turned the crystal which is loosely enclosed lays against a number of contact points. The result is that adjustment can be made easily by rotating the disk until the best results are obtained.

The instrument is entirely enclosed in the black composition case. The two exposed binding posts act as terminals to the detector. Two holes are provided for flat base mounting.

The sparsely settled portion of northern Canada is to be linked to the cities and towns of southern Canada by a broadcasting station to be installed by the Manitoba government.

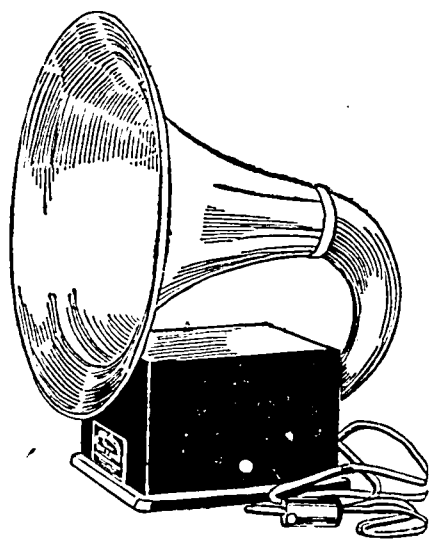
THE variometer shown differs slightly from the popular construction as the outer coil or stator is self-supporting and is mounted on a mahogany frame block in two halves, one at each side. The rotor is also made in two sections retained in position by a circular wooden disk which is mounted on the pivot shaft. For this type of construction a minimum amount of clearance between the rotating and fixed coils is possible, thus obtaining fairly high efficiency. Soldering terminals are provided for making connections to the two ends of the variometer. The instrument can be mounted on the panel



Formed Coils Remain in Molded Shape

by means of two screws which are furnished. It is manufactured by the Radio Mart Company of Long Beach, Cal.

THE loud speaker shown in the illustration is manufactured by the Dictograph Products Corporation of New York City. Neat, compact, well-made and efficient, are some of the descriptive characteristics. The black metallic case acting as base contains the receiver unit, the copper horn with a highly polished finish is secured to one end and curves over the base in graceful lines, flaring out to the familiar trumpet front. Equipped with six feet of flexible cord and a phone plug, it is ready to snap in on any standard type of receiving set or amplifier with telephone jacks.

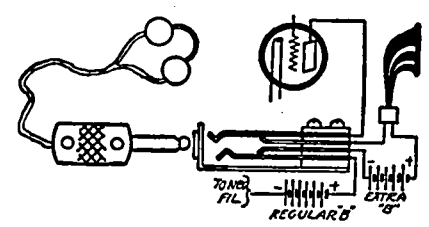


Compact New Loud Speaker

The tone reproduction is clear and avoids the metallic harshness found in most of the loud speakers. Its sound directing property is sufficient to fill the living room in the average home equipped with any of the standard types of tube and amplifier receiving sets.

Phone-Loud Speaker Jack

With the use of a two-circuit jack you can change from phones to a loud speaker with very little trouble by connecting the loud speaker in on the second circuit. It is somewhat easier to tune weak signals



in on the phones than it is on the loud speaker. After adjustments are made and signals are coming in best remove the plug and they will come in through the horn. Additional B battery may be added in the loud speaker circuit.—D. Harvey, Detroit, Mich.

Radiophone Broadcasting Stations

Corrected Every Week.

(NOTE.—The first half of the schedule list and the state, city index appear below. The second half appeared last week.)

AGI, Presidio of San Francisco, Cal. 50 mi. Signal Corps, U. S. A. Sun, 7-9 pm, instruction. Pacific.

AS6, Camp Travis, Texas. 480 only. 100 mi. U. S. Army, Tues, Fri, 7:30-8:30 pm. Thurs, 8:30-9:30 pm. Central

CFAC, Calgary, Alta., Can. 430 only. 400 mi. Western Radio Co., Ltd. Daily ex Sun, 3:30-4:30 pm. Daily, 7:45-8:45 pm. Mountain.

CFCA, Toronto, Ont., Can. 400 only. 500 mi. Toronto Star. Daily ex Sun, 12 m, reports; 2 pm, music, reports; 4:15, music, news; 6:55, bedtime story; 7-8, concert. Eastern.

CFCB, Vancouver, B. C., Can. 440 only. 1,000 mi. Marconi Co. Daily ex Sun, 8:30-9:30 pm, news, weather, concert. Pacific.

CFCE, Halifax, N. S., Can. 440 only. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.

CFCF, Montreal, P. Q., Can. 440 only. 500 mi. Marconi Co. Daily ex Sun, 1-1:30 pm, Mon, Wed, Fri, 7:30-9 pm. Eastern.

CFCH, Iroquois Falls, Ont., Can. Abitibi Power & Paper Co., Ltd.

CFCI, Walkerville, Ont., Can. Motor Products Corp.

CFCN, Calgary, Alta., Can. 440 only. 1,500 mi. W. W. Grant Radio, Ltd. Wed, Sat, 10:30-11:30 pm, concert. Mountain.

CFCX, London, Ont., Can. The London Advertiser.

CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.

CFTC, Toronto, Ont., Can. The Bell Telephone Co.

CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.

CFZC, Montreal, Que., Can. Can. Westinghouse Co., Ltd.

CHBC, Calgary, Canada. 410 only. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily, 8:45-10 pm, news, stock quotations, music. Mountain.

CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.

CHCB, Toronto, Canada. 440 only. 500 mi. Marconi Co. Tues, 8-10 pm, concert. Eastern.

CHCC, Edmonton, Alta., Can. Can. Westinghouse Co., Ltd.

CHCF Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.

CHCQ, Calgary, Alta., Can. 400 only. 150 mi. Western Radio Co., Ltd. Daily ex Sun, 3:30-4:30 pm. Daily, 7:45-8:45 pm. Mountain.

CHCS, London, Ont., Can. London Radio Shoppe.

CHCX, Montreal, Que., Can. B. L. Silver.

CHCZ, Toronto, Ont., Can. Globe Printing Co.

CHOC, Vancouver, B. C., Can. Can. Westinghouse Co., Ltd.

CHVC, Toronto, Canada. 410 only. 200 mi. Metropolitan Motors Co. Daily ex Sat and Sun, 5-5:30 pm, news, concert. Eastern.

CHXC, Ottawa, Ont., Can. 400 only. 50 mi. J. R. Booth, Jr. Mon, Wed, Sat, 8:30-10 pm, music, entertainment. Eastern.

CHYC, Montreal, Que., Can. Northern Elec. Co.

CJBC, Montreal, P. Q., Can. 290 and 420. 40 mi. Dupuis Freres. Wed, Fri, 9-10 pm or 8-9, music etc. Eastern.

CJCA, Edmonton, Alta., Can. 450 only. 1,000 mi. Edmonton Journal, Ltd. Daily ex Sun, 12 m, reports, concert; 8:30-10 pm, concert. Western.

CJCB, Nelson, B. C., Can. 400 only. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.

CJCD, Toronto, Canada. 410 only. 200 mi. T. Eaton Co. Daily ex Sat and Sun, 4-4:30 pm, concert. Sat 12-12:30 pm, concert. Eastern.

CJCE, Vancouver, B. C., Can. 420 only. 150 mi. Vancouver Sun. Daily ex Sun, 12:30-1:30 pm, 3:30-5, 8-10, music, news. Pacific.

CJCF, Kitchener, Ont., Can. 420 only. 100 mi. News Record Limited. Mon, Tues, Fri, Sat, 9-9:30 pm. Thurs, 8 pm on, concert. Eastern.

CJCG, Winnipeg, Canada. 410 only. 1,000 mi. Manitoba Free Press. Daily ex Sun, 10-10:30 am, news; 12-1 pm, reports. Mon, Thurs, 8-10 pm, concert. Tues, 7-8 pm, music. Fri, 5:30-6:45 pm, music. Sun, 8 pm, every other week starting August 20. Central.

CJCH, Toronto, Ont., Can. United Farmers of Ontario.

CJCI, St. John, N. B., Can. 400 only. 75 mi. McLean, Holt & Co., Ltd. Daily, 8-9 pm, music, news, weather. Eastern.

CJCN, Toronto, Ont., Can. Simons, Agnew & Co.

CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.

CJCY, Calgary, Alta., Can. Edmund Taylor.

CJGC, London, Ont., Can. 430 only. 75 mi. London Free Press. Daily ex Sun, 9:30-10 am; 12-1 pm, news; 3:30-6 pm, weather, news; 8-9, music, entertainment. Eastern.

CJNC, Winnipeg, Man., Can. 400 only. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 9:30-10 am, 1-2 pm, Mon, 5:30-6:45 pm. Tues, 8-10 pm. Fri, 7-8 pm. Sun, 3-4 pm. Central.

CJSC, Toronto, Ont., Can. Evening Telegram.

CKAC, Montreal, P. Q., Can. 430 only. 2,000 mi. La Presse Pub. Co. Daily 9 am to 11 pm at intervals. Eastern.

CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.

CKCD, Vancouver, B. C., Can. 410 only. 150 mi. Vancouver Daily Province. Daily ex Sun, 8:30-9:30 pm, music, entertainment, news. Pacific.

CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co.

CKCK, Regina, Sask., Can. 420 only. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news; 1:15-2 pm, markets, news, music. Mon, Wed, Thurs, 7:30-8:15 pm, sports, music. Tues, Fri, 7:30-9 pm, concert. Mountain.

CKCR, St. John, N. B., Can. 400 only. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Atlantic.

CKCS, Montreal, Que., Can. The Bell Telephone Co.

CKCZ, Toronto, Ont., Can. Westinghouse Co., Ltd.

CKKC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd.

CKOC, Hamilton, Ont., Can. 410 only. 100 mi. Wentworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8.30-9:30 pm, concert. Sun, church services. Eastern.

CKQC, London, Ont., Can. 410 only. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.

CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.

DD5, Denver, Colo. 340 only. 200 mi. Fitzsimmons General Hospital. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.

DM-7, San Antonio, Tex. 200 mi. Brooks Field, U. S. Army. Daily ex Sun, 6:30-7:30 pm, concert. Sun, 7:30-8:30 pm, concert. Central.

DN4, Denver, Colo. 340 only. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.

KDKA, E. Pittsburgh, Pa. 400 and 485 only. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10:15 am; 12:30-1 pm, music; 3:30, sports; 7:15-9, news, features, markets, entertainments; 9:55-10 pm, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, 7:30, church service. Eastern.

KDN, San Francisco, Calif. 485, 510 also. 500 mi. Leo J. Meyberg Co. Daily, 1-2 pm, 8:30-9, 4:30-5:30, 7-7:15, music, reports, concert. Pacific.

KDPT, San Diego, Calif. 250 mi. Southern Elec. Co. Daily 7:30-9 pm, news, weather, concerts, lecture. Pacific.

KDYL, Salt Lake City, Utah. 485 also. 500 mi. Telegram Pub. Co.

KDYM, San Diego, Calif. Savoy Theater.

KDYN, Red Wood City, Calif. Great Western Radio Corp.

KDYO, San Diego, Calif. Carlson & Simpson.

KDYQ, Portland, Ore. Oregon Inst. of Technology.

KDYR, Pasadena, Calif. Pasadena Star-News Pub. Co.

KDYS, Great Falls, Mont. 485 also. 1,000 mi. Great Falls Tribune. Daily 12 m, weather, time. Daily ex Tues, 8-10 pm, concert etc. Sun, 4 pm, church services. Mountain.

KDYU, Klamath Falls, Ore. Herald Pub. Co.

KDYV, Salt Lake City, Utah. Cope & Cornwell Co.

KDYW, Phoenix Ariz. Smith, Hughes & Co.

KDYX, Honolulu, Hawaii. 750 mi. Star-Bulletin. Daily ex Sun, 12:15-1:15 pm, stocks, markets, business news; 6:30-7:30, concert, lecture. Sun, 11-12 am, church service; 4-6 pm, concert, lecture. Honolulu.

KDZA, Tucson, Ariz. Arizona Daily Star.

KDZB, Bakersfield, Calif. Frank E. Siefert.

KDZD, Los Angeles, Calif. W. R. Mitchell.

KDZE, Seattle, Wash. 300 mi. Rhodes Co. Daily ex Sun, 10:30-11 am, news, 3:30-4:30 pm, style talks, music. Mon, Wed, Fri, 7:15-8:15 pm, concert. Pacific.

KDZF, Los Angeles, Calif. Automobile Club of Southern California.

KDZG, San Francisco, Calif. Cyrus Pierce & Co.

KDZH, Fresno, Calif. 485 also, 50 mi. The Herald-Buford Co. Daily ex Sun, 4-5 pm, news, sports, music. Mon, Wed, Thurs, Sat, Sun, 7-8 pm, music. Tues, 8-9 pm, music. Fri, 8-8:30 pm, music. Sun, 10-11 am, sermon. Pacific.

KDZI, Wenatchee, Wash. 300 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, concert. Sun, 11 am-12, church service. Pacific.

KDZJ, Eugene, Ore. Excelsior Radio Mfg. Co.

KDZK, Reno, Nev. 50 mi. Nev. Mchy. & Elec. Co. Wed, Fri, Sat, Sun, 8-9 pm, music, entertainment. Pacific.

KDZL, Ogden, Utah. Rocky Mountain Radio Corp.

KDZM, Centralia, Wash. 50 mi. Hollingworth Hdwe. & Radio Supply Store. Daily ex Sat & Sun, 8-9 pm, music. Pacific.

KDZP, Los Angeles, Calif. Newberry Elec. Corp.

KDZQ, Denver, Colo. 500 mi. Wm. D. Pyle. Daily ex Sun, 6:45-7:15 pm, news, 9-10 pm, concert. Mountain.

KDZR, Bellingham, Wash. 200 mi. Bellingham Pub. Co. Daily ex Sun, 7-8 pm, 8:30-9 pm, music, news, sports, reports. Sun, 7-8 pm, church service. Pacific.

KDZT, Seattle, Wash. Seattle Radio Assn.

KDZW, San Francisco, Calif. Claude W. Gerdes.

KDZX, San Francisco, Calif. Glad Tidings Tabernacle.

KDZZ, Everett, Wash. 50 mi. Kinney Bros. & Seppell. Daily ex Sun, 2:30-3:30 pm, 4:30-5:30, 8:15-9:15. Pacific.

KFDD, Boise, Ida. St. Michaels Cathedral.

KFDS, San Francisco, Calif. John D. McKee.

KFEC, Portland, Ore. Meier & Frank Co.

KFED, Taft, Calif. City of Taft.

KFI, Los Angeles, Calif. 500 mi. Earle C. Anthony, Inc. Daily ex Sun, 1-1:30 pm. Daily ex Mon & Fri, 7:40-8:20 pm. Tues, Sat, 2-3 pm. Sun, 10:45-11 am, 4-5 pm, 7:40-8:20. Pacific.

KFV, Yakima, Wash. 250 mi. Foster-Bradbury Radio Store. Daily ex Sun, 3-4 pm. Mon, Wed, Fri, 8-9 pm. Pacific.

KFZ, Spokane, Wash. 300 mi. Doerr Mitchell Elec. Co. Tues, Wed, Fri, Sat, 7-8:30 pm, music etc. Pacific.

KGB, Tacoma, Wash. 200 mi. Wm. A. Mullins Elec. Co. (Tacoma Ledger). Daily ex Sun, 4-5 pm, 7-9. Sun, 5:30-7 pm. Pacific.

KGF, Pomona, Cal. 150 mi. Pomona Fixture & Wiring Co. Thurs, 7:30-8:15 pm, news, markets, concert. Mountain.

KGG, Portland, Ore. 500 mi. Hallock & Watson Radio Service. Daily ex Sun, 5-6 pm, music, entertainment, 7:30-8 pm, reports. Sun, 9-10, music. Pacific.

KGN, Portland, Ore. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.

KGO, Altadena, Calif. 350 only. 300 mi. Altadena Radio Lab. Mon, Wed, Fri, 5:15-6 pm, reports, code lessons, agriograms. Tues, Thurs, 7:40-8:20 pm, concerts. Sat, 7:40-9 pm, concert. Sun, 2-3 pm, church service. Pacific.

KGU, Honolulu, Hawaii. 485 also. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat. special program. 150th meridian. (Three hours later than Pacific.)

KGW, Portland, Ore. 200 mi. Ship Owners Radio Service Inc. (Daily Oregonian.) Daily, 3:30-4:30 pm, news etc. Mon, 7:30-8:30 pm, concert. Wed, 8-10 pm, concert. Fri, 8-9 pm, concert. Sun, 7-8 pm, church service. Pacific.

KGY, Lacey, Wash. 50 mi. St. Martins College. Tues, Fri, Sun, 8:30-9:30 pm, news, concert, bedtime story. Pacific.

KHD, Colorado Springs, Colo. 485 also. 50 mi. Daily ex Sun, 8:15 am, weather. Daily ex Sun, Mon, 7-7:30 pm, music. Mountain.

KON, Los Angeles, Calif. 200 mi. Holzwasser Inc. Daily ex Sun, 4-5 pm and 8:15-9, concert, news. Sun, 10-11 am, 4-5 pm and 8:15-9, church service. Pacific.

KOP, Detroit, Mich. Detroit Police Dept.

KPO, San Francisco, Calif. 300, 600 also. 500 mi. Hale Bros., Inc. Daily ex Sun, 11-12 m, 3:30-4:30 pm, concert. Wed, 7:30-8:15 pm, concert. Sun, 11-12:15 pm, church service. Pacific.

KQI, Berkeley, Calif. Univ. of Calif.

KQP, Hood River, Ore. 350 only. 50 mi. Hood River News. Daily ex Sat, Sun, 7 pm, news. Tues, Fri, Sun, 8:30-9:30 entertainment. Pacific.

KQT, Yakima, Wash. Elec. Power and Appliance Co.

KQV, Pittsburgh, Pa. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm, 2:30-3, music, lectures. Mon, Wed, Fri, 10-11 pm, music, entertainment. Eastern.

KQW, San Jose, Calif. 345 also. 500 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed, 8:15-9 pm, concert. Pacific.

KQY, Portland, Ore. 200 mi. Stubbs Elec. Co. Daily, 1-2 pm, 6-7. Pacific.

KRE, Berkeley, Calif. 200 mi. Maxwell Elec. Co. Every other Sat, 8:15-9 pm. Sun, 1-2 pm, 6-7. Pacific.

KSD, St. Louis, Mo. 400 & 485 only. 1,500 mi. St. Louis Post-Dispatch. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Sun, 8:15 pm. Central.

KSL, San Francisco, Cal. 50 mi. The Emporium. Daily ex Sun, 10-11 am, concert, news; 2-3 pm, concert, educational talk. Sun, 2-3 pm, concert and educational talk. Pacific.

KSS, Long Beach, Calif. 25 mi. Prest & Dean Radio Research Lab. Daily ex Sun, 3:30-4:30 pm, news, concert. Pacific.

KTW, Seattle, Wash. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.

KUO, San Francisco, Calif. 485, 525 also. 1,500 mi. San Fran. Examiner. Daily ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 3-3:30 pm, lecture, news; 5:30-6:45 pm, concert; 9 am, 12 m, 6:45 pm, weather report. Wed, 3:30 pm, health bulletins. Sun, 9-10 am, concert; 5-6 pm, concert, news. Pacific.

KUY, El Monte, Calif. 500 mi. Coast Radio Co. Daily ex Sun, Sat, 4-4:45 pm. Mon, Thu, 8:20-9 pm. Sat, 3-4 pm. Pacific.

KVQ, Sacramento, Calif. 300 mi. Sacramento Bee. Daily ex Sun. 6:30-7:30 pm, news, reports, music. Sun, 6-7 pm, reports, music. Pacific.

KWG, Stockton, Cal. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

KWH, Los Angeles, Calif. 485 also. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.

KXD, Modesto, Calif. Herald Pub. Co.

KXS, Los Angeles, Calif. Braun Corp.

KYF, San Diego, Calif. Thearle Music Co.

KYG, Portland, Ore. 700 mi. W. P. Hawley, Jr. Tues, Thu, Sat, 9-10 pm, concert. Pacific.

KYI, Bakersfield, Calif. Bakersfield Californian.

KYJ, Los Angeles, Cal. 485 also. 1,000 mi. Leo J. Meyberg Co. (Hamburgers). Daily ex Sun, 4-5 pm, concert, markets, weather, news. Mon, Thurs, Sat, 8-9 pm, same program. Pacific.

KYW, Chicago, Ill. 400, 485 only. 1,500 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:35 am-1:20 pm, market quotations every half hr; 2:15, news, markets; 3, baseball; 4:15 and 6:30, news, final markets and stocks; 7:30, baseball, bedtime story; 7:45, feature; 8-9, concert; 9, news. Sun, 3:30 pm, church service. Central.

KYY, San Francisco, Calif. The Radio Telephone Shop.

KZC, Seattle, Wash. 100 mi. Public Market & Department Store Co. Daily ex Sun, 6:45-7:15 pm, music, news, agriograms. Pacific.

KZM, Oakland, Calif. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZN, Salt Lake City, Utah. 485 also. 1,000 mi. Desert News. Daily ex Sun, 3-4 pm, reports, music, 8-9:30 pm, music, news, bedtime stories etc. Mountain.

KZV, Wenathchee, Wash. Wenathchee Battery & Motor Co.

NOF, Anacostia, D. C. 412 only. 600 mi. U. S. Navy Dept. Mon, Tues, Thur, 7:15-7:30 pm, lecture. Mon, Thur, 6:45-7 pm, lecture. Tues, Thur, 7:45-8 pm, health lecture. Wed, Fri, 8:30-9:45 pm, band concert. Eastern.

WAAB, New Orleans, La. Valdemar Jensen.

WAAC, New Orleans, La. Tulane Univ.

WAAD, Cincinnati, O. 200 mi. Ohio Mechanics Inst. Fri 2:30-4:30 pm, and Sat, 8:15-10:15 pm, Cincinnati Symph. Orchestra concert. Central.

WAAF, Chicago, Ill. 485 only. 300 mi. Chi. Daily Drovers Journal. Daily ex Sat & Sun, 8:30 am, 10:30, 10:45, 12:30 pm, 3, 4:30, stock reports. Central.

WAAG, Shreveport, La. 50 mi. Bordreaux Co. Daily ex Sun, 7:30-9 pm, sports, concert. Central.

WAAH, St. Paul, Minn. 200 mi. Commonwealth Elec. Co. Mon, Fri, 12-12:45 pm, concert. Mon, Tues, 8-9:30, music. Wed, 1-1:45 pm, lecture. Sun, 3:30-4:30 pm, concert. Central.

WAAJ, Boston, Mass. 50 mi. Eastern Radio Inst. Mon, Wed, Fri, 9-10 pm, music. Eastern.

WAAK, Milwaukee, Wis. 485 also. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, markets, weather; 11, markets; 12:10 pm, markets; 1:25, closing markets; 2, and every hr. after, concert, test; 7, weather; 7:15, baseball; 7:30, concert. Central.

WAAL, Minneapolis, Minn. Minnesota Tribune Co.

WAAM, Newark, N. J. 300 mi. I. R. Nelson Co. Daily ex Sun, 11-11:55 am, 3-4 pm, music. Wed, 8-9 pm, special program. Eastern.

WAAN, Columbia, Mo., Univ. of Mo.

WAAO, Charleston, W. Va. 40 mi. Radio Service Co. Daily ex Sun, 6:45-7:45 pm, music, news, weather, baseball. Eastern.

WAAP, Wichita, Kan. 200 mi. United Elec. Co. Daily, 12-1:30 pm, music, news; 5, weather; 7:15-7:30, sports, markets; 9:45-12, talks, music, and code on C. W.; 10:30, weather. Tues, Fri, 8 pm on, concert, etc. Central.

WAAQ, Greenwich, Conn. 600 mi. New England Motor Sales Co. Daily ex Sun, 9:30 am-5:30 pm, every half hr. Eastern.

WAAR, Huntington, W. Va. Groves-Thornton Hdw. Co.

WAAS, Decatur, Ga. Georgia Radio Co.

WAAT, Jersey City, N. J. 70 mi. Jersey Review. Wed, 7-8 pm, concert, lecture. Sun, 7-8, church service, concert. Eastern.

WAAV, Athens, O. 500 mi. Athens Radio Co. Daily, 7-9 pm, miscellaneous. Central.

WAAW, Omaha, Neb. 485 also. 500 Omaha Grain Exchange. Daily ex Sun, 9:45, 10:45, 11:45, 12:45, 1:20, 8 pm, market reports. 8:15-9 pm, music. Central.

WAAX, Crafton, Pa. Radio Service Corp.

WAAY, Youngstown, O. 500 mi. Yohrling Rayner Music Co. Daily ex Sun, 5:30 pm, reports; 8:15-9 pm, music. Eastern.

WAAZ, Emporia, Kans. 250 mi. Hollister-Miller Motor Co. Daily ex Sun, 7-8 pm, weather, entertainment. Central.

WAH, El Dorado, Kans. Midland Refining Co.

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

WAJU, Yankton, S. D. Yankton College.

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

WBAB, Syracuse, N. Y. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30-9:30 pm, concert, agriograms etc. Eastern.

WBAD, Minneapolis, Minn. Sterling Elec. Co. (Journal Printing Co.)

WBAE, Peoria, Ill. Bradley Polytechnic Inst.

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

WBAG, Bridgeport, Pa. 485 also. 300 mi. Diamond St. Fibre Co. Daily, 11:45-12 m, markets, weather. Eastern.

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.

WBAJ, Toledo, O. 300 mi. Marshall-Gerken Co. Daily ex Sun, 12:05-2 pm, 6-7:30, news, music, reports. Tues, Thur, Sat, 8-9 pm, concert. Eastern.

(Continued on page 9)

In Two Parts—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which RADIO DIGEST has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one-half appearing this week, and the other half to appear next week. It is believed the improvement will be greeted as welcome by many readers.

The station schedules, given here, are listed alphabetically by call letters. Following the call is given the city and state, the wave length (PROVIDING a wave length other than 360 meters is used), the miles range of the station, the owner of the station, the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the first half of the station schedules every other week and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Two successive issues of RADIO DIGEST will give one the most complete and accurate list of broadcasting stations obtainable.

KFAB, Portland, Ore. Pacific Radiofone Co.

KFAC, Glendale, Calif. 355 and 485. 250 mi. Daily Press. Daily ex Sun, 4:15-5:15 pm, news etc. Mon, Wed, Fri, 7-8 pm, concert. Pacific.

KFAD, Phoenix, Ariz. 485 also. 100 mi. Mon, Wed, Fri, 8-9:15 pm, concert, weather, stocks, markets. Sun, morning, church service. Mountain.

KFAE, Pullman, Wash. 200 mi. State College of Wash. Program irregular.

KFAF, Denver, Colo. 1,000 mi. Western Radio Corp. Daily ex Thurs & Sun, 8-9 pm, music, reports, news. Mountain.

KFAJ, Boulder, Colo. Univ. of Colo.

KFAN, Moscow, Idaho. The Elec. Shop.

KFAP, Butte, Mont. Standard Pub. Co.

KFAQ, San Jose, Calif. City of San Jose.

KFAR, Hollywood, Calif. Studio Lighting Service Co.

KFAS, Reno, Nev. 300 mi. Reno Motor Supply Co. Mon, Tues, Thurs, 8-9 pm, music. Pacific.

KFAT, Eugene, Ore. 100 mi. Pac. Radio Co. Tues, Thurs, Sat, 7-8 pm, music. Sun, 8:45-9:15 pm, church service. Pacific.

KFAU, Boise, Ida. 485 also. 200 mi. Boise H. S. Mon, Wed, Fri, 9:30-10 am, 2:30-3:00 pm, reports, news, 8:15-9 pm, concert. Tues, Thurs, Sat, 9:30-10 am, 2:30-3:00 pm, reports, news, 7:45-8:15 concert. Mountain.

KFAV, Venice, Calif. Cooke & Chapman.

KFAW Santa Ana, Calif. 485 also. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 8-9 pm, concert. Pacific.

KFAY, Medford, Ore. 300 mi. Virgin Radio Service. Mon, Fri, 9-10 pm, concert. Wed. 9-12 pm, dance music. Sun, church service. Pacific.

KFBA, Lewiston, Idaho. Ramey & Bryant Radio Co.

KFBB, Havre, Mont. F. A. Buttrey & Co.

KFBC, San Diego, Calif. 100 mi. W. K. Azbill. Thurs, Bible lesson for foll. Sun. Sat. lectures.

KFBD, Hanford, Calif. 100 mi. Calif. Radio Lab. Daily ex Sun, 3-4 pm, 8-9. Sun, 5-6 pm. Pacific.

KFBE, San Luis Obispo, Calif. 50 mi. R. H. Horn. Daily ex Sun, 4-5 pm, 7-8. Pacific.

KFBF, Butte, Mont. Butte School of Telegraph.

KFBG, Tacoma, Wash. First Presbyterian Church.

KFBH, Marshfield, Ore. Thomas Musical Co.

KFBJ, Boise, Idaho. 170 mi. Boise Radio Supply Co. Daily ex Sun, 5-5:30 pm, police reports, music. Mon, Wed, Fri, 7:45-8:15 pm, concert. Tues, Thurs, Sat, 8:15-9 pm, concert. Mountain.

KFBK, Sacramento, Calif. 300 mi. Kimball-Upson Co. Daily ex Sun, 3-4 pm, 6-6:30, concert, news. Sun, 8-9 pm, church service. Pacific.

KFBL, Everett, Wash. Leese Bros.

KFBM, Astoria, Ore. Cook & Foster.

KFBN, Oakland, Calif. Borch Radio Corp.

KFBQ, Prescott, Ariz. Savage Elec. Co.

KFBU, Laramie, Wyo. Bishop N. S. Thomas.

KFBV, Colorado Springs, Colo. Clarence O. Ford.

KFC, Seattle, Wash. 700 mi. Northern Radio & Electric Co. Daily, eight hours, miscellaneous. Pacific.

KFCB, Phoenix, Ariz. 500 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.

KFCC, Wallace, Ida. 380 only. 100 mi. Auto Supply Co. Daily, 7:30-8:30. Pacific.

KFCD, Salem, Ore. Sales Elec. Co.

KFDA, Baker, Ore. Adler's Music Store.

KHJ, Los Angeles, Calif. 485 also. 500 mi. C. R. Kierulff & Co. Daily ex Sat & Sun, 1:30-2:15 pm, 6:40-7:20. Sat, 6:40-7:20 pm. Sun, 10-10:45 am. Pacific.

KHQ, Seattle, Wash. Louis Wasmer.

KJC, Los Angeles Calif. 100 mi. Standard Radio Co. Barker Bros. Daily ex Sun, 11:30-12 noon. Mon, 10-11 am. Wed, 9-10 am. Sun, 1-2 pm, 5-6. Pacific.

KJJ, Sunnyvale, Calif. 500 mi. Radio Shop. Tues, 8:15-9 pm. Fri, 7:30-8:15 pm. Pacific.

KJQ, Stockton, Calif. C. O. Gould.

KJR, Seattle, Wash. 200 mi. Northwest Radio Service Co. Daily ex Sun, 8-9 pm, miscellaneous. Pacific.

KJS, Los Angeles, Calif. 100 mi. Bible Inst. of Los Angeles. Tues, Wed, 12-12:30 pm, sacred music, lecture. Sun, 11:30-12:30 pm, sacred music, sermon. Pacific.

KLB, Pasadena, Cal. 300 mi. J. J. Dunn Co. Mon and Fri, 7:30-8:15 pm, concert. Sun, 3-4 pm and 8-9, concert. Pacific.

KLN, Del Monte, Calif. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert Pacific.

KLP, San Francisco, Calif. 500 mi. Colin B. Kennedy Corp. Mon, 7:30-8:30 pm. Thurs, 8:30-9 pm. Sun, 4-5 pm. Pacific.

KLS, San Francisco, Calif. 300 mi. Warner Bros. Radio Supply Co. Daily, 12-1 pm. Sat, 7:30-8:15 pm. Pacific.

KLX, Oakland, Calif. 500 mi. Oakland Tribune. Daily ex Sun, 7:15-7:30 pm, news, entertainment. Tues, 7:30-8:15 pm, Fri, 8:15-9 pm, and Sun, 3-4 pm, concert. Pacific.

KLZ, Denver, Colo. 485 also. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30 pm on, news, markets, bedtime story, concert. Sun, 8-9 pm, church service. Mountain.

KMC, Reedley, Calif. 100 mi. Lindsay-Weatherill & Co. Mon, Wed, Fri, 8:30-9 pm, concert. Pacific.

KMJ, Fresno, Calif. 200 mi. San Joaquin Lt. & Pr. Corp. Tues, Fri, 7-8 pm, music. Sun, 5-6 pm, music. Pacific.

KMO, Tacoma, Wash. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 11-1 pm, 6-7, 9:15-10, concert, news, lecture. Pacific.

KNI, Eureka, Calif. T. W. Smith.

KNJ, Roswell, New Mex. 485 also. 750 mi. Roswell Public Service Co. Daily, 8 pm, news, reports, concerts. Mountain.

KNN, Los Angeles, Calif. 100 mi. Bullock's. Mon, 2:30-3:30 pm. Wed, 2:15-3 pm. Thurs, 4-5 pm. Pacific.

KNT, Aberdeen, Wash. 400 mi. Grays Harbor Radio Co. Daily, 5-5:30 pm, 7:30-8:15, news, concert. Pacific.

KNV, Los Angeles, Calif. Radio Supply Co.

KNX, Los Angeles, Calif. Elec. Lighting Supply Co.

KOB, State College, N. M. 485 also. 500 mi. N. M. College Agri. & Mech. Arts. Daily ex Sun, 11:55-12 m, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert, Mountain.

KOG, Los Angeles, Calif. 300 mi. Western Radio Elec. Co. Daily ex Sun, Wed, 5-5:30 pm, code, news. Mon, Fri, 7:40-8:20 pm, music. Wed, 4:30-5 pm, code, 8:20-9 pm, music. Pacific.

State, City, Call

Alabama:
Auburn, WMAV
Birmingham, WIAG, WSY
Mobile, WEAP
Montgomery, WKAN

Arizona:
Phoenix, KDYW, KFAD, KFCB
Prescott, KFBQ
Tucson, KDZA

Arkansas:
Fort Smith, WCAC, WGAR
Little Rock, WCAV, WEAX, WSV
Pine Bluff, WOK

California:
Altadena, KGO
Bakersfield, KDZB, KYI
Berkeley, KQI, KRE
Del Monte, KLN
El Monte, KUY
Eureka, KNI
Fresno, KDZH, KMJ
Glendale, KFAC
Hanford, KFBD
Hollywood, KFAR
Long Beach, KSS
Los Altos, KLP
Los Angeles, KDZD, KDZF, KDZP, KFI, KHJ, KJC, KJS, KNN, KNV, KNX, KOG, KON, KUS, KWH, KXS, KYJ
Modesto, KXD
Oakland, KFBN, KLS, KLX, KZM,
Pasadena, KDYR, KLB
Pomona, KGF
Reedley, KMC
Sacramento, KFBK, KVQ
San Diego, KDPT, KDYM, KDYO, KFBC, KYF
San Francisco, AG1, KDN, KDZG, KDZW, KDZX, KFDB, KPO, KSL, KUO, KZY
San Jose, KFAQ, KQW,
San Luis Obispo, KFBE
Santa Ana, KFAW
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

Colorado:
Boulder, KFAJ
Colorado Springs, KFBV, KHD
Denver, DD5, DN4 KDZQ, KFAF, KLZ

Connecticut:
Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
New Haven, WCJ, WGAH

Delaware:
Wilmington, WHAV

District of Columbia:
Anacostia, NOF
Washington, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WPN, WWX, 3YN

Florida:
Jacksonville, WCAN, WDAL
Miami, WFAW, WYAZ
Pensacola, WGAN, WLAV
Tampa, WDAE, WEAT, WHAW
West Palm Beach, WKAH

State, City, Call

Georgia:
Atlanta, WAAS, WDAW, WSB, 4CD
College Park, WDAJ
Gainesville, WKAY
Savannah, WHAO

Idaho:
Boise, KFAU, KFBJ, KFDD
Lewiston, KFBA
Moscow, KFAN
Wallace, KFCC

Illinois:
Chicago, KYW, WAAF, WBU, WDAP, WGAS, WJAZ, WMAQ, WNAJ, WQX
Decatur, WBAO, WCAP, WHAP
Peoria, WBAE, WFAP, WJAN
Quincy, WCAW, WCAZ
Rockford, WIAB, WJAH
Springfield, WDAC
Tuscola, WDZ
Urbana, WRM

Indiana:
Anderson, WMA
Fort Wayne, WFAS
Frankfort, WKAT
Greencastle, WLAX
Huntington, WHAY
Indianapolis, WLK, WOH
Marion, WIAQ
Muncie, WJAF
Richmond, WOZ
South Bend, WBAQ, WGAZ
Terre Haute, WEAC
West Lafayette, WBAA

Iowa:
Ames, WOI
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Cresco, WNAG
Davenport, WHAI, WOC
Des Moines, WGF, WHX
Fort Dodge, WEAB
Iowa City, WHAA
Le Mars, WIAU
Marshalltown, WLAR
Newton, WIAH
Shenandoah, WGAJ
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WEAZ, WHAC, WMAR

Kansas:
Anthony, WBL
Atwood, WEAD
Eldorado, WAH
Emporia, WAAZ
Hutchinson, WLAS
Independence, WFAY
Liberal, WMAG
Lindsborg, WDAD
Manhattan, WNAH, WTG
Salina, WFAD
Topeka, WJAQ
Wichita, WAAP, WEAH, WEY, WHAN

Kentucky:
Bowling Green, WNAB
Louisville, WHAS, WKAG, WLAP, 9ARU
Paducah, WIAR
Waco, WPAA

State, City, Call

Louisiana:
New Orleans, WAAB, WAAC, WBAM, WCAG, WGV, WIAF, WWL
Shreveport, WAAG, WDAN, WGAQ, WMAU

Maine:
Auburn, WMB
Houlton, WLAN
Portland, WJAL
Sanford, WFAR

Maryland:
Baltimore, WCAO, WEAR, WKC

Massachusetts:
Boston, WAAJ, WFAU, WNAC
Dartmouth, WMAF
Holyoke, WHAX
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ, WIAP
Worcester, WCN, WDAS

Michigan:
Ann Arbor, WMAX
Bay City, WTP
Dearborn, WWI
Detroit, KOP, WCX, WWJ
East Lansing, WHW, WKAR
Flint, WEAA
Kalamazoo, WLAQ
Lansing, WHAL
Saginaw, WIAW

Minnesota:
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, WBAD, WBAH, WCAS, WLAG, WLB
Northfield, WCAL
St. Cloud, WFAM
St. Paul, WAAH

Mississippi:
Corinth, WHAU

Missouri:
Cameron, WFAQ
Carrollton, WLAB
Columbia, WAAN
Jefferson City, WOS
Joplin, WHAH
Kansas City, WDAF, WHB, WMAJ, WOQ, WPE
Marshall, WJAT
Rockport, WNAD
St. Joseph, WEAK
St. Louis, KSD, WCK, WEB, WEW, WMAY
Springfield, WIAI, WKAS
Tarkio, WIAT

Montana:
Butte, KFAP, KFBF
Great Falls, KDYS
Havre, KFBB

Nebraska:
Fremont, WOAE
Hastings, WKAM, WLAD
Lincoln, WCAJ, WFAV, WGAT, WIAX, WJAB, WKAC, WLAF, WMAH
Norfolk, WJAG
Omaha, WAAW, WIAK, WNAL, WOU, WOV
Rushville, WEAV
University Place, WJAC
Waco, WPAA

State, City, Call

Nevada:
Reno, KDZK, KFAS,

New Hampshire:
Laconia, WKAV

New Jersey:
Atlantic City, WHAR
Camden, WRP
Deal Beach, 2XJ
Jersey City, WAAT
Moorestown, WBAF
Newark, WAAM, WBS, WJX, WJZ, WOR, 2XAI
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Trenton, WMAL

New Mexico:
Roswell, KNJ
State College, KOB

New York:
Albany, WNJ
Binghamton, WFAX, WIAV
Buffalo, WGR, WWT
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WDAM, WDT, WEAF, WLAW, WVP, WWZ, 2XI
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Syracuse, WBAB, WDAI, WFAB, WLAH
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Raleigh, WLAC

North Dakota:
Fargo, WDAY, WKAJ
Wahpeton, WMAW

Ohio:
Akron, WOE
Athens, WAAV
Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH
Cleveland, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN
Dayton, WAI, WFO, WJAJ
Defiance, WCAQ
Fairfield, WL-2
Granville, WJD
Hamilton, WBAU, WRK
Lebanon, WPG
Marietta, WBAW
Springfield, WLAM, WNAP
Stockdale, WJAK
Toledo, WBAJ, WHU, WJK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY, WMC
Zanesville, WPL

State, City, Call

Oklahoma:
Ardmore, WOAA
Enid, WNAF
Muskogee, WDAV
Norman, WNAD
Okemah, WKAK
Oklahoma City, WKY, WMAB, 5XT
Tulsa, WGAF, WLAL
Yale, WHAT

Oregon:
Astoria, KFBM
Baker, KFBA
Central Point, KFAY
Eugene, KDZJ, KFAT
Hood River, KQP
Klamath Falls, KDYU
Marshfield, KFBH
Portland, KDYQ, KFAB, KFEC, KGG, KGN, KGW, KQY, KYG
Salem, KFCD

Pennsylvania:
Allentown, WIAN
Altoona, WGAW
Bridgeport, WBAG
Brownsville, WDAQ
Clearfield, WPI
Easton, WMAP
Erie, WJT, WOAV, WSX
Harrisburg, WBAK
Lancaster, WGAL
McKeesport, WIK
Parkesburg, 3XW
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO
Pittsburgh, KDKA, KQV, WAAX, WCAE, WHAF, WJAS
Scranton, WLAO
Villanova, WCAM
Wilkes-Barre, WBAX, WKAZ, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
East Providence, WKAD
Pawtucket, 1OJ, 1XAD
Providence, WEAN, WJAR

South Carolina:
Charleston, WFAZ
Orangeburg, WGAM

South Dakota:
Rapid City, WCAT
Sioux Falls, WFAT
Yankton, WAJU

Tennessee:
Memphis, WKN, WPO
Nashville, WDAA

Texas:
Abelene, WQAQ
Amarillo, WDAG, WRAU
Austin, WCM
Beaumont, WMAM
College Station, WTAW
Dallas, WDAO, WFAA, WRR
El Paso, WDAH
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WFAL, WGAB, WPAN, WSAV
Orange, WKAL
Paris, WTK
Port Arthur, WFAH
San Antonio, AS6, DM7, WCAR, WJAE, WOAI
Waco, WJAD, WLAJ

State, City, Call

Wichita Falls, WKAF

Utah:
Ogden, KDZL
Salt Lake City, KDYL, KDZV, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX

Virginia:
Richmond, WBAZ

Washington:
Aberdeen, KNT
Bellingham, KDZR
Centralia, KDZM
Everett, KDZZ, KFBL
Lacey, KGY
Pullman, KFAE
Seattle, KDZE, KDZT, KFC, KHQ, KJR, KTW, KZC
Spokane, KFZ, KOE
Tacoma, KFBG, KBG, KMO
Wenatchee, KDZI, KZV
Yakima, KFV, KQT

West Virginia:
Bluefield, WHAJ
Charleston, WAAO
Clarksburg, WHAK
Huntington, WAAR
Morgantown, WHD

Wisconsin:
Beloit, WKAW
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
Superior, WFAC
Waupaca, WIAA

Wyoming:
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU

Porto Rico:
Ensenada, WGAD
San Juan, WKAQ

Canada:
Calgary, CHBC, CHCQ, CFAC, CFCN, CJCY
Edmonton, CHCC, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls CFCH
Kitchener, CJCF
London, CFCX, CHCS, CJGC, CKQC
Montreal, CFCF, CHYC,
Montreal, CFCF, CFZC, CHCX, CHYC, CJBC, CKAC, CKCS
Nelson, CJCB
Ottawa, CHXC
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CHCZ, CHVC, CJCD, CJCH, CJCN, CJSC, CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC, CHCA, CHOC, CJCE, CKCD
Walkerville, CFCI
Winnipeg, CHCF, CJCG, CKCB, CKZC, CJNC

Cuba:
Havana, TWX

STATION SCHEDULES

(Continued from page 8)

WBAM, New Orleans, La. 100 mi. I. B. Rennyson. Daily ex Sun, 10-11 pm, real estate bulletins, lecture, concert. Central.

WBAN, Paterson, N. J. 100 mi. Wireless Phone Corp. Daily ex Sun, 10:30 am, on the hour to 9:30 pm, concert, baseball. Eastern.

WBAO, Decatur, Ill. James Millikin Univ.

WBAQ, South Bend, Ind. 200 mi. Myron L. Harmon. Tues, Thur, Sat, 7 pm. Sun, 2 pm. Central.

WBAP, Fort Worth, Texas. 400 and 485 only. 1,500 mi. Ft. Worth Star Telegram. Daily ex Sun, 9:45-10 am, 11-11:30, 3-3:30 pm, 3:45-4, 5:15-5:30, 6:30-6:45, 9:30-10:30, news, reports, concert. Central.

WBAU, Hamilton, O. Republican Pub. Co.

WBAV, Columbus, O. 485 also. 300 mi. Erner & Hopkins Co. Daily ex Sun, 12:30 pm, news, weather. Mon, 7 pm, music. 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.

WBAZ, Richmond, Va. 300 mi. Times-Dispatch. Daily, 7-9 pm, news, concert, markets, etc. Eastern.

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. 500 mi. Southern Radio Corp. Daily ex Sun, 11 am, reports, 8 pm, music. Sun, 7:30 pm, church service. Eastern.

WBU, Chicago, Ill. City of Chicago.

WBZ, Springfield, Mass. 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. 500 mi. John Fink Jewelry Co. Fri, Sun, 8-10 pm, music, talks, sermon. Central.

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

WCAE, Pittsburgh, Pa. Kaufman & Baer Co.

WCAG, New Orleans, La. Daily States Pub. Co.

WCAH, Columbus, O. 150 mi. Entrekin Elec. Co. Tues, Fri, 7-9 pm, music. Wed, Thur, Sat, 7-8 pm, music. Sun, 10-12:30, church service. Central.

WCAI, San Antonio, Tex. Southern Equipment Co.

WCAJ, Univ. Place, Neb. 485 also. 100 mi. Neb. Wesleyan. Univ. Daily ex Sun, 11 am, weather, news. Wed, 9 pm, music, lecture. 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.

WCAN, Jacksonville, Fla. Atlantic Nat'l Bk. Bldg., Southeastern Radio Telephone Co.

WCAO, Baltimore, Md. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20. Mon, Wed, 7:30-8:30 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. 500 mi. Alamo Radio Elec. Co. Daily ex Sun and Thurs, 8:30-9:30 pm, music. Thurs, 9:30-10:30 pm, music. Sun, 2:30-3:30 pm, 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. Dak. 485 also. 300 mi. S. Dak. School of Mines. Daily ex Sun, 9:30-12:30 pm, weather. Mountain.

WCAU, Philadelphia, Pa. Phila. Radiophone Co.

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

WCAW, Quincy, Ill. 200 mi. Quincy Elec. Sup. Co. (Quincy Herald.) Daily ex Sun, 8:45 am, markets; 11, markets; 1 pm, markets; 5, music, baseball. Tues, Wed, Thurs, Sat, 8:30-9:45 pm, concert. Sun, 6:30-7:30 pm, religious. Central.

WCAX, Burlington, Vt. Univ. of Vt.

WCAY, Milwaukee, Wis. Kesselman O'Driscoll Co.

WCAZ, Quincy, Ill. Whig-General.

WCE, Minneapolis, Minn. Findley Elec. Co.

WCJ, New Haven, Conn. 400 mi. A. C. Gilbert Co. Mon, Wed, Thur, 7:30-8:30 pm, news, music. Eastern.

WCK, St. Louis, Mo. 485 also. 50 mi. Stix Baer & Fuller (Grand Leader). Mon, Wed, Fri, 6:45-8 pm, concert, lecture, bedtime story. 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. Detroit Free Press.

WDAA, Nashville, Tenn. Ward Belmont School.

WDAC, Springfield, Ill. Ill. Watch Co.

WDAD, Lindsborg, Kans. Wm. L. Harrison.

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. 500 mi. Kansas City Star. Daily ex Sun, 3-4 pm, reports, music. Mon, Wed, Fri, 8-10 pm, concert. Sun, 3:30-5:30 pm, music. Central.

WDAG, Amarillo, Tex. K. 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. 300 mi. A. & W. P. R. R. Co. Daily, 9-10 pm, concert etc. 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, 3-3:15, 4-4:15, 5-5:15, 8-9:30 music. 10:05-10:20 pm, reports. Eastern.

WDAN, Shrereport, La. Centenary College and Glenwood Radio Corp.

WDAO, Dallas, Tex. Automotive Elec. Co.

WDAP, Chicago, Ill. 485 also. 1,000 mi. Midwest Radio Central Inc. Daily ex Sat and Sun, 9:45 am, 10:45, 11:45, 1:45 pm, 3:15, foreign exchange; 3:17, closing Chicago stocks. Sat, 9:45 am, 10:45, 11:45, 12:45 pm, foreign exchange; 12:17, closing Chicago stocks. Sun, 8:30-10:30, 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 music. Tues, Thurs, Fri, 9:15-10 pm, concert. Sun, 5 pm, chapel. Eastern.

WDAR, Philadelphia, Pa. Lit Bros.

WDAS, Worcester, Mass. Samuel A. Waite.

WDAU, New Bedford, Mass. 50 mi. Slocum & Kilburn. Mon, Wed, 7-9 pm, concert etc. Eastern.

WDAV, Muskogee, Okla. Daily Phoenix.

WDAW, Atlanta, Ga. 485 also. 500 mi. Georgia Ry. & Power Co. Daily ex Sun, 6-7 pm; 9-9:55. Sun, 3:30-4:30 pm. Central.

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

(NOTE.—The second half of the station schedule list will appear next week.)

A Vacuum Tube Socket Kink

There are so many cheap vacuum tube sockets on the market now that after a little use the contact points soon lose their tension, making a poor contact with the points on the vacuum tube and causing poor reception. This can be remedied by taking a hairpin and putting the bent end under the contact point so as to pull it up to its respective position. This is more successful than trying to pull it up with the fingers. When one contact point is pulled up with the fingers the one opposite is bent down by the first joint on the finger.—Frank Cerniglia, Tallulah, La.

Some Tips to Amateurs

The following tips from experienced Radio men will help you get the most out of your receiving set.

Never try to share your aerial with another fellow. It will not work. This applies to both outdoor and indoor antenna.

If you have to share the aerial, disconnect one set while the other is in use.

Don't expect too much of your indoor loop or frame aerial.

Ether, upon which electro-magnetic waves are said to travel, permeates all substances, excepting possibly iron and steel, as easily as it does air.

If you want to shut out reception, throw your switch and disconnect your set from the antenna circuit.

We speak of the detector tube as oscillating when it is so regulated to receive signals at maximum audibility. In this oscillating it throws off a small amount of energy which leaks through the receiving set into the aerial.

These signals, thrown off by the aerial, will be heard by those nearby who may be tuning in to the same wave length.

This is a great source of annoyance and it requires skill in tuning to avoid it.

The problem of tuning in to the best advantage is one that each fan will have to work out for himself—by simply varying his dials until he discovers the selective spots.

You may see a set receiving very satisfactorily at a friend's home or in a store and note the position of its dials, but if you try to make exactly the same arrangement on your own set it may not work.

It all depends on the location of the receiving station, the height and length of the aerial, the length of the lead-in and the size of the wire used.

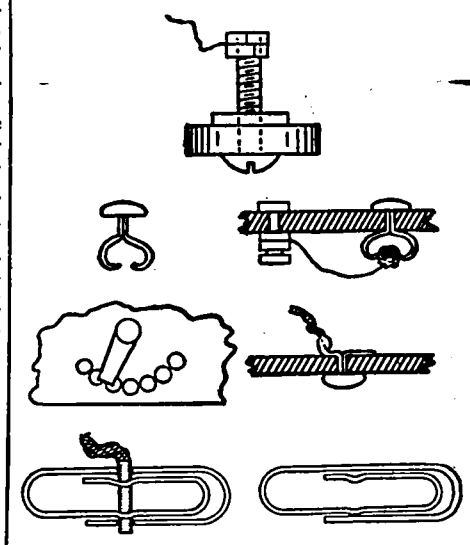
No rules can be laid down for tuning.

Shields for Bulbs

A two-step audio frequency amplifier set squealed so loudly when one's hand was placed near the vacuum tubes that it greatly retarded reception. Metal shields placed on the panel did not help. Then paper tubes were made to slip over the vacuum tubes and project about ½ inch above the top. The paper tubes were painted with aluminum paint. The squealing almost disappeared entirely, permitting much better reception than before. The aluminum gilt can be obtained easily at any hardware store.

Odds and Ends Supply Parts

Good cord tips may be made from shoestring tips, if they are scraped and soldered onto the end of the wire. Jacks for these tips may be made from paper clips as shown. Paper fasteners make good switch points if they are put in



through the panel, bent and the wire soldered to them. These fasteners also make good crystal holders when bent in the form shown. Pieces of broom handle make good knobs for various switch levers. When polished and given a coat of shellac they present a neat appearance.—C. E. Rust, Phoebus, Va.

An advance in the technique of broadcasting may be looked for as the result of a new type of microphone—the instrument responsible for converting speech or music into electrical form. The drum of the microphone is fitted with a coil which vibrates in sympathy with it, and being placed in a strong magnetic field, the vibrations create electric impulses which are carried by Radio in the usual way. The voice currents are stated to be remarkably true, and the reproduction of music highly successful.

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No Radical Changes in Sets

The Old Set Will Do as Well as Some New Ones

PROGRAMS broadcasted are becoming better and better. The institution of 400-meter wave lengths makes it possible to have more programs in the air every hour of the day. If you desire to get the best of all the entertainment on the air, you had best select a set now. If you have expected great changes in Radio equipment you will be much disappointed, for there are few changes in the standard equipment, which was sold last spring. You may as well purchase a good set and get ready for the winter.

Radio Becomes Pleasant Habit

Not Necessary to Relegate Set to Attic for Tuning In

THE RADIO "fad" has settled down to a pleasant habit. In many families throughout the nation a pleasant hour after dinner is given over to listening in, with fluttering expectations of the concert to come, and as this is really the case, it must be planned for in more ways than just "everybody keeping quiet and sitting around."

If one will make a tour of the shops in any city he will find many attractive provisions made especially for the Radio family. There are clever ways of installing sets in the living room so that they do not look out of place; cases, cabinets, tables, consoles and the like for the installation of the receiving set without making the room resemble a workshop or laboratory. It is not necessary, therefore, to transport and banish the outfit to the attic or garage when expecting "company." All one need do now is purchase a nice looking piece of furniture with the set enclosed.

Know Your Receiving Set

Some Knowledge of Location and Outfit Needed

DEALERS, wholesalers and manufacturers should take a little of their time in educating their patrons in the science of Radio. The general fervor of the recent rush has abated, and now the buying public wants to learn as much as it can; how to operate the sets they now have in order to get best results, or how to intelligently purchase apparatus. A little teaching is necessary. The purchaser must be careful to analyze his own particular case and not depend on reports given out by others on what they have done with certain kinds of equipment.

You must first know your Radio area. By this is meant the location of the broadcasting station nearest you. The capacity of that station or any station you wish to hear must be known first. Then you can buy your set accordingly. In determining this you should take into consideration static and also the so-called fading. Know the receiving capacity or reaching out power of your set and don't expect too much.

Learn all about your set so that in the event of trouble you can make the necessary repairs. This knowledge will save money for you.

Broadcasting Grand Opera

Are We to Have a Continuation of Last Season's Music?

AS THE winter approaches the season for grand opera opens. KYW was the first station to broadcast grand opera. How many of us would like to hear grand opera this year? It is safe to say that every person owning a receiving set desires to listen in on the best of music. Are we going to have this all inspiring music broadcasted this year? There have been rumors flying as to whether the best of talent will sing for the general public without remuneration. Last year many of the singers used the broadcasting stations to get their selections before the public and claimed that this microphone publicity drew larger crowds to the auditoriums and theaters to see and hear them, just because they heard them sing over the Radiophone.

Usually the better a person becomes known to the general public the more popular he will be. This may result in a better income than if he were to restrain his talents to just those who pay him.

There may be a great many who listen in to grand opera on their home sets who can never afford to be at a recital in person, but nevertheless this is indirect advertising for the talents of an accomplished artist. It may appear to be the wrong way, but the stingy fellow who demands pay for everything he does, seldom gets anywhere in this world of "give and take," and the Radiophone is quickening those people who have lain dormant in rural and more or less isolated places.

Condensed

By DIELECTRIC

That report from the United States Government experts claiming high frequency waves to be the cause of larger and quicker maturing vegetation may have some modicum of truth in it. Never dispute an expert's decision, unless he happens to be a "ham," and even then you may strike a "short." But I am reminded of the claims made in regard to thunder storms, that their frequency was due largely to so many broadcasting stations being in operation. That hook-up proved incorrect. One thing the farmers of this country would like to be told is, the prices of farm commodities can be raised by the use of electromagnetic waves. Lately these waves have been carrying the news of falling prices. Yet the farmer needs a receiving set, if for nothing else than to hear things which will relieve his mind of the monotony of his daily grind.

From now on the ladies will have material for pleasant dreams, that is, all those able to get Station WGY. For a half-hour before they take their afternoon siestas they can listen in to the program from this station especially adapted to women's interests. Mere man can tune in some other station during that limited period, unless he wants to hear in advance of his wife's announcement, the probable cost of fashion's headgear.

We Americans will shortly become perfect athletic specimens, and it won't be due entirely to following directions as given by phonograph records. Furthermore, rising early to hear the instructions for the day in setting-up exercises will be a good thing for many of us. All of this refers to the new schedule of the Amrad Station WGI, at Medford Hillside, Mass. Each of us owning a receiving set need only to obey that first impulse to leave our comfortable beds a little before seven A. M., Eastern time, tune in this station and follow the directions broadcast for our especial benefit. If sitting in front of your tubes so many hours an evening has added to your weight, follow the Radio advice and reduce. Or, if worrying because you can't get that distant station you have tried for so long, be assured the exercises suggested for your case will bring back the lost pounds. There is not a single hour of the day or night devoid of interest to a real fan.

There have been a great assortment of loud speakers put on the market, some of them very good and some others—rather indifferent. Most of the types are loud enough probably, but mere magnification is not sufficient. We would like to have the sounds as nearly identical to the original as possible, and inventors are directing their efforts toward that very accomplishment. A new loud speaking device is promised for distribution before the Christmas shopping season. This one claims to have almost entirely eliminated distortion and foreign noises. It resembles somewhat the old fashioned tin dipper in shape, we are told. If that is so, then the liquid notes should come in very true to life. Here is one item you may place tentatively on your Christmas shopping list.

Members of the American Radio Relay League are getting tuned up for the tests next December, and from all reports it will be an exciting occasion. You remember how the news of Paul Godley's success last year in receiving amateurs' messages from this country, while he was in Scotland, produced the wildest enthusiasm. This year will test the ability of the American amateur to pick up messages from European amateurs. Mr. Godley will have his set on the job in December on this side the Atlantic. Here's to success for you all!

In a recent issue of RADIO DIGEST I did some gossiping about the interest of several colleges in the science of Radio. More and more are these institutions of learning taking an active part in the use of transmitting sets. Not only is this a good omen for the oncoming generations of students to apply themselves to the science, but it also augurs well for those desirous of filling some empty spaces in their education by listening to the lectures broadcast from these schools. I was impressed by a statement appearing in connection with the proposed broadcasting station to be erected at the Ohio State University. It revealed the widespread interest manifest by the alumni in Radio, as only twenty per cent lacked either a receiving set or the ambition to go where one was in use. Little wonder then, that the money for this new station was readily obtained from the alumni of the University.

A friend of mine asked me the other day whether receiving sets had been so perfected that further changes in them was unlikely. Well, I informed him of the many new ideas being incorporated in such sets from day to day, he decided to wait before investing in one. Are others assuming the same attitude? Will they wait ten or twenty years in hopes that finally a set will be produced impossible to improve upon? Think of the enjoyment my friend is denying himself and family simply because a set he might buy now would be inferior to another later. The most fun comes from using new ideas in improving the set you have on hand. This man owns an automobile. Why doesn't he wait until they cease improving them?

Would-be stenographers are using Radio messages to perfect them in taking dictation. That is a pretty good idea, for it is possible to listen to almost every variety of speechmaker: the rapid talker; indistinct enunciator; the one who invariably changes his sentence, after getting half-way through, and the technical lecturer. They don't have to wait for some kind friend to show up in order to dictate to them. Radio supplies that in abundance.

RADIO INDI-GEST

A Subject for the Secretary of Labor

One broadcast talk is "Taking the Work Out of Housework." Another interesting talk might be "Putting the Work Into Labor."

It'll Laugh Out Loud

If you can't get any entertainment out of your single-circuit tuner use the "tickler" more vigorously.

Radiograms

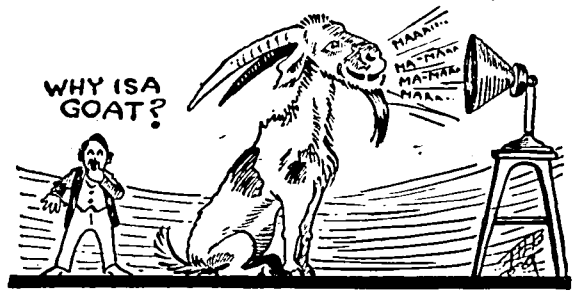
Out of the far-reaching spaces they come,
  Bits of laughter and story and song,
Tales of the day in a world outside,
  Making one part of the busy throng.

Borne on the silence at dusk-time they come,
  Voices of those I never have known,
Till all the care that infest the day
  Out on the wings of the night have flown.

Much do I marvel at all that I hear,
  Voices that come from I know not whence;
But oh, you have nothing, O Radio mine,
  On news that comes over the backyard fence.

—Florence Jones Hadley, in Judge.

Just So His Name Isn't Nanny



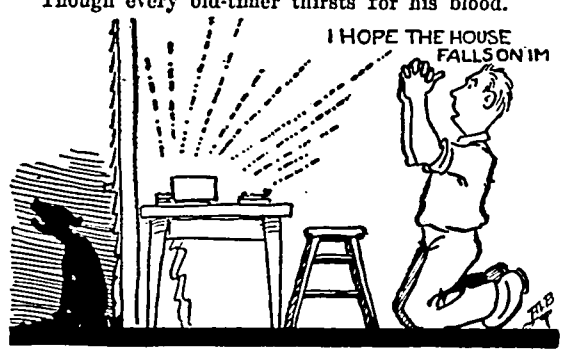
Walter Goat is the name of a member of a committee of a Brooklyn club that is arranging to give Radio concerts. Radio evidently has their Goat.

Better Than the Rattle of Chips

"Ancient Order of Night Owls" is name of a western Radio club. Can't join unless you're able to prove you've actually sat up till breakfast with the old head clamps on.

You May Opine So, But He Don't

Listen, old-timers, and your fones will resound
  With the well-known squeal of the CQ hound,
Whose sending won't stop for fire or flood,
  Though every old-timer thirsts for his blood.



It's always, "Hello, and how am I now?"
  And "QSU now, for it's time to chow."
He is always on deck, though "QTC NIL,"
  His message will read, "Is this you or Bill?"
Oh! For his presence and a huge retty-snitch,
  A double-barreled shotgun, a barrel of hot pitch.
That never again could we hear that sound.

They All Listened In

Bang: "Smyth wanted to be original, so he broadcasted his proposal."

Bing: "And now he has three breach of promise suits on his hands."—American Legion Weekly.

That Proves There Are Better Waves!

Mrs. Sam: "How does your hubby like the new Radio set?"

Mrs. Ham: "Great. He turns it on at nine o'clock and it isn't ten minutes after the lecture starts before he's sleeping like a baby."

Use of the Radio Receiving Set in the Home

Part IX—Radio Frequency Amplification

By H. M. Towne

THE USE of Radio frequency amplification has not been very general among the broadcast "fans." This is entirely natural since audio frequency amplification ordinarily fulfills the requirements for pleasing audibility in the home receiving set. There are, however, many instances where amplification at Radio frequency is entirely warranted. To cite such instances we can mention those enthusiasts who are geographically isolated from the broadcasting centers or where adverse topographical conditions would limit favorable reception to but one or two hundred miles.

Again, the local conditions may be such as to preclude the erection of the conventional outdoor antenna, making necessary the substitution of the somewhat shielded indoor intenna or a loop. Still again it may be the mere desire to receive some of the very distant stations or to further increase the intensity of signals beyond that which can be had by three stages of audio frequency amplification so that broadcast music from stations one or two hundred miles distant can be reproduced with sufficient volume for dancing, open air concerts, or roller or ice skating rinks.

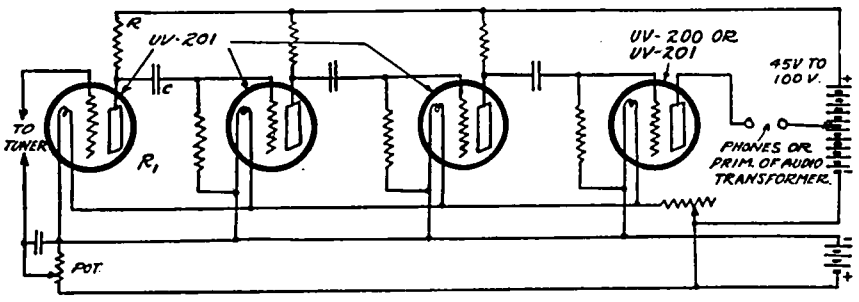


Figure 29

Detector Tube Efficiency

It must be remembered that detector tube efficiency decreases with a decrease in the Radio frequency energy which is impressed on the detector grid. The extremely feeble antenna oscillations as produced by very distant stations may, therefore, be of insufficient energy to permit efficient rectification. The Radio frequency amplifier increases the signal oscillation energy before the process of rectification, so that stations which are too distant to be heard with detector and audio amplification, can be heard with good audibility when one, two or more stages of Radio amplification are inserted ahead of the detector.

It is quite a common misunderstanding that audio frequency amplification will increase the receiving range, while in reality any station which can be heard on two or three stages of audio amplification can be heard on the detector tube only, though of course with much less signal intensity. Amplification at Radio frequency, however, will increase the receiving range by intensifying the received energy from distant stations to a point where it will cause the detector tube to function efficiently.

Radio Frequency Amplification

In Radio frequency amplification the same type of vacuum tube and filament control is used as is employed for the audio frequency amplification. In both it is essential that the amplifier tubes be operated on the straight portion of their characteristic curve. The antenna oscillations are impressed on the input terminals (grid and filament) of the amplifier tube and the output or plate circuit of the tube is coupled to the input of the detector tube or still another amplifier tube.

The most important factor in Radio amplification lies in the method of coupling the output of one amplifier tube to the input of another. As was true with audio amplification, the coupling may be made with resistance, transformer, choke coil or reactance, inductor or combination of inductor and capacitance.

The resistance coupling is shown in the diagram Figure 29. The resistance R is non-inductive and of a value approximating that suggested for such coupling in audio amplification; namely, 100,000 to 200,000 ohms. The grid leak resistance R1 should be about 2 or 3 megohms. The condenser C should be of the order of .002 mfd. in size. The resistance coupling is effective over a very wide range of frequencies, an advantage not found in the other methods of coupling. Objections to the resistance coupling are that it amplifies audio frequency sounds and so it amplifies static and low frequency induction and accentuates the tube noises.

The chief objection with which we are concerned is that the resistance method of coupling is not as sensitive and efficient at broadcasting frequencies, 750,000 to 850,000 cycles. The better efficiencies of the resistance coupling are not had until wave lengths of around 1000 meters are approached. These correspond to frequencies of about 300,000 cycles. From this value on down through the lower frequencies (higher wave lengths) the amplification constant is good. Therefore, for amateur and broadcast reception we must look to other forms of coupling.

Transformer Type of Coupling

The transformer type of coupling is shown diagrammatically in Figure 30. This is probably more frequently used than any of the various forms. The transformer will only transfer energy at a limited range of frequency. For instance, a transformer designed for 200 meters will respond efficiently to a narrow range of from say 175 to 225 meters. As the frequencies extend above or below this range, the amount of energy transferred by the transformer will diminish and at, say, 360 meters the amplification constant approaches zero. Similarly, a transformer designed for 360 or 400 meter broadcasting wave lengths will include a narrow band of, say, 325 to 425 meters over which the transformer will be effective in performance.

While this characteristic has the disadvantage of requiring several transformers where one desires to receive over wave lengths say 200 to 600 meters or more, it has the important advantage of eliminating somewhat the undesirable noises such as static and audio frequency disturbances. Tube noises will not be as pronounced when several stages are used, as with the audio amplification.

With some transformers it is possible to slightly increase the range by connecting a very small variable condenser in shunt with the primary winding, the condenser being not over 5-plate size. This, however, is of little value as the inductance of the transformer windings in combination with the tube capacities will of themselves establish a definite frequency range which can be altered but little.

Radio Frequency Transformers

There are numerous Radio frequency transformers on the market. They all embody more or less standardized features. It is the writer's opinion that there is less attention to be paid to the kind or make of transformer used and more attention given to connecting it in the circuit and studying its operation and its control in the circuit.

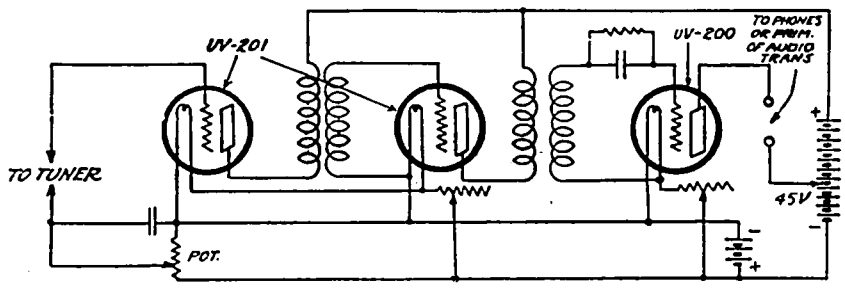


Figure 30

The simplest form of transformer would be a spider web form wound with two small wires side by side, so that two windings very closely coupled would be had. The ratio of secondary to primary turns might be 1 to 1 or perhaps 1.3 to 1. Such a transformer would be of the air core type and would have a very critical frequency range, probably operative over a band of wave lengths not more than 5 or 10 meters in width.

The introduction of a very finely laminated iron core in such a transformer would tend to broaden the wave length band, but in broadening the band it would at the same time somewhat flatten the peak of the amplification curve. This explains why better amplification can generally be had using a tuned circuit

(to be described in the next installment)

Use of the Potentiometer

At the shorter wave lengths, or in other words, at the higher frequencies, the grid and plate elements of a vacuum tube represent sufficient capacitance to permit a certain amount of regeneration, and the back coupling through the tubes may in this way build up oscillations in the amplifier tubes. To overcome this tendency the grid voltage of the amplifier tube is made variable by the potentiometer shown in both Figures 29 and 30. This should be the usual 200 ohm design similar to that commonly used with the regenerative circuits. By adjusting this potentiometer, the grid potential is controlled within sufficient limits to stabilize the operation of the tubes.

The tendency to oscillate will be when the grid is negative and by swinging the potentiometer contact arm toward the positive side of the "A" battery the grid potential may be made positive with respect to the filament, which will prevent the oscillations in the amplifier circuit. A fixed condenser of about .005 mfd. capacity should be shunted across a part of the potentiometer as shown in the diagrams. This will prevent the adjustments of the potentiometer from influencing the tuning of the circuit.

One precaution must always be taken in Radio amplification and that is to aim to minimize the length of all connections between the tubes and the coupling devices. Many unfavorable results may be attributed to capacity effects produced by long and poorly arranged leads.

In the next installment the choke coil and tuned circuit couplings will be discussed, together with the indoor loop form of antenna.

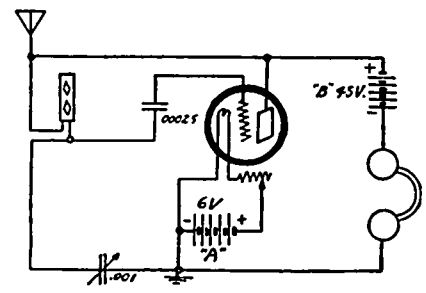
(Continued in the November 11th issue)

Phone Condenser

The parallel leads of the receiving telephones combined with the distributed capacity between the turns of the winding provides a small amount of capacity which acts as a by-pass condenser for the high-frequency currents. More satisfactory operation will be obtained, however, if the telephones are shunted by a condenser having a capacity of 0.002 microfarads.

One Knob Control Hook-Up

But one control knob is necessary with a regenerative hook-up being used extensively here by Radio fans. The diagram as shown is without a grid leak, uses 45



volts on a UV-200 detector tube, has one variable condenser, one rheostat and one interchangeable honeycomb coil or duolateral coil. The set can be built for less than $30, according to local concerns which furnish parts and tell how it is hooked up. —L. W. Martin, San Antonio, Texas.

Panel Mounted Variable Condenser

Plates Cut Out of Tin Peach Cans Make Parts

Most of the parts necessary to build this condenser can be picked up about the home workshop, but if purchased the total cost will not exceed 25 cents. One peach or similar size can, one bolt ⅛ by 3 inches, one bolt ⅛ by 3½ inches, thirty washers to fit on bolts, and two extra nuts for the bolts are all that are needed.

Cut ten plates from the tin can 2 inches long by 1 inch wide and drill or punch one hole at one end in each plate. Smooth off the burr left from the punching or drilling. With all the plates prepared start to assemble by slipping a washer on one bolt up to the head, then slip on a plate, then three washers, follow with another plate and three more washers, and so on until five plates are in position. Follow the same construction for the other bolt. When the last plate is on, run on a nut and tighten the plates.

The support or base for holding the plates is made of two blocks of wood, one 3 by 4¼ inches and the other 3 by 4 inches, both ¾ inch thick. These pieces are nailed together to form a right angle, using the larger piece for the bottom. Mark a place in the center and ⅜ inch from the top of the upright and bore a ⅛-inch hole or smaller for one of the bolts. Turn the longer bolt into this hole and run it back and forth until it works smoothly, then remove the bolt and put on three washers so that they will be in between the upright and the last plate for correct spacing. The plates on this bolt will be the rotor plates. Another ⅛-inch hole is drilled or bored 2½ inches down from the first hole in the upright. The hole is threaded in the same manner by turning the bolt into it, then two washers are put on between the first plate and the block to make the spacing right.

Tape may be used for a knob, or a knob purchased at a supply house will do, if you desire to make that expense.—Edgar Deal, Ames, Ia.

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.

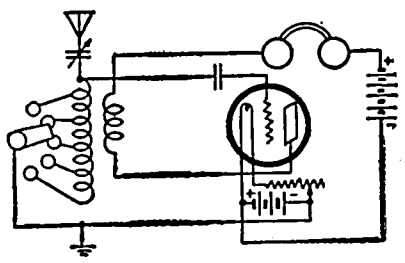
RADIO KINKS DEPARTMENT,
RADIO DIGEST,
123 West Madison St., Chicago, Ill.

Inexpensive Receiving Set

The set shown in the illustration is one of my own make and it may be of interest to many readers who would like to receive from long distance broadcasting stations without an expensive outfit. I live in the central part of California and I am able to hear with only one tube stations in a 900-mile radius from my home. These include KFC, Seattle, Wash., and KFAF, Denver, Colo. KFAF comes in very clear and distinct even in static season.

The equipment used is very easy to assemble and the cost is low. Parts needed for the set are, one 23-plate variable condenser, one tube, one socket, Vernier type rheostat, grid condenser, 22½-volt B battery, head phones and ½ pound of No. 22 D. C. C. wire.

The tuning element is a single winding of about 100 turns of No. 22 D. C. C. wire

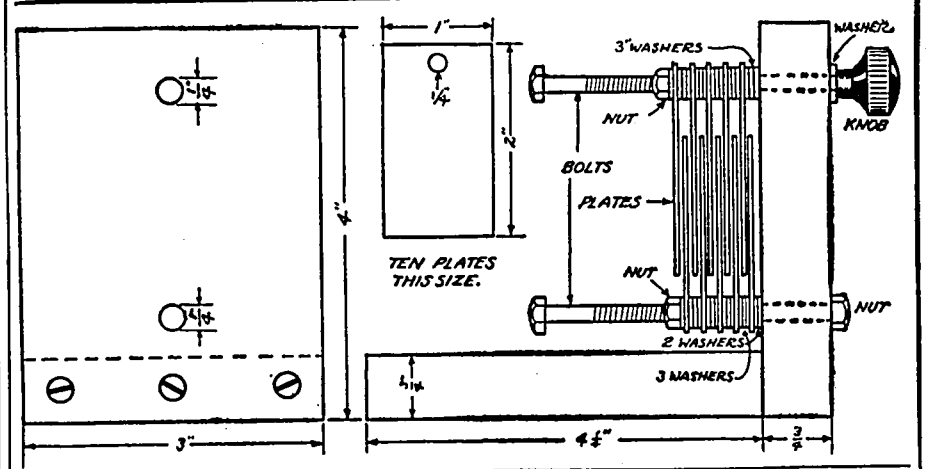


on a 4-inch cardboard tube and tapped every ten turns. A tickler is whittled from a piece of 1-inch thick wood, just small enough to turn nicely inside the tube. Two slots are sawed about ⅛-inch deep and ¼ inch wide around the tickler block and are filled with wire, about 30 turns. Each end of the wire is soldered to a long, slim wood screw at each side of the tickler. The tickler is then mounted in the end of the tube, as in the illustration, so that it will turn freely.

The circuit is a well-known regenerative type and is shown in the diagram. Panel, knobs, etc., were made of common wall board. Selective switch was made of spring brass. Switch points were made of tinned rivets.

The most important point in the construction is to solder every connection in the set and do it carefully.—H. F. Manchester, Atwater, Cal.

HOMEMADE DEVICE USED IN SET

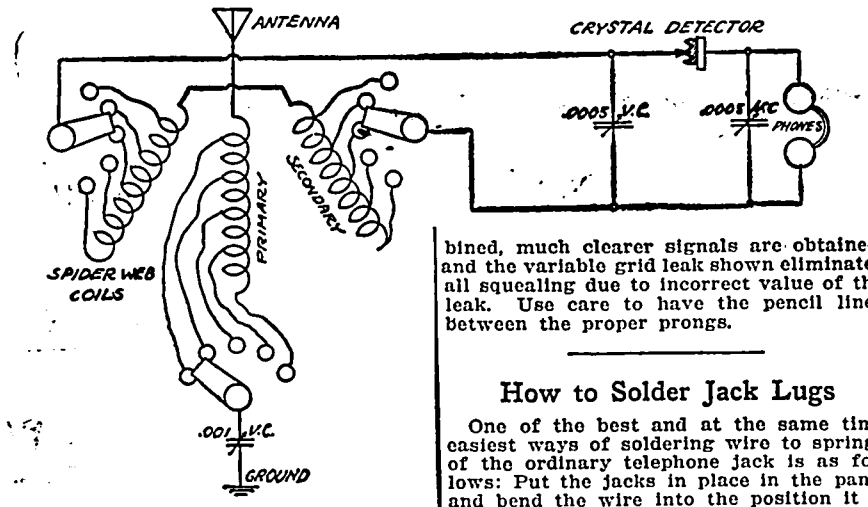


Use Wire to String Insulators

Use the same kind of wire for stringing up your insulators that you use for the antenna itself. Rope will stretch and shrink with the changes of weather and will cause the antenna to sag and tighten up. This strain may cause the wires or the rope to give way.

Hook-Up with Spider Web Coils

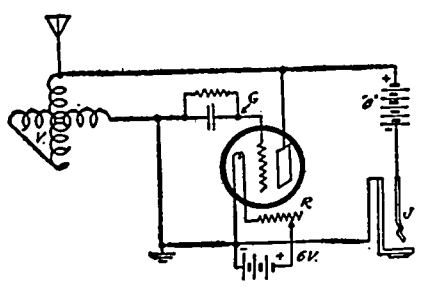
The accompanying diagram shows a hook-up with spider web coils which I found after considerable experimentation. Each unit is tapped off fifteen times or five on each coil. This is used without



condensers. These spider web coils may be used by beginners in a galena set. When a better set is wanted the coils may be put in use with a vacuum tube, using all parts the same without the crystal.—William C. Davis, Beeville, Texas.

Hook-Up for a Variometer

With a set having a hook-up, as shown in the illustration, I have copied practically all stations within a radius of 600 miles. Using a two-stage amplifier, I have copied the following and heard them 10 feet away from the phones: WDAF, WDAJ, WOC,



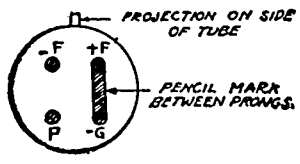
WWJ, KSD, NOF, WSB, and some amateurs on spark and CW for 1,650 miles.

It will be seen that the plate is connected to the aerial, causing direct regeneration. I am using a Remler variometer and a .0005 variable condenser. There are just two controls, and with these sharp tuning can be made with little practice.—J. W. Mayfield, Cincinnati, Ohio.

The most complete Radio system in South America will be that of Brazil, according to American Charge d'Affaires Crocby at Rio de Janeiro.

A Grid Leak

Philip H. Smith, of Lexington, Mass., a Radio fan, has developed a neat little method for making a variable grid leak on the base of the detector tube. Since a pencil mark is easily made on the unglazed porcelain, he turns the tube upside down, as shown in the diagram, and connects the



positive filament projection on the tube to the grid projection with pencil marks until the correct resistance is obtained. This is determined by the clearness of signals. If using the leak across the condenser this method cannot be used, but by substituting a .001 variable condenser for the fixed condenser with fixed leak combined, much clearer signals are obtained, and the variable grid leak shown eliminates all squealing due to incorrect value of the leak. Use care to have the pencil lines between the proper prongs.

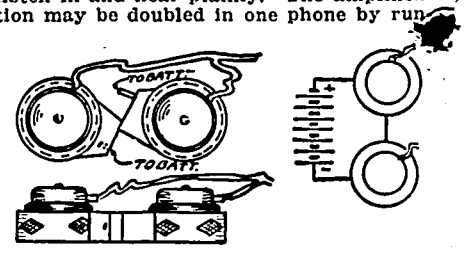
How to Solder Jack Lugs

One of the best and at the same time easiest ways of soldering wire to springs of the ordinary telephone jack is as follows: Put the jacks in place in the panel and bend the wire into the position it is to take after soldering. Then remove the leaves and solder.

Be careful not to get too much acid flux on the metal for this causes corrosion. When the springs are cool put them back in place and connect the free ends of the wires. This procedure saves much time and patience and at the same time produces a beautiful and lasting job.—Loren C. Hurd, Northfield, Minn.

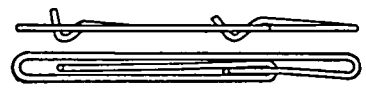
Honeycomb Coils Give Strong Phone Signals

If you have a pair of honeycomb coils at hand they will greatly assist in producing loud tones from your head receivers. Plug the coils together, as shown in the illustration, and lay the phones on the holes in the center of the coils. If the phones are pressed tightly on the coils the tone will be audible in a room for several to listen in and hear plainly. The amplification may be doubled in one phone by running a current through the coil. If two coils are used make the connection as shown in the diagram.—Jack Ward, Berkeley, Cal.



Series Connector for Phones

A number of times some of the young fans have borrowed my connector for series phone connection and in its absence I made a connector as shown in the illustration from some antennæ wire. However, spring wire is to be recommended.—Edward Gille, Quincy, Ill.



Eliminating Capacity Effects

An interesting experiment for the amateur bothered with severe capacity effects and tube noises, is to enclose each part such as the tuning units and transformers in a metal lined case, the lining being grounded to the earth connection of the set. By following out this idea it has been possible to use six or more stages of audio frequency amplification without the howls ordinarily heard when using so many tubes.

Rubber Tray Saves Rugs

A photographer's rubber developing tray placed under the storage battery will prevent leaking or creeping acid from eating through the carpet and the varnish on floor.

Formulas for Construction of Loop Aerials

A Consideration of the Square Flat Coil and Spiral Types

RECENT developments in the popularity of the loop aerial has necessitated a clearer and more concise description of its calculations. Most of the formulas for the determination of inductance are very complex in character and quite beyond the average amateur. An effort has been made, however, in this article to simplify them as far as possible with but slight effect on their accuracy.

Four tables are given in order to avoid unnecessary calculations and reference to other texts. The formulas in spite of their awesome appearance are simple enough so that an ordinary knowledge of fractions will suffice for their solution.

Two types of loops are taken into consideration, the first of which is the square loop with the flat coil effect, and the other, the flat spiral loop. Although the same formula is used in both, a slight variation is found in the substitution of values in the formula for the second type.

Square Loop, Flat Coil Type

The formula used in the solution of the inductance value in this type of loop (Fig. 1) is as follows:

$$L = \frac{Sn^2}{125}\left[\log\frac{S}{D} + .726 + .2235\frac{D}{S}\right] - \frac{Sn}{125}[X + Y]$$

In this formula the letter values are defined as follows:

L = inductance in microhenrys
S = side of square in centimeters
D = length of winding in centimeters or (n — 1)d
d = distance between wires in centimeters
n = number of turns
X = constant depending on w (diameter of wire in centimeters) and length of winding
Y = constant depending on the number of turns

Values of the Correction Constant Y

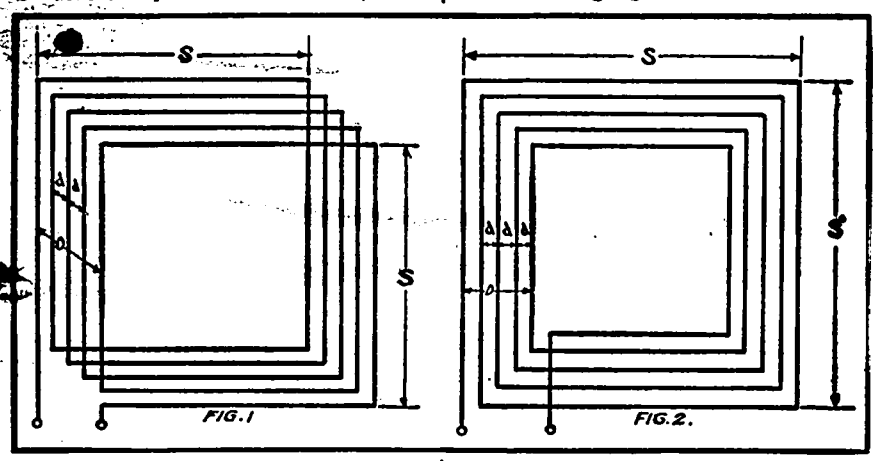
No. of Turns n	Y	No. of Turns n	Y
1	0.0000	50	0.3186
2	.1137	60	.3216
3	.1663	70	.3239
4	.1973	80	.3257
5	.2180	90	.3270
6	.2329	100	.3280
7	.2443	125	.3298
8	.2532	150	.3311
9	.2604	175	.3321
10	.2664	200	.3328
15	.2857	300	.3343
20	.2974	400	.3351
25	.3042	500	.3356
30	.3083	600	.3359
35	.3119	700	.3361
40	.4138	800	.3363
45	.3169	900	.3364
50	.3186	1000	.3365

Specimen Problem

To aid the understanding of the formula in its practical application, a sample problem is worked out as follows, in which the side of the square "S" equals 30 inches, and the distance between wire .5 inch. Ten turns of No. 22 B. & S. Gauge wire are used, spaced one-half inch apart.

Tabulating the given values and substituting the same with the balance in formula is as follows:

S = 30" = 76.2 cm.
d = .5" = 1.27 cm.
n = 10 Y = .2664
D = (n — 1)d = 4.5" = 11.43 cm.
w = B & S gauge 22 = .0644 cm.



$$\frac{w}{d} = \frac{.0644}{.5} = .129 \quad \therefore X = -1.4833$$

$$\frac{S}{D} = \frac{76.2}{11.43} = 6.666\ldots.$$

$$\text{Log}\frac{S}{D} = 1.897094 \qquad \frac{D}{S} = .15$$

$$L = \frac{76.2 \times 100}{125}[1.897 + .726 + .0335] - \frac{762}{125}[-1.4855 + .2664]$$

$$L = 161.97072 - 6.906[-1.2169]$$

$$L = 161.97072 + 7.41822$$

L = 169.38894 microhenrys = .169 millhenrys

The inductance of a loop of this type and proportions then, is .169 millhenrys. The natural wavelength of a loop of this type without a condenser will be about 200 meters. With a .001 mfd. (43-plate) condenser in shunt across the loop, the wavelength range would run from about 200 to 800 meters. The amateur must not overlook the fact that loop aerials are usually connected direct to the grid and filament terminals. If an additional inductance or tuning apparatus is inserted, its inductance value must be taken into consideration in determining the wave length of the primary or antenna circuit.

TABLE OF NAPIERIAN LOGARITHMS

No.	Log	No.	Log
1	0.000000	51	3.931825
2	0.693147	52	3.951243
3	1.098612	53	3.970291
4	1.386294	54	3.988984
5	1.609437	55	4.007333
6	1.791759	56	4.025351
7	1.945910	57	4.043051
8	2.079441	58	4.060443
9	2.197224	59	4.077537
10	2.302585	60	4.094344
11	2.397895	61	4.110873
12	2.484906	62	4.127134
13	2.564949	63	4.143134
14	2.639057	64	4.158883
15	2.708050	65	4.174387
16	2.772588	66	4.189654
17	2.833213	67	4.204692
18	2.890371	68	4.219507
19	2.944438	69	4.234106
20	2.995732	70	4.248495
21	3.044522	71	4.262679
22	3.091042	72	4.276666
23	3.135494	73	4.290459
24	3.178053	74	4.304065
25	3.218875	75	4.317488
26	3.258096	76	4.330733
27	3.295836	77	4.343805
28	3.332204	78	4.356708
29	3.367295	79	4.369447
30	3.401197	80	4.382026
31	3.433987	81	4.394449
32	3.465735	82	4.406719
33	3.496507	83	4.418840
34	3.526360	84	4.430816
35	3.555348	85	4.442651
36	3.583518	86	4.454347
37	3.610917	87	4.465908
38	3.637586	88	4.477336
39	3.663561	89	4.488636
40	3.688879	90	4.499809
41	3.713572	91	4.510859
42	3.737669	92	4.521788
43	3.761200	93	4.532599
44	3.784189	94	4.543294
45	3.806662	95	4.553876
46	3.828641	96	4.564348
47	3.850147	97	4.574710
48	3.871201	98	4.584967
49	3.891820	99	4.595119
50	3.912023	100	4.605170

Log 650 = log 26 + log 25; log 7.2 = log 72 — log 10

B. & S. Gauges in Centimeters

B. & S. Gauge No.	Dia. in Cm.
10	.2588
11	.2305
12	.2053
13	.1828
14	.1628
15	.1450
16	.1291
17	.1150
18	.1024
19	.0912
20	.0812
21	.0723
22	.0644
23	.0573
24	.0511
25	.0455
26	.0405
27	.0361
28	.0321
29	.0286
30	.0255

Flat Spiral Loop

For this type of loop the same formula as before is used with the following substitution:

S' = side of square in centimeters
∴ S = S' — (n — 1)d

Specimen Problem

In the sample problem for this type the same original values are taken with the outside turn of the square given as "S'" equal to 30 inches as before. The tabulation of the given values and the substitution of same in the formula is as follows:

S' = 30" = 76.2 cm.
(n — 1)d = 4.5" = 11.43 cm.
S = 76.2 — 11.43 = 64.77 cm.

$$\frac{S}{D} = \frac{64.77}{11.43} = 5.666\ldots$$

$$\text{Log}\frac{S}{D} = 1.734566$$

$$\frac{D}{S} = \frac{11.43}{64.77} = .1765$$

D = (n — 1)d = 4.5" = 11.43 cm.

$$\frac{w}{d} = .129 \quad \therefore X = -1.48.33$$

n = 10 ∴ Y = .2664

$$L = \frac{64.77 \times 100}{125}[1.7346 + .726 + .0394] - \frac{647.7}{125}[-1.4833 + .2664]$$

L = 129.54 — 5.1816 [— 1.2169]
L = 129.54 + 6.31.
L = 135.85 microhenrys = .136 millhenrys

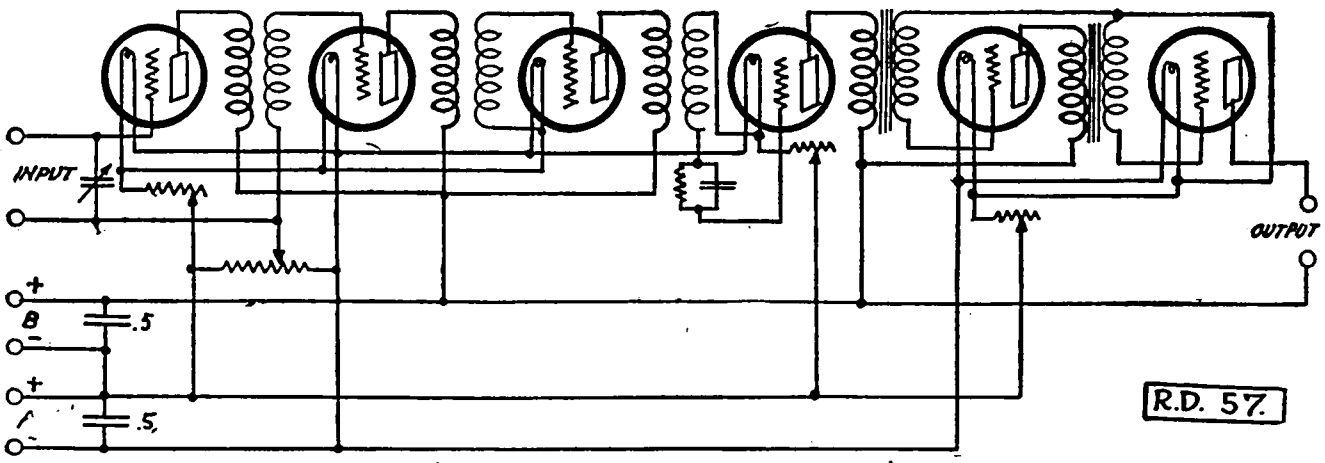
It will be noticed that the inductance is less than before, which is more or less to be expected—namely .136 millhenrys. The wave length range with a loop of these dimensions would then be about 200 to 700 meters when a .001 mfd. variable condenser is shunted across it.

In both of the above problems the X value is negative. Therefore the last section of the formula is added to the first rather than subtracted as would be the case if the X value were positive. Napierian Logarithms are used for the $\text{log}\frac{S}{D}$ value.

Value of the Correction Constant X

w/d	X	w/d	X
.01	—4.0483	.51	— .1165
.02	—3.3551	.52	— .0971
.03	—2.9497	.53	— .0781
.04	—2.6620	.54	— .0594
.05	—2.4389	.55	— .0410
.06	—2.2565	.56	— .0230
.07	—2.1024	.57	— .0053
.08	—1.9689	.58	+ .0121
.09	—1.8511	.59	+ .0292
.10	—1.7457	.60	+ .0460
.11	—1.6504	.61	+ .0626
.12	—1.5634	.62	+ .0789
.13	—1.4833	.63	+ .0949
.14	—1.4092	.64	+ .1106
.15	—1.3402	.65	+ .1261
.16	—1.2757	.66	+ .1413
.17	—1.2151	.67	+ .1563
.18	—1.1580	.68	+ .1711
.19	—1.1039	.69	+ .1857
.20	—1.0526	.70	+ .2001
.21	—1.0038	.71	+ .2143
.22	— .9573	.72	+ .2283
.23	— .9128	.73	+ .2421
.24	— .8702	.74	+ .2557
.25	— .8294	.75	+ .2691
.26	— .7902	.76	+ .2824
.27	— .7525	.77	+ .2955
.28	— .7161	.78	+ .3084
.29	— .6810	.79	+ .3211
.30	— .6471	.80	+ .3337
.31	— .6143	.81	+ .3461
.32	— .5826	.82	+ .3584
.33	— .5518	.83	+ .3705
.34	— .5219	.84	+ .3825
.35	— .4929	.85	+ .3943
.36	— .4648	.86	+ .4060
.37	— .4374	.87	+ .4176
.38	— .4107	.88	+ .4290
.39	— .3847	.89	+ .4403
.40	— .3594	.90	+ .4515
.41	— .3347	.91	+ .4625
.42	— .3106	.92	+ .4734
.43	— .2871	.93	+ .4842
.44	— .2641	.94	+ .4949
.45	— .2416	.95	+ .5055
.46	— .2197	.96	+ .5160
.47	— .1982	.99	+ .5468
.48	— .1771	.97	+ .5264
.49	— .1565	.98	+ .5367
.50	— .1363	1.00	+ .5568

HOOK-UP FOR THREE R.F., DETECTOR, TWO A.F. SET



To the more experienced amateur desirous of a set with considerable range of operation covering especially distant reception, hook-up R.D.—57 is recommended. This is the sort of a set for the Radio fan who wishes to install it in an elaborate cabinet or console with the alternative of using either a loop or outdoor aerial.

Eight binding posts cover the necessary connections to external apparatus. Six vacuum tubes are necessary, all of which can be hard tubes, as a potential of at least sixty volts is used in the plate circuits. A .5 mfd. condenser is shunted across the terminals of the B battery and another one across the A battery. A two to four hundred-ohm potentiometer is used for the control of the grid potential of both the first two Radio frequency tubes.

One rheostat controls the three stages of Radio frequency amplification, one for the detector tube, another rheostat, making three in all, is used for the two audio frequency tubes. In this way, the minimum amount necessary in rheostats are accounted for, at the same time, giving satisfactory filament control. It should be noted that the filaments are connected in parallel and not in series.

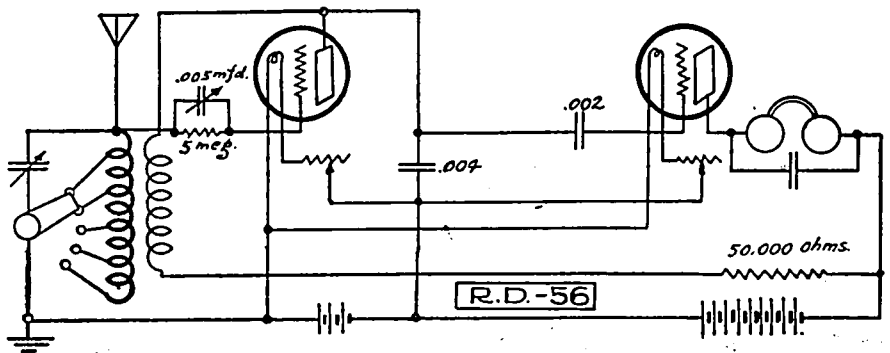
Three Radio and two audio frequency transformers are used. For the detector tube a .0005 mfd. grid condenser and .5 megohm grid leak are indicated. A 43-plate variable condenser is shunted across the input leads for the control and adjustment of proper wave length value.

The high side or outer winding of the primary should be connected to the plate circuit. In the secondary, contrary to usual practice, it is often found best to connect the low side or inner winding of the secondary to the grid. Outside the rheostat controls this hook-up requires only two control dials. These are for the primary condenser and the potentiometer.

If a loop is used, the two terminals are connected to the input binding post, whereas when the outdoor aerial is connected, it may be advisable to run a tuning coil in series, as the natural wave length of the antenna may not be high enough. A .002 mfd. phone condenser can be shunted across the output posts.

In connecting up a set of this type it is important to avoid longer leads than necessary. All terminals should be well soldered to make good electrical contact. Careless workmanship will do more toward spoiling good reception than any possible fault of apparatus. The commonest source of complaint is the fact that the amateur expects to complete a set, hook it up and get Radiophone reception from Paris, France immediately. Very often he shows unexpected reluctance in checking up his own work and simply assumes that it won't work because of the other fellow's fault. The assembly of any complex set requires patience. Good judgment with such patience will ultimately be rewarded with satisfactory reception.

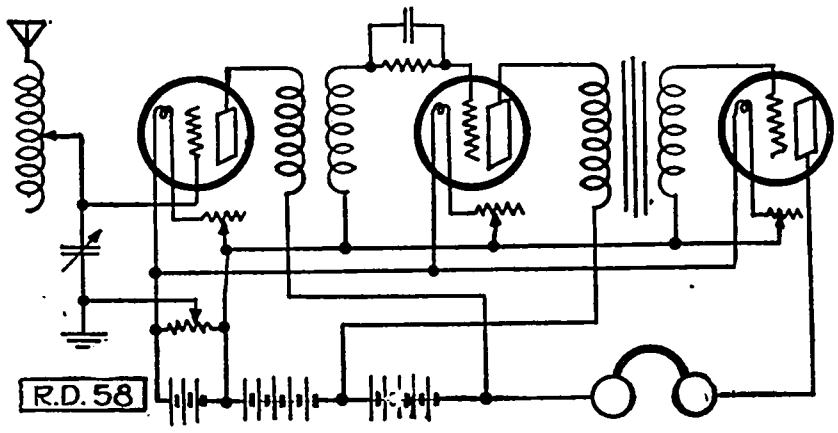
TWO TUBES RESISTANCE COUPLED



Hook-up R.D.—56 is of the two-tube type, one stage of which is audio frequency with a resistance capacity coupling. A variometer tuning unit is used with the rotor acting as a tickler for the plate circuit. A 43-plate variable is shunted across the primary for more sensitive tuning. The grid circuit has a variable 43-plate grid condenser and a ½-megohm grid leak. A soft tube is used for the detector stage. A .002 mfd. fixed condenser is inserted in series between the plate of the first tube and the grid of the second or amplifier tube, and a .004 mfd. fixed condenser is inserted between this circuit and the positive side of the filament. Both tubes are equipped with filament rheostats.

The peculiarity of this circuit is the fact that the one side of the tickler runs to the positive side of the plate battery with a 50,000 ohm resistance in series. This, to a certain extent, gives a regenerative effect to both tubes. The plate voltage should be at least 60 volts. The tun- very critical and therefore will prove a ing adjustments on this circuit are not rather attractive one for the amateur.

ONE R.F., DETECTOR, ONE A.F. SET



To the individual assembling a set with a limited outlay, the illustrated hook-up is highly recommended. This circuit uses one stage of Radio frequency amplification with transformer coupling to the detector and one stage of audio frequency amplification also employing transformer coupling. A single-slide tuning coil is placed in the antenna circuit and acts as a loading coil for the rough wave length adjustments. The more accurate control is maintained through the 43- or 23-plate variable in the grid circuit.

The potential of the grid in the first Radio frequency tube is controlled by potentiometer shunted across the A battery. The second or detector tube uses the average grid leak and condenser combination in series. Three rheostats are used, one controlling the filament of each tube. The plate circuits of both Radio and audio frequency use the full voltage of the B batteries which consist of a 22½ and 45-volt unit in series. The plate circuit of the detector tube through the primary of the audio frequency transformer is connected only to the positive of the first battery, thus placing only 22½ volts in the plate of that tube. Although not indicated, the usual phone condensers ought to be connected across the head receivers.

This set is an easy one to tune and should therefore present no difficulties in reception.

Handling Detector Crystals

Those not fortunate enough to possess an audion detector should try to obtain the best results possible from their crystal.

The first thing to observe about the proper care of crystals is to see that their surfaces are kept absolutely clean. The experimenter cannot hope to do this by continually handling them, as this will deposit a thin film of greasy matter from the fingers which will greatly interfere with the efficient action of the crystal through its high resistance.

To keep crystals in a sensitive condition they should be handled with a small pair of tweezers.

When the operator is through receiving, he should if possible remove the crystal from the detector stand and place it where it can be kept free from dust and dirt. By following these simple precautions, the results obtainable with a mineral detector will be entirely satisfactory.—J. M. C.

LONDON, ENGLAND.—Japan proposes to come to an agreement with the Chinese government as to the disposition of the Radio stations at Tsingtau and Tsinan, and to arrange for the continued operation of the submarine cables between Tsingtau and Sasebo, which were part of the communication system developed and administered by the Germans, but taken over by the Japanese during the war.

Anti-Capacity Varnish for Use on Cardboard Tubes

Many amateurs use cardboard tubes on which to wind receiving inductances for economy sake and accessibility. While such tubes give good results, if dry, as far as insulation is concerned, they will usually shrink after the winding is applied, allowing the wires to become loose. Varnishes are often used to hold the wires in place, but the tube usually contains some moisture and may absorb more, causing an undesirable capacity effect. Insulating varnishes made for this purpose are expensive and difficult to obtain.

A material that is reasonable in price and quite easy to obtain for this purpose is collodion. It is a compound of soluble cotton and ether. An ounce of this mixture will cover an average inductance coil and it will leave a hard, moisture proof surface that will hold the wires in place regardless of tube shrinkage. This finish is practically the same as celluloid when dry.

The best method of applying this mixture is to bake the tube in an oven with a heat not hot enough to burn. This drives out all moisture. Wind the wire as desired and cover it with the collodion. When applying this coating the work should be done out of doors. This will prevent any explosion. Hold the bottle of collodion in the left hand, using the left forefinger as a stopper, pouring out a few drops at a time and spreading it on with the right forefinger. Repeat this operation until the coil is covered. Set the coil aside to dry, which will only take a few minutes, and the windings will be found firm and hard.

The finger must be kept on the bottle when not pouring for the collodion soon dries and hardens. This method of securing the wire will have no bad effect on the reception of signals.—Emry Stuedle, Norman, Okla.

Things to Know About Detectors

If you have a crystal detector you should always break new crystals to get a new surface; avoid touching crystals with your bare fingers and not allow dust to accumulate on the mineral. Make sure that the end of the cat whisker is not corroded. Do not allow any heavy currents to pass through the crystal. Remember that, although a crystal may seem worthless, it may be pulverized and used with good results.

Never mount a vacuum tube sidewise as this allows the filament to sag. Mount it in an upright position. Never turn the current on to its maximum brightness quickly. Take a little time. Do not use more than 25 volts on the plate or more than 6 volts on the filament. For amplifying bulbs the plate voltage may be much higher. Provide a rheostat which will carry at least one ampere without heating. Be sure that the terminals all make good contact with the corresponding socket contacts.—Vernon Hagelin, Geneseo, Ill.

Questions and Answers

R. C. A. Transformer

(1045) AAM

I find much valuable information in your weekly magazine, which has helped me considerably in assembling my honeycomb coil set with two steps of audio frequency amplification. I have all the necessary parts to construct a two step Radio frequency amplifier to add to my set, but would like to ask one question relative to my R. C. of A. UV-1714 transformers before I begin to assemble the set. These transformers, as you know, have six binding posts each which are marked 1, 2, and 3 on either side with a connecting bar mounted across two of the posts, but there are no other markings on them to indicate the grid, plate, and filament connections, or to indicate which are the primary and secondary connections. If you will please make this clear to me I can go ahead connecting up my set without any trouble.

A.—We are pleased to receive your expression of appreciation and that you are finding helpfulness through RADIO DIGEST, and to serve you further.

Answering your question briefly: Radio Corporation transformer UV-1714 bears the nameplate on primary side. Referring to sketch returned herewith for 200 to 500 meters use 1 to 3 on both primary and secondary with shunt. For 500 to 1,500 take off shunt.

Crystal VS. Audion

(1112) CH

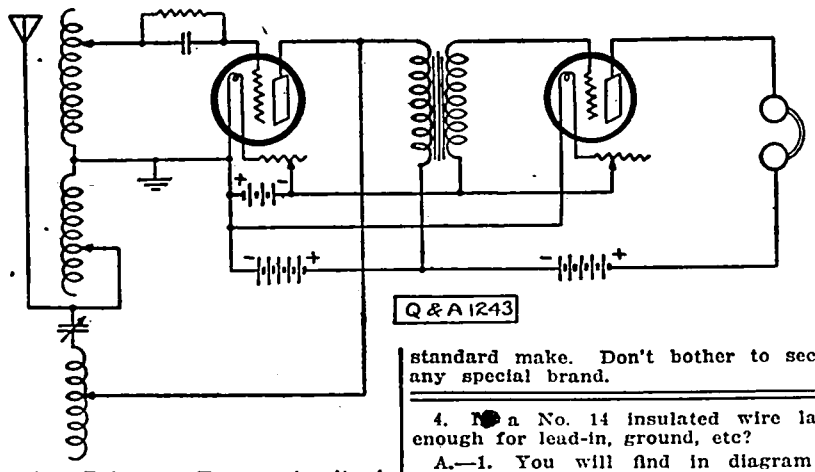
Would it be advisable to use a detector tube instead of a crystal detector in your hook-up shown as Figure 9 on page 13 of August 21st issue of RADIO DIGEST? If so, how far would it receive under favorable conditions?

A.—An audion detector is always more sensitive than a crystal detector and can be used as suggested. It should increase your receiving range to about three hundred miles. By adding variometer to plate circuit the range would be approximately eight hundred miles.

Reinartz Tuner Hook-up

(1243) WHM

Will you please furnish me with a hook-up of a Reinartz tuner?



A.—The Reinartz Tuner circuit is shown here as Hook-up Q.&A. 1243.

Aerial Improvement

(1139) DW

1. Please send me a hook-up for a one tube set employing a loose coupler and one variable condenser.

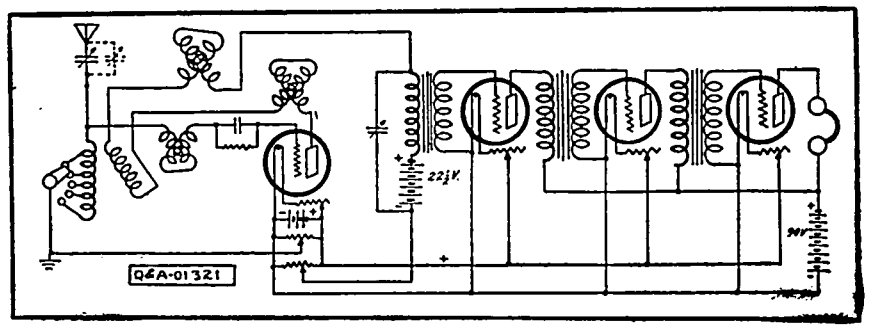
2. What would be the first improvement to make that would allow the use of my present instruments?

3. I am going to lengthen my aerial to seventy-five feet. How many wires would you advise? What amount of space should I allow between the wires of my aerial?

Allen Circuit

(1322) CHN

On page four of your issue of September 23rd you show the hook-up of A. J. Allen. If I had his street address I would write him direct. However, the thing I want to know is how you would bring in your amplification on this hook-up? The thing that puzzles me is the matter of the potentiometers. Will you please send me an outline of this hook-up with the amplifications brought in?



Circuit showing the A. J. Allen regenerative circuit adapted to 3-stage audio frequency amplifier. (Note: No condenser is used across phones and the 90-volt B battery may be less. Forty-five volts might be all right for UV-201, or Cunningham 301 tubes)

I use three stages of audio frequency amplification in my present hook-up, and I wish to adapt these to the Allen hook-up. I use a potentiometer now, but this is across the amplifier, whereas in the Allen hook-up it is wired directly to the detector tube. Of course if the potentiometers are to remain exactly as in this diagram, I would take my amplifiers out of the telephone output.

Where can I get a Faradon Variable Grid condenser? It does not seem to be known in Philadelphia.

A.—The address of Mr. A. J. Allen is 3807 Graceland Avenue, Indianapolis, Ind. However, the circuit shown will help you on this point. The extended circuit is numbered Q.&A. 1321.

The variable condenser and variable grid leak used in parallel can be of any standard make. Don't bother to secure any special brand.

4. Must a No. 14 insulated wire large enough for lead-in, ground, etc?

A.—1. You will find in diagram 5, page 14, of the April 29th issue the proper hook-up for the apparatus you described.

2. Would suggest the addition of a plate variometer first in increasing efficiency of your set.

3. A seventy-five foot aerial will doubtless serve you although one hundred and fifty feet will improve materially. Two wires spaced about twenty inches apart will be sufficient.

4. Number 14 insulated wire is large enough.

Mountainous Location

(1140) LEH

I have a regenerative receiver with two variometers (moulded), a variocoupler, vacuum tube detector and one stage of audio frequency amplification. I get WBL, WAAP, WHB, WEAH, WKY, WFAD WDAF, WAAZ and WAAW and a few other local stations north, east and south of me. My set howls pretty badly sometimes when the reception should be loudest, but if I tune in the opposite direction I can cut out the howl. My aerial is of the inverted L type, 110 feet long between spreaders, and two copper spreaders between with three wires of No. 18 hard drawn copper. It is 35 feet high with the free end pointing northwest.

1. How can I reduce the howl without weakening the signals?

2. Why can't I hear Denver and other stations west of me?

3. How large a loop aerial will I need for this set?

A—1. The technical editor advises shunting a grid leak across the secondary of the amplifying transformer to eliminate howling without weakening signals.

2. Your inability to receive Denver and other stations west of you is in all probability due to your location with respect to mountains. Where Radio waves are met by hills or mountains composed mainly of mineral matter they are said to be in part or wholly deflected or absorbed and have not sufficient energy to reach distant centers.

A loop of six wires on a frame four or five feet square should give local reception.

Radio Illustrated

One of the many elaborate sets that was on exhibition at the recent show held in the Coliseum at Chicago. It is the Zenith Renaissance model made by the Chicago Radio Laboratories. Miss Florence Stilwell is shown at the instrument tuning in for the reception of broadcasts by WGAS in another part of the building

Tune in on all distant stations, then add the totals, when the game of Radio golf. The greatest total in a week, or month, as you wish, wins the stakes
© K. & H.

Two post office officals at Washington, Paul Henderson and James E. Edgerton, both enthusiasts in their lines, motion pictures and Radio
© P. & A.

America's famous dancer, Miss Nina Payne, learning the French language over the ether waves while not at the theater in Paris
© K. & H.

As there is no further need for the corkscrew, it now becomes a receiving set. The inventor claims that it works
© INT.