LISTENING IN

The Popular Illustrated Radio Magazine

Devoted to the welfare of everything connected with radio broadcasting and reception

Vol. I June 16, 1923 No. 4

Vacation Number—Radio in the Summer Time
Construction of Amplifiers—Broadcasting Problems

10 Cents a Copy $2.00 a Year

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Three-In-One Combinations

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LISTENING IN

RADIO · ILLUSTRATED MAGAZINE

Devoted to the welfare of everything connected with radio

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PUBLISHER'S PAGE

This, our fourth appearance, brings us into the summer and vacation season. We, however, have been striving harder than ever to make this number more helpful and interesting than any of the preceding issues. Now, while planning for the summer, we believe you will find in this number many practical ideas and suggestions which will make your radio receiving set afford more entertainment this season on vacation trips into the country or while in camp and on outings at the shore or in the mountains.

We are planning interesting things for our readers in future issues and believe you will find the succeeding numbers of "LISTENING IN" as entertaining and helpful as this present issue.

The response of radio fans to the efforts we are making to produce an attractive and instructive magazine, has been very gratifying and we surely appreciate the interest and good will shown us and our new publication. We shall continue to strive to be worthy of your confidence and patronage.

The public prefers to trade with manufacturers and dealers who are up-to-date and keep the cob-webs out of their brains as well as from their merchandise, shelves and window displays.

"Birds of a feather flock together"—we are proud to welcome into our wide-awake family new advertising members with this issue. Progressive concerns soon will realize that our readers are worth cultivating and will be glad to co-operate with us in promoting the growth and development of radio in all its phases.

Will W. Zimmer
Publisher

Must We Learn From England?

The Broadcasting Monopoly Existing In Great Britain Should Be Object Lesson For Us To Avoid

America's radio problems are looming larger and leaders in the industry in this country are studying the situation in England, where a demand for "wireless freedom" and relief from "the boredom of the lustreless programmes" has gone up.

Conditions on this side of the Atlantic, it is pointed out, cannot be finally resolved without close consideration of the point of view of the individual. Listeners are multiplying so rapidly as a result of the adoption of radio instrumentalities by churches, universities and newspapers that discussion of proposed legislation meets with a wide range of suggestions. All this, radio men say, means that the man in the street is becoming an increasingly important factor in shaping the development and regulation of the art. The National Radio Chamber of Commerce is adding listeners to its membership, so that the voice of the public may be heard when constructive plans are framed.

In England, it is said, 200,000 people are now breaking the law by listening in without licenses. The law, according to the London Daily Express, is a dead letter. Opponents of the British monopoly are reviving the cry "You cannot indict a whole nation." The wholesale "piracy" exists, it is said, because listeners-in cannot buy the license they require.

The whole question in England is said to hang on the word "transmission." "Can the meaning, by any quibble, be stretched to include "listening-in?" it is asked. The whole fabric of the wireless broadcasting monopoly in England, where the wireless telegraphy act of 1901 gives the postmaster general the power to enforce wireless licenses, may be based upon an illegality, it is charged. English firms and newspapers are offering to begin broadcasting at once for nothing in orde to provide better programmes.

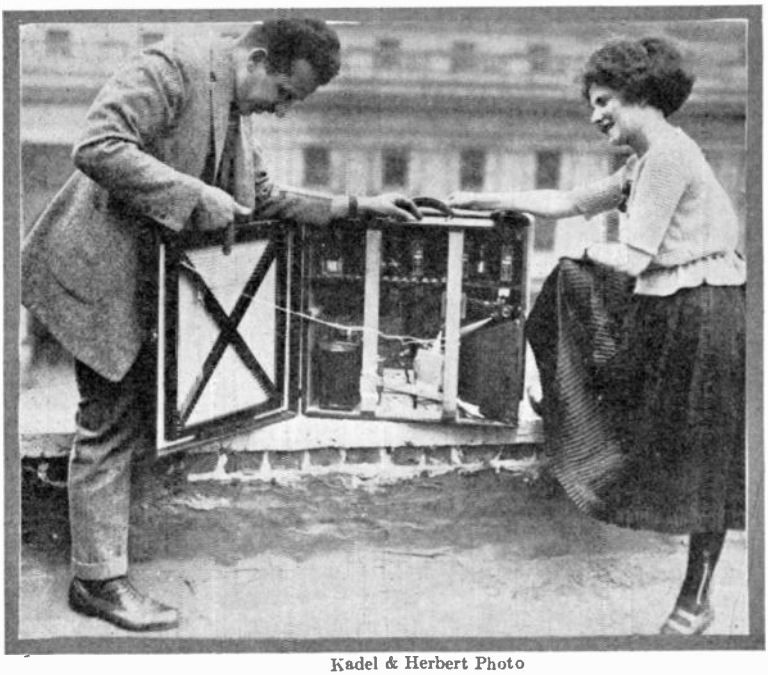
C. B. Cooper of New York, one of the governors of the National Radio Chamber of Commerce and a member of the Hoover Conference Committee, says that the English situation is a warning to the United States. "There has been much discussion as to ways and means of supporting broadcasting," according to Mr. Cooper. "It has been suggested that we use the British method, by which a government-controlled monopoly was formed, the Post-office Department collecting a tax from all owners of receivers. This tax is used to support the broadcasting monopoly.

"In the United States it has been found that there are plenty of private business organizations, including newspapers, which are willing to furnish free broadcasting to the public. The newspapers are coming to regard broadcasting as a part of their functions as publishers of news. Education considers broadcasting as a useful element of extension teaching. Manufacturers view broadcasting as part of their regular overhead, necessary in the manufacture and sale of equipment.

"Therefore, the American public should be assured of permanent free broadcasting, in contrast with the conditions prevailing in England, where agitation against monopoly is assuming considerable proportion.

"Monopoly exists in England. We have no monopoly in the United States and we should have none, either of broadcasting or of apparatus essential to the transmission and reception of broadcasting. The whole field of radio in this country should be kept open to competition because it is only by competition that manufacturers receive the incentive to work for greater efficiency. It is competition that has made the United States lead the world in industrial supremacy and it is competition that will heighten this supremacy through radio, which may be destined to work a revolution in human thought and understanding."

A Real Companion for Vacationists



Kadel & Herbert Photo

A complete radio set for the traveler is the latest. The set, which has a loop antenna, requires no long wires to intercept the ether waves.

As shown in the photo, the outfit is assembled in a most compact manner in what, to all appearances, is an ordinary suitcase.

For the convenience of the radio enthusiast who plans to spend his vacation in company with a handy, complete receiving set, so constructed that he may easily transport it from place to place on his trip, a set of this type will be found unusually convenient.

Manufacturers and dealers all over the country are reporting record sales of special types of radio sets designed for vacation use. A dyed-in-the-wool radio fan will not consider the prospect of spending several weeks in the wilds without the amusement value that he will invariably derive from having a radio receiving set with him throughout the trip.

Two years ago, or even last summer, the idea of having a radio receiving set on a vacation was more or less unheard of. Virtually everyone, enthusiastic radio fans included, were of the opinion that such a feat was impossible due to the interference caused by summer static.

However, radio has progressed so rapidly since that time that while this interference has not been entirely eliminated, it has been considerably reduced, thereby permitting increased enjoyment for those who plan a vacation with radio this summer.

The Construction of Amplifiers

In Which Audio Frequency and Radio Frequency Amplifiers, together with Methods of Constructing and Operating Same, are Thoroughly Discussed

By James Leo McLaughlin

Audio Frequency

The construction of a multistage amplifier requires a certain amount of patience and skill, with a close study of the details, to make it a success.

It is important that only the best of material be used. This holds true for any kind of a radio outfit and in a great many cases the "best," is none too good.

The first type of amplifier that the amateur or radio fan has any experience with, is the audio frequency type, consisting of one or two stages, as they are called.

With this amplifier (two stages) connected up with a good tuner and detector, stations a few hundred miles away can be received with good volume on a loud-speaker and stations a thousand or more miles can be heard with the head phones.

Many times it is desirable to increase the volume of sound from some station, so that the music may be used to fill a large hall, to dance by. In such a case, a third or fourth stage of A. F. will be of great help. But three and four stage A. F. Amplifiers are rare, because in many cases they cannot be made to work properly. They either howl badly or else cause distortion.

It has become part of the average radioman's religion, never to build over two stages of audio, but contrary to the general opinion on the matter, three and four stages can be made to work satisfactorily if a little pains and some system are used.

The trouble with most amplifiers is that a very poor system in arrangement of the apparatus is used.

The first important point in a successful amplifier is to see that the grid and plate leads are as short as possible. By this I mean, that no wire from the transformer to the grid, or from the plate to the transformer, is over two inches at the most and the shorter you can make them the greater is going to be your success.

To get these leads short a good layout of the apparatus is necessary. Fig. 1A shows a good three-stage A. F. amplifier but it need not be restricted to three, as a fourth stage can be added by wiring the third the same as the second and the fourth the same as the third is in the diagram.

The next point of importance is to see that the plate and grid leads are separated from each other and from all other wires as far as possible. If Fig. 1A is followed, this point will take care of itself.

All the other wires are connected in such a manner that they can be bunched together. Since we are dealing with alternating currents—all wires should be at ground potential and by bunching them we accomplish this by virtue of the capacity between the wires. For the sake of clearness, in the diagram, they are shown separated.

Build your tuner, so that the tickler coil or plate variometer and grid condenser leads are kept short, the same as in the amplifier.

It will be noted that there is a total absence of such devices as automatic jack and while they may be very useful at times, in many cases are the cause of poor results. A four point jack may be added to the detector circuit at (X) if care is taken not to get the lead too long. Another may be used for the output of the last tube.

All A. F. transformers will not be marked, as shown in the diagram. Fig. 1B shows several different markings used and how to connect a transformer of a different shape.

Naturally the transformers used have a lot to do with the success of the set. Do not use any old type—get a good one both electrically and mechanically.

See that the transformer has a good iron core with thin lamination, that the insulation is Bakelite or hard rubber—that it is built compact with the leads arranged in some handy manner to facilitate wiring up in the circuit. And above all see that the ratio of turns of the secondary to the primary is not over four to one, because this is the

highest ratio that has been found to give maximum amplification without producing a distortion with the standard tube used to-day.

In regards to shielding, I see very little advantage when only three or four stages are used.

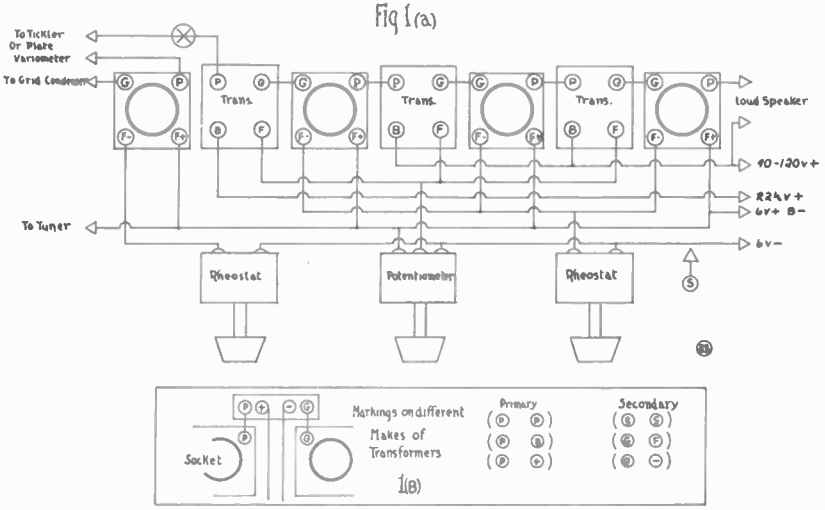
It has been repeatedly stated by different authors that the transformers must be placed at right angles to each other to reduce the tendency of the amplifier to howl. So far as two to four stages are concerned this has not been the case in my experience.

on the negative side—this can be easily found because the negative side will be the one that gives the greatest volume. To reduce this volume, move the knob in the direction of the positive side but never more than one half the total resistance, as this will not only reduce the volume but will also cause distortion.

Radio Frequency

No matter how good or large your audio frequency amplifier is your range will not be increased materially. This is

Fig 1 (a)



A two stage amplifier was built by the writer some years ago, with flexible leads going to the transformers. This was done so that the transformers could be moved around.

The amplifier was connected to a receiver with a detector. A station was tuned in, then the transformers were moved around in different positions to each other and the results noted. It was found that the positions made no difference whatsoever, not even when the transformers were pressed close together! Some of the transformers so tried were the Federal, General Radio Co., and the Acma, all unshielded types.

The main cause for howling was found to lie in the grid or plate, particularly the grid. By keeping those leads short it was never encountered.

Operation

Light the tubes fairly bright and set the pointer of the potentiometer over

due to the fact that the output of a detector is proportional to the square of the input. This means that the A. F. amplifier will amplify a loud signal to a greater proportion than it will a weak one and if the signal is very weak it will hardly amplify it at all. But if we increase the current going to the detector, then our range will be increased.

The amplifier that will do this is called a radio frequency amplifier, because it amplifies the radio frequency current before it is detected and changed to A. F. currents.

The difficulties encountered in building an efficient amplifier of this type are much greater than in the other. If you have at present a good regenerative receiver and you desire to increase your range you will have to use at least two stages of good R. F. amplification to give you better results than your present set will now give. This

(*Continued on Page 50*)

The Newest Radiotron, Model UV-199

Features of Which are its Operation on Dry Cells, and its Unusual Qualities as an Amplifier and Detector When Compared With the UV-201

By J. C. Warner, Research Laboratory, General Electric Co.

Radiotron UV-199 is a receiving tube of the high vacuum type which has been designed for operation on dry cells. The filament of this new tube requires only sixty milliamperes current which is supplied at a potential of 3.0 volts. Thus, the power consumed by the filament is only .18 watt.

This low current and small power consumption are made possible by the use of the new X-L tungsten filament which is being used in both the UV-199 and in the larger UV-201-A. This new filament requires much less current than the older type of tungsten filament and operates at a much lower temperature, appearing a dull yellow when lighted, while the older filaments burned at a brilliant white heat.

To illustrate the capabilities of the new filament, it is of interest to compare the UV-199 filament with that of the well known UV-201. The UV-201 filament required 1.0 ampere at 5.0 volts, that is 5 watts, and gave a total electron emission of 7.5 to 10 milliamperes. The UV-199 filament gives the same electron emission but requires only 1/16th of the current and 1/27th of the power.

In order to operate at such a low current, it is, of course, necessary that the filament be of very small size, and in fact the UV-199 filament is only about one-fourth as thick as the average human hair. In spite of this small diameter, the filament is remarkably strong, since tungsten has about the same tensile strength as high grade steel.

The low filament current makes the UV-199 admirably suited to dry cell operation. It is always most economical to use dry cells at a low discharge rate; that is, the capacity of the cell in ampere hours is greatest if the energy is taken from the battery at a small current rate. Also, for greatest battery economy, the battery should not be discarded until the closed circuit voltage has fallen to 1.0 volt or less per cell. That is, although the voltage of a dry cell is often thought of as 1.5 volts, this is true only at the very beginning of the life of the cell. The closed circuit voltage drops rapidly at first and then more slowly until it has reached 1.0 volt the energy contained in the battery is practically exhausted and the battery should be renewed.

The UV-199 filament is designed for operation on three dry cells in series and so takes advantage of the economy of a low current rate and the 1.0 volt per cell end point. Three six-inch cells of the ordinary general purpose type will operate one tube two hours a day for 387 hours or 193 days, two tubes 200 hours and three tubes 125 hours. It is even possible to use flashlight cells where minimum weight and size of set are required. A small flashlight bulb requires .55 watt or three times as much power as the UV-199 filament and an ordinary tubular three cell battery will operate a single UV-199 tube one hour per day for a month. This combination makes it possible to build a portable radio set containing a tube detector, complete with batteries and phones and weighing only five or six pounds.

Another interesting comparison gives an idea of the low filament consumption. We usually think of the power consumed in the plate circuit of a vacuum tube as being very small and this is quite true, but in some cases, the UV-199 may use more power in the plate circuit than in the filament. For example, the plate current at 80 volts may be 2.5 milliamperes, making a plate power consumption of .2 watt, while the filament power is only .18 watt.

The life of an X-L tungsten filament is usually terminated, not by actual burnout, but by a decrease in electron emission. This decrease is not gradual during the life of the tube, but occurs suddenly, close to the end of life and is indicated by a marked increase in the voltage required on the filament to give good results.

W G Y Bids the World Good-night

Traveling Correspondent for "Listening-In" Describes Visit to Schenectady Station; Hears Program Broadcast to Invisible Audience; Has Extensive Equipment

By Elmer L. Wheeler

"All aboard!" bellows the first mate. "Hoist the gang plank! Otta the way there!"

The steamer is on its way. We're off, to sail with the current to New York City, after spending the previous day in Renssalaer Polytechnic Institute studio, at Troy, and the night before at W G Y, Schenectady.

I proceed to the fore-deck, recline in a deck chair and as the steamer WASHINGTON IRVING glides smoothly down the glistening water of the Hudson, I recall my visit through W G Y at Schenectady. I arranged with M. P. Rice, director of broadcasting at W G Y, for a trip through the studio.

The studio is located in the International Building, where receptions for foreign representatives are held. Upon entering the building we signed the visitors' ledger.

It is quite difficult to get by the attendant there unless provided with proper passes. Minute care is taken to guard the building and its studio rooms.

Leading from the lobby are several doors, one of which opens into the reception room. The reception room is equipped with chairs and a radio receiver and loud-speaker with which to entertain visitors.

From each side of the large lobby runs a hallway. We enter the left hallway, going through the first doorway to the right, which brings us to the studio office. In this office the programs are made and mailed to publications. Arrangements are made here to secure the best talent for broadcasting.

From the office one enters the auxiliary studio, which is used to avert loss of time in broadcasting. A program is given from the main studio, then one from the auxiliary studio, alternating in this manner to save time.

This little sub-studio has its walls made echo proof by heavy Parisian rugs. It is about 15x25 feet and is equipped with microphones and the props of a broadcasting studio. The main studio is adjacent to this one.

The walls and ceiling are treated, being padded with heavy absorbent felt and covered with monkis cloth, pleated on the walls to further deaden sound. The floor is covered with a heavy rug.

There is a large green fern in the room, a handsome grand piano, an upright piano, an organ for the broadcasting of church services, wicker lounges and chairs for visitors, various props to aid the radio listener's imagination during the performance of a drama and a sound proof telephone booth, the latest addition to the studio.

In this booth the director "listens-in" to the concert being given and hears it just as the radio fan does miles away. Thus he can tell whether the musical or speaking parts of the program are too loud or not loud enough.

Upon the right wall as one enters from the sub-studio are two large lights. One is red, the other green. The microphones control these lights. When the microphone is open, the red light glows, indicating silence. The green light brightens when the microphone is shut off.

In this manner those in the studio know at what time they are free to talk. Also late arrivals can tell by peering through the glass panels of the door, whether or not they might enter.

C. J. Jester, one of the announcers is introduced, after which he requests silence, as he turns on the microphone at one end of the room upon a desk and proceeds to tell the world the latest baseball scores. The red light glows. Silence!

His voice falls flat. It is dead. All echo is quickly absorbed from it by the treatment given the studio. As he pauses, one senses a tomb-like silence, a silence that is ominous.

Beside me sits a woman. She has to sneeze. She sniffs; reaches hurriedly

(*Continued on Page 59*)

Radio Supplants Sea-Shore Amusements

Kadel & Herbert Photo

This charming picture was sent to us with the title, "What Are the Wild Waves Saying?" It seems that Miss Marie Devourak, a San Francisco mermaid, takes her radio set to the beach each day and as she waits for the water to get a little warmer, she listens-in on the musical programs.

Photo shows Miss Devourak on the sands of Neptune Beach, listening in on the radio music.

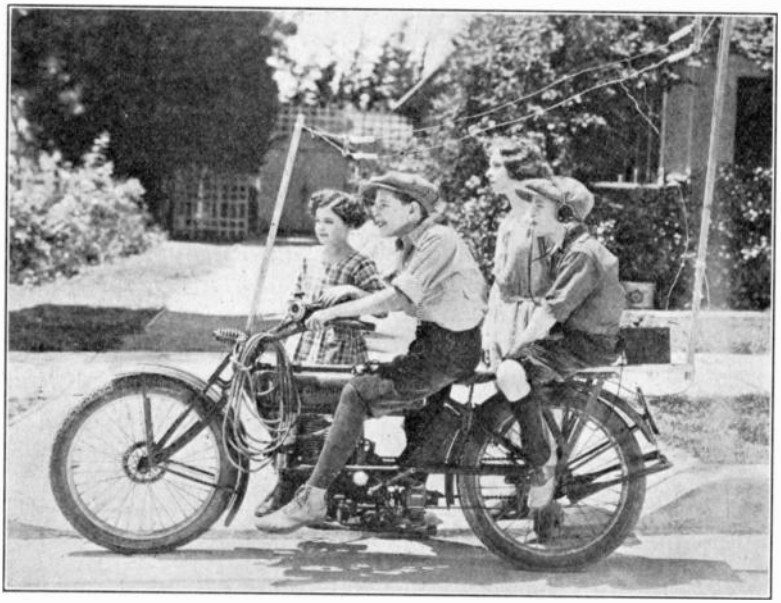
First Coast Opera Given By KPO

San Francisco.—A new chapter in the history of Pacific Coast Radio was written recently when station KPO broadcast a complete opera from the studio on the sixth floor of the Hale Bros. department store. This was the first opera to be heard in its entirety from a coast city and judging by the response from Radiophans all over the country, it was one of the most successful performances ever given to the air by a local station.

The work was "El Rancho del Rey," libretto by Evelyn Nells of the San Francisco Call, music by George Bigler of Burlingame, Cal., and was conducted by Pearl Hossack Whitcomb, of San Francisco. The story treats of the early Spanish history of California, and was especially favored by the melodious music and excellent cast. Sixty men and women appeared in the production and much favorable comment was elicited for the splendid way in which they were handled by Mme. Whitcomb.

It is to be regretted that science has not yet found a means of broadcasting the colorful stage settings, the gorgeous costumes and beautiful dances that called forth such thunders of applause when the opera appeared locally several weeks ago. However, the production was considered a success as given.

Days of Real Sport are Here



Here is shown the latest method of radio transportation for the fan who has to "keep on the jump". Head phones, receiving set and aerial complete, the "gang" is ready to set out on their big adventure. Gertrude Messinger and Johnny Jones, Jr., juvenile co-stars in Pathe's latest screen comedy, "Broadcasting," are shown at the left.

Radio Uniting Home

Marion Gary, general secretary of the Vermont Council of District Y. W. C. A.'s believes that the radio is helping to bring the home back as the center of attraction, for both young and old, girls and boys alike.

On Sunday afternoon in one rural home of which Miss Gary knows, there is standing room only as the radio proves far more attractive than any of the former forms of amusement. This is a good thing, for their one thought seemed to be to get their pleasures away from home.

Cuba has two broadcasting stations. They are located at Havana and Tuincu.

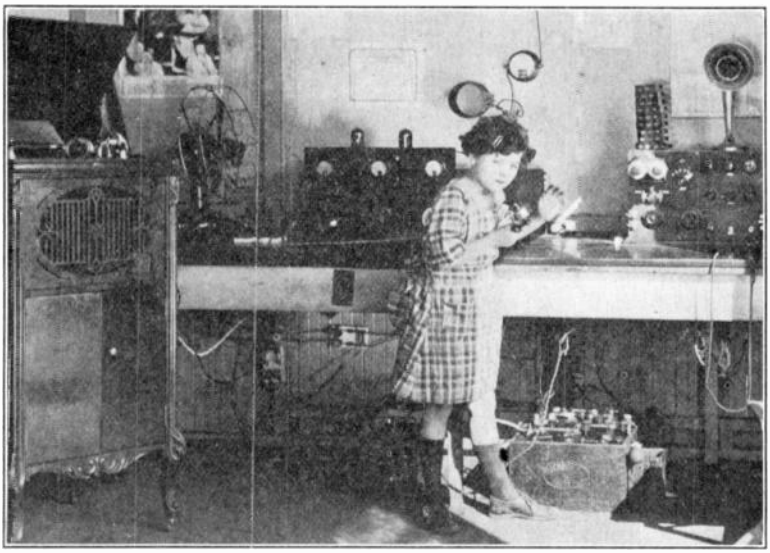
The Radio Church

The Radio Church of America, which was recently incorporated in Sacramento, under the laws of the state of California, is non-sectarian and non-denominational. The plan of the organization is to bring the church to the people instead of having the people go to church.

Dundee, a little farming village of less than a thousand inhabitants, in Michigan, is distinguished as having the first working system of a municipal radio in the United States. Many of the farms are merely equipped with loud speakers, from which messages are received from all parts of the country.

France now has 50,000 radio "fans" operating 12,000 receiving sets.

Radio in New Screen Comedy



Gertrude Messinger, juvenile co-star with Johnny Jones, Jr., in the new Pathe comedy, "Broadcasting," is shown charging the ether waves with a declaration for "wimmin's right".

An Enthusiastic Reader

Rochester, N. Y.,
June 2, 1923.

Will W. Zimmer, Inc.,
Rochester, N. Y.

Dear Sirs:—I am an enthusiastic reader of your new magazine and I find it highly interesting. Please find enclosed a money order for $2.00 for one year's subscription. Please send me "HOW TO MAKE RADIO-PHONE RECEIVING SETS".

In your second issue there is a Reflex hook-up and I would like to have you draw me a plan for the wiring, just as it looks when it is wired up if you please and can do without too much trouble. I am not able to wire so complicated a set from a hook-up. How large should my cabinet be? Could I put all the batteries in it? Please tell me what kind of radio frequency transformers to use and a good vario-coupler. I have a large and a small De Forest Condenser with the veniers. Are these all right for this set? I also have 2 UV-201-A tubes and a WD-11, are these all right? Could I use the new UV-199 tube in this set anywhere?

I am greatly interested in this set and I wish you could do this for me and if there are any charges for the drawing let me know and I will gladly pay for them.

I am enclosing self-addressed envelope and am looking for an early reply.

Yours truly from an interested radio-fan.

CHAS. E. SMYTHE

P. S. I am enclosing ten cents more for a copy of your first issue as I would like to get the set complete.

We are unable to give you the sketch that you desire as we know nothing of the types of apparatus which you would use and so could not judge how that apparatus would be arranged.

If you have not had very much experience in making radio sets we would not advise you to start in on such a complicated problem as the reflex circuit offers.

Radio Cops Newest Foe to Crime

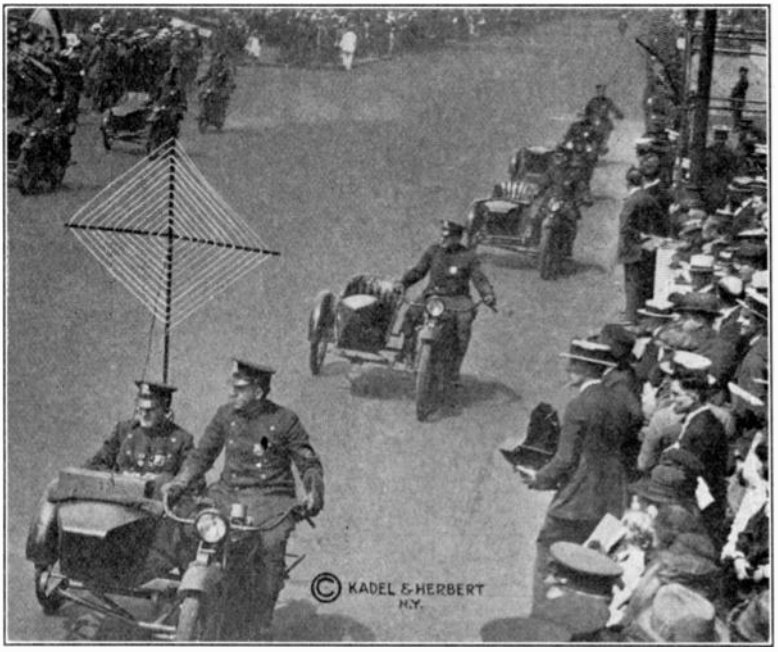


Photo taken during the New York City Jubilee parade showing a motor cycle squadron led by the radio-equipped patrol. Mounted on the motorcycle bed, with a loop antenna, this device will be unusually effective in sending instructions and descriptions to patrolling officers in local areas. From the N.U.P.D. Radio Station WLAW, valuable information may be broadcast and instantly picked up, saving precious time in case of riot or desperate crime.

New Washington Station

Practically the whole continent will be able to hear a new broadcasting call, as yet unassigned, when the R.C.A. station at Washington opens up in June. Other than that the station will be of the highest order and latest type, the Radio Corporation refuses to state.

The new station is located at 14th Street and Park Road, known in Washington as Mount Pleasant.

Through the co-operation of the Riggs National Bank and Chas H. Tompkins, two 100′ fabricated steel towers have been erected on the roofs of the Riggs and Tompkins Buildings in the highest section of Washington where they will serve as new and modern landmarks for the Capital.

Their construction is unusual, in that they have three legs instead of the more customary four. This reduces wind resistance and makes for stability. A 36′ cross-arm near the top of each tower supports four antenna wires each 12′ apart. The distance between the towers is 220′ and the effective radiating length of the antenna 160′.

The studio, the reception, transmitting and apparatus rooms are on the second floor of the building. Two motor generator units will insure an adequate power supply and two tube transmitters will make possible flexible, smooth running programs. It is hoped that the station will be in operation and ready to serve Washington and the surrounding territory within two months.

News from all Corners of the Earth

Radio Assumes Role of Dan Cupid

Atlanta, Ga., May 25.—Broadcasting old-fashioned romance figured prominently in station WSB's operations since last spring, it develops in an announcement of the engagement of Miss Carolyn Hinkle, "the Virginia girl with the guitar", and W. Walter Tison, chief operator and daylight announcer at the "Journal" station.

The Virginia miss, lately of Richmond, became a popular WSB star by accident when Mr. Tison happened to hear her sing informally at a social affair. Since then her appearances before the "Journal's" microphone have been frequent and successful. Listeners in many States have been generous in praising the quaint melodies sung by Miss Jinkle against the background of her tinkling guitar.

Operator Tison, however, whose duty it was to send her music to the four corners of the country, quickly became her staunchest admirer. Within less than five months the radio romance had progressed to the stage where the Hinkle-Tison wedding is announced for June 6. Tison is a native Georgia boy; he learned the wireless game on the high seas and was instrumental in moving the Atlanta "Journal" to establish the first newspaper broadcasting outfit in Dixie fourteen months ago.

Landlords—Attention!

According to a recent decision by a Chicago magistrate, a landlord cannot legally destroy his tenant's radio aerial, inasmuch as the radio set is an appurtenance to the home.

England May Revise Broadcast Plans

Recent developments in England indicate that a strong effort will soon be made to relieve the amateur radio operator in that country from having to pay a proposed increase in license and buy his apparatus from the British Broadcasting Company. Radical steps to break the alleged monopoly are predicted, although they may not remove the bar against foreign manufacture radio telephone sets. If development is to be permitted, the whole situation must be simplified, many believe.

The new Postmaster General is said not to be especially sympathetic toward the present arrangement, but it is felt he will insist that apparatus be of United Kingdom manufacture. Many fans in Great Britain want to make their own receiving sets and utilize some manufactured parts. To-day these radio fans can only secure an experimenter's license, but after receiving their permits, they can use any kind of a set or parts they desire, and listen-in on all stations. These licenses, it is reported, remove them from the control of the British Broadcasting Company. It is assumed that they are engaged in experimental work but they undoubtedly listen-in on all broadcasting concerts.

The Radio Manufacturers' Association has suggested abandoning of the present method of securing revenue for the Broadcasting Company by license fees and royalties and collecting the amount necessary for adequate revenue from the license fee. Restrictions against the so-called "pirate" would then be tightened.

According to a statement in Parliament, 35,383 experimental licenses

have been issued while as many more applications are on file. It is estimated that 200,000 individuals are using sets without licenses because they cannot secure the licenses they desire.

Samoa Regulations

Although the radio regulations for New Zealand have been extended to apply to Samoa, it is reported that more latitude is given the amateurs and that an effort to regulate broadcasting stationf is being made before interference begins

Samoa is designated as the Fifth New Zealand Radio District, with the officer in charge of the Apia radio station as inspector of local reception and transmission.

Except that it is necessary to secure a license and pay a small license fee, amateurs are unrestricted in radio reception, but licenses are not to be issued for circuits which cause interference. Amateur transmitting stations in grade 1 require the supervision of a licensed operator and are assigned on wave lengths between 150 meters and 180 meters, the power being limited to 50 watts. Grade 2 operators are restricted to a 140 meter wave, and five watts in power. All amateur transmission is prohibited between 7 and 8 P. M.

Aerials Cut Down

French Radio experts are having considerable difficulty ascertaining who is broadcasting on the same wave length as the Eiffel Tower and at the same time. In the vicinity of London there is a problem of a different nature. Interference from amateurs has been prevalent and now someone has taken to cutting aerials down, in an effort to get rid of the alleged nuisance. The work is believed to be that of boys, but so far the miscreants have not been discovered.

According to Secretary Hoover, there are now 2,500,000 radio receiving stations tapping the air. The majority of these sets are designed to reach only 600 meters.

Receiving Obstacles Shown By Relay League

Hartford, Conn., May 25.—Some deep rooted beliefs as to the causes of interference with broadcast reception are set at naught by an investigation of this subject now being made under the direction of Professor C. M. Jansky, Jr., of the University of Minnesota, in conjunction with the Bureau of Standards' Radio Laboratory. His preliminary report has been received by the American Radio Relay League which is co-operating with the Bureau's staff.

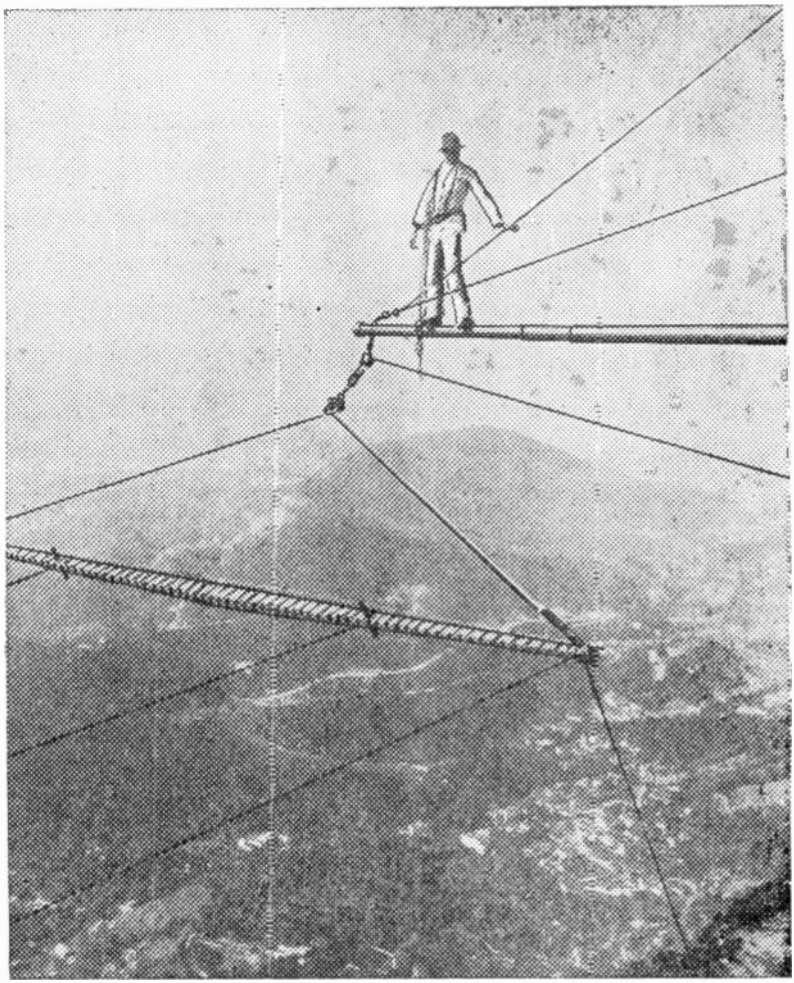
Every owner of a receiving set has experienced some form of interference with reception of broadcast programmes and frequently his ideas as to the actual reasons for such interruptions have been erroneous. Obstacles to receiving, the report states, may be divided into two general groups, those derived from natural conditions and from human agencies.

The results are based on observations of reception from KDKA at East Pittsburgh, Pa., and WLB at Minneapolis, Minn., between August 1922 and February 1923. During the initial observations until September 15, interference from amateur telegraph stations amounted to less than 1 per cent, and throughout the entire period the average interference from amatuer damped wave stations was 3.5 per cent. and from amateur continuous wave stations only 2.3 per cent of the total interference observed.

By far the greatest amount of interference was caused by natural sources such as fading and static and from broadcast, sending and receiving stations themselves; this in all amounting to 67.5 per cent. This has been classified specifically, interference from other broadcast stations 30.9 per cent, atmospherics, 19.1, fading 13.5, commercial stations 2.1, other receiving sets, 5.0 and power lines 1.2 per cent. Reception of broadcasts without any interference whatever was experienced during only 23.3 per cent. of the total observations.

Radio is furnishing entertainment to the oil well drillers in Montana during their idle hours.

SPC is Declared to be World's Highest Station



SPC, the radio telephone station recently installed by the Westinghouse Electric International Company, on the peak of Mt. Corcovado, overlooking the city of Rio De Janeiro, Brazil, enjoys the distinction of being the highest radio station in the world. The peak of the mountain is more than 2,100 feet above the city and from the station one may have a most wonderful view of the country for miles around.

While erecting the antenna for the station workmen were given many thrills and many times faced death when the slightest mis-step would have meant a plunge into the depths below. The photo shows one of the workmen standing out on one of the poles to which the antenna spreaders are attached.

SPC was the feature of American exhibits at the Brazil Centennial.

The Possible Solution of Broadcasting Problems

C. W. Horn, Superintendent of Radio Operations, Westinghouse Electric and Manufacturing Company.

When radio broadcasting first became popular the person "listening in" was thrilled when he recognized sounds as music or as someone speaking. This "listener in" was generally, at that time, an amateur radio telegraph operator, as no one yet had purchased apparatus to listen to the experiments being conducted by one or two prominent radio experts. In fact, the radio amateur may be said to be the one who "sold" radio broadcasting to the public, for the average person usually wants to have a demonstration before he invests money in a new idea.

Since that day many changes have taken place. The public has become a large body of critics and the big station of today in order to court favor must "produce the goods." The radio listener of today, generally now a man, woman or child without any knowledge of the radio code and probably not much interest in it, at that, sit back and carefully compares the quality of the different stations within reach of his apparatus. Through magazines and other publications and the general gossip one hears everywhere this individual has become quite well acquainted with what is going on and is, therefore, somewhat justified in setting himself up as a critic. This is as it should be and is quite a normal development, for it is the duty of the public to know what it desires and by its judgment—expressed in several ways—demand what it wants.

Very much in the same way that we poor mortals, who remember the development of the phonograph, clustered about the first machine that we ever saw and marveled at the fact that speech and music could be recorded and then reproduced whenever desired so has the first radio fan listened and marveled. Needless to say, this period of wonderment was but a short one in both cases. It did not take us long to realize that the quality of the sound being emitted by the original phonographs were not such as would keep us home nights; it also did not take the radio fans long to realize that the quality of music and talent from the original broadcasting station could be very greatly improved upon.

We all remember the individuals who, endowed with the dampening spirit, predicted that this was but a fad. "There was nothing to it and it would die out in a very short time." But radio broadcasting did not accommodate these pessimists by dying out but has developed into a lusty infant industry which some day will be compared with the automobile and motion picture industries in its rapid growth and development. There is a reason for this predicition and that reason is that it fills a long felt want. We needed the automobile and we needed the movie. Also, we needed something at home which would open the wide spaces and permit us to attend fu e-tions and affairs and be entertained without the necessity of putting on a stiff, starched shirt and enriching the ticket scalpers. It will be a part of every household for the same reason that the phonograh became successful. People wanted music and, instead of going to the music, had the music brought to them. But radio has none of the limitations of the phonograph or any device or mechanism developed in recent years. From my present viewpoint there is as yet no limit to what radio may be called upon to do but it is not necessary here to repeat the many and varied activities to which radio can be applied.

As in the case of the phonograph, public enthusiasm ran away ahead of the practical development of the apparatus. This, of course, stimulated the engineers and those in charge of development work to greater effort and has been the cause of the great strides being made. One of the forms this enthusiasm has taken and the one which has caused the greatest amount of embarrassment to the science itself, has been the desire of a large number of individuals and concerns "to entertain the people," in many cases merely to

get publicity. It is of this latter phase of radio work that I am best qualified to speak and which I will discuss here. It is a very serious matter and will have much to do with the immediate future of radio and vitally concerns the public.

There were before the end of 1922, more than 600 radio broadcasting stations in existence. There were probably not more than 25 or 30 of these stations so situated in centers of population and so operated and maintained that they were giving unselfishly the best that could possibly be given at the present stage of development. This meant the outlay of enormous sums of money without any possible revenue accuring from this expenditure. The majority in this group of more than 600 licensed stations were in the game merely to spread their names over the map and to obtain for themselves all the publicity that they could. These stations may be classed as offensive billboards on the highway reserved for pleasure and education. They obstruct the view of the person seeking to broaden himself by listening to the many fine speeches and talks given nightly over the radio and in place of these desirable talks and entertaining music which this poor listener could pick up he must listen to the "Blaa-Blaa Station of the Blaa-Blaa Company blaaing. Generally this "blaa-blaa" station was built by some energetic amateur whose experience in radio telephony was obtained from having once seen a radio telegraph spark set on a ship and, because those for whom the station was built knew nothing of radio itself, this young man was usually set up as being a "wizard" and a "genius." Stacked up against a radio engineer he would probably feel embarrassed to be called a radio man. This young man buys the material and after much experimenting and extensive testing he finally gets something that will emit squawks and is eventually called a radio broadcasting station in big letters in some store or other business advertisment. Gradually improvements are made as defects are found and of course in the end and after the public has become somewhat used to the "quality" of the station it functions fairly well.

Contrasted with these are the stations built by the large electric companies, each of which maintains a large and competent staff of engineers who have all the information there is available on the subject and the facilities and assistance of research laboratories, etc. These people produce a transmitter which is about the best that can be built at present, but they have the objectionable feature of charging a rather high price for their product.

To Broadcast Concerts During Summer

Although the broadcasting of the government's band concerts by NAA, Arlington, will cease during the summer months, radio fans within several hundred miles of Washington will be able to pick up some concerts if the plans of the Chesapeake and Potomac Telephone Company are carried out.

By June 5th, this company hopes to complete its new station in Washington and start broadcasting the open-air public concerts from the White Lot and local parks where the Marine, Navy and Army bands will play almost daily.

Through the aid of a new portable "input apparatus" recently perfected by telephone engineers, the company expects to be able to pick up concerts and transmit them by wire to their station for radio broadcasting. This apparatus is mounted on a motor truck and can be dispatched anywhere in the city where something is to be broadcast.

Representatives of the company say that it is also sometimes difficult to relay speeches and music from private residences to broadcasting stations but they expect to overcome this handicap.

Important speeches and some concerts will also be put on a land line to New York and broadcast simultaneously from WEAF on a different wave length, telephone officials state.

Martin P. Rice, manager of publicity for the General Electric Co. has been investigating the possibility of installing a 1,000 watt broadcasting station at San Francisco or in the vicinity. This station is to be similar to the G. E. Station at Schenectady and will constitute one of the nine stations to be operated by the Radio Corporation, the Westinghouse Company and the General Electric Company.

How WGY Broadcasts

Use Twenty Mile Line; Four Microphones; Sermon Passes Through Five Exchanges

Have you ever wondered how a Radio broadcasting station with its fixed equipment manages to send out religious services weekly from churches many miles away from the sending station?

The operating staff of WGY, the Schenectady, N. Y., station of the General Electric Company has so developed church service broadcasting that thousands of letters of appreciation are sent in from far and near. Furthermore, clergymen who were frankly skeptical at first of the value of broadcast religious services and who doubted that the dignity and beauty of these services could be conveyed through the air, now pronounce Radio an invaluable aid.

The installation necessary for broadcasting the service of the Second Presbyterian Church of Amsterdam, N. Y., recently is typical and will give the Radiophan an idea of how it is accomplished.

In the church were four microphones, two of them spares for emergency use. Two were placed at the reading desk to get the words of the clergyman in scripture reading, prayer, sermon and announcements. Two more were hung above and in front of the choir and organ. These microphones or pick-ups were the only evidence to the congregation that the service they were hearing was going out to countless thousands many miles away. There is nothing in the church installation to distract the attention of the congregation from the services.

At one side of the church, hidden from view but in a position where he could follow the service was stationed one of the WGY staff who switched the microphones on and off as the service progressed. If the minister was speaking his microphone was brought into the circuit and the choir microphone was switched off.

Two other operators were situated in an adjoining room where a portable control equipment had been installed. In this room one of the operators controlled the amplification of speech and music. The amplifying outfit consisted of two 5-watt tubes, one 50-watt tube and other necessary apparatus. Sufficient amplification was used to overcome line noise on the twenty miles of telephone wire necessary to carry the electrical oscillations set up in the microphones to the control room of WGY in Schenectady, N. Y. The second operator in the side room was in constant communication by special land wire with the control room at WGY.

In the control room in Schenectady the church services were again amplified, this time on equipment which consisted of one 5-watt tube and two 50-watt tubes. From this point the electrical oscillations passed to the power apparatus and were impressed on modulator and oscillator tubes going to the antenna and the air.

Between the church in Amsterdam and control apparatus in Schenectady the service passed through three exchanges of the New York Telephone Company, the Amsterdam exchange, the Schenectady exchange and finally the exchange of the General Electric Company.

Will Broadcast Radio Minstrel Show

Radiophans throughout Western New York will have an opportunity for the first time, on Saturday evening, June 21st, of hearing a radio minstrel show, which will be broadcast complete on that evening from Station WHAM, Rochester, N. Y.

A feature of the program will be a chorus of eight, which will supplement the regular minstrel program with several vocal selections. The entire program will be given by a company of fifteen individuals under the direction of David C. Clark, announcer at the station.

From experiments carried on at other stations throughout the country, programs of this sort have worked out very satisfactory and have provided thousands of radio enthusiasts with an evening's entertainment of unusual merit.

The Square Law Condenser

By Virgil M. Graham

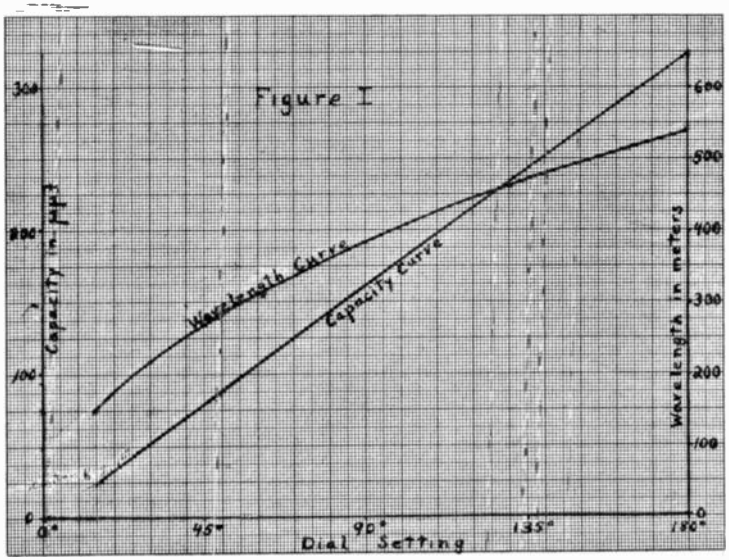
In the ordinary variable condenser with semi-circular plates, the capacity varies directly with the dial setting, that is, when the capacity is plotted, against dial setting as abscissae, the resulting graph will be a straight line. Thus the capacity of the condenser at any setting may be expressed as a function of the dial setting times a constant.

If this condenser is used across a secondary coil, loop, or tuned radio-frequency transformer, the wave length curve plotted against dial setting will not be a straight line, showing, of course, that the wave length does not vary directly as the dial setting. This is due to the fact that the wave length of an oscillating circuit containing a fixed inductance and a variable capacitance is not proportional to the value of this capacitance but to the square root of this value. Stated differently, the wave length of this circuit is a function of the square root of the capacity value multiplied by a constant. This results from the equation for the wave length of an oscillating circuit.

$$\lambda = 1885 \sqrt{LC}$$

It is obvious that if the capacity value of the condenser is proportional to the dial setting and the wave length of the circuit is proportional to the square root of the capacity value, the wave length will vary as the square root of the condenser dial setting multiplied by a constant.

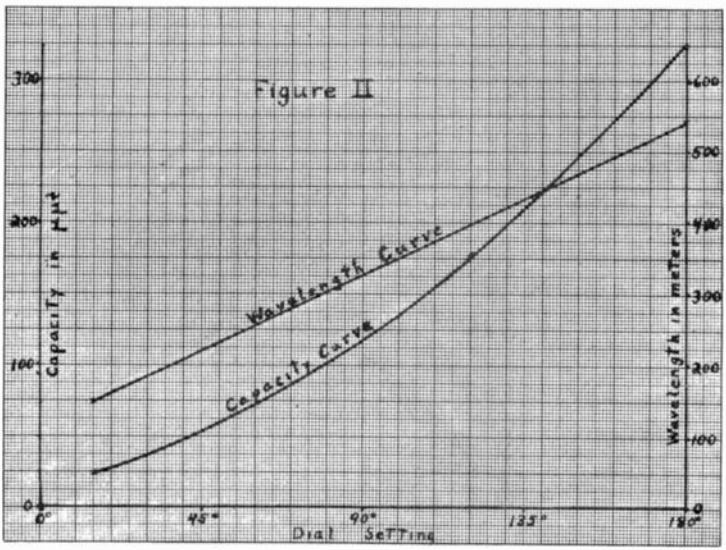
The capacity graph of a variable condenser and the wave length curve of the same condenser and a fixed inductance, both plotted against dial setting, are shown in Figure I.



It is evident that it would be desirable and convenient to have the wave length vary directly as the dial setting. This may be accomplished by using the "square law" condenser.

The square law condenser is one whose capacity is a function of the square of the dial setting or angular displacement of the rotary plates with respect to the zero position.

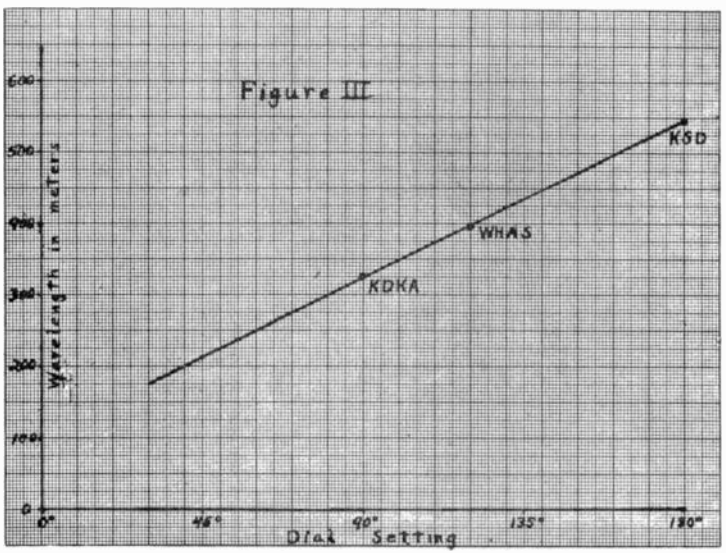
It can be shown by mathematics and proved experimentally that if this square law condenser is used with



a given inductance the wave length of this oscillating circuit will be a direct function of the dial setting. A capacitance curve of this square law condenser and a wave length graph of this condenser and a fixed inductance, are shown in Figure II.

If this condenser is used with a loop, secondary coil, or tuned radio frequency transformers, as mentioned above, a wave length calibration curve may be plotted from two or three stations whose wave lengths are known. The dial settings are plotted as abs-

(*continued on page 53*)



For the Benefit of the Layman

In Which Several Technical and Otherwise Confusing Expressions are Explained

By Eugene Handler—Associate I. R. E.

To the layman it is very puzzling to hear others speak of hook-ups, single circuit tuners, double circuit tuners, supers and other confusing expressions.

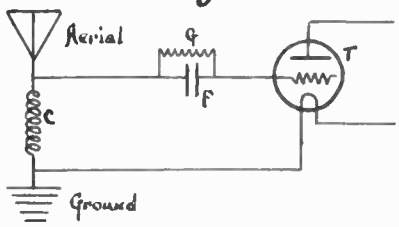
Actually, however, these terms are really very simple.

Radio tuning circuits are ordinarily divided into single and double circuit tuners.

Where one coil is used to tune both the aerial and the detector or local circuit, it is called a single circuit tuner.

Fig. 1 shows how this is accomplished.

Fig. 1



C-Coil, F-Fixed Condenser, G-Grid Leak, T-Tube.

To gain selectivity in tuning, the commercial and advanced amateurs employ double or two circuit tuners as shown in Fig. 2.

In this circuit the aerial is tuned to the correct wave length or frequency, and the secondary adjusted to resonance. The coupling between the two coils is of course variable which permits sharper tuning and the elimination of certain interference.

A three circuit tuner is the same as No. 2 with the exception that a third coil is placed in the plate circuit of the tube.

This third adjustment is usually referred to as regeneration and is the most simple form of radio frequency amplification.

Honeycomb coils offer a great many attractions.

First, the range is very great.

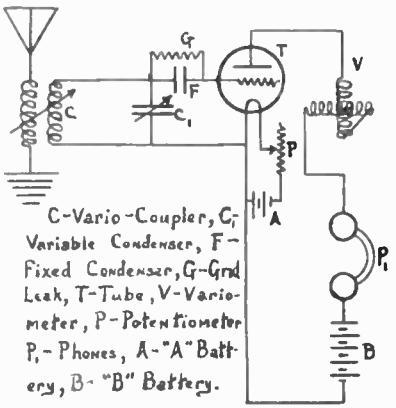
Second, the coupling can be made very loose, which means greater selectivity and sharper tuning.

Third, although greater skill is required in "tuning in" they are easily handled when the operation is learned.

In spite of the numerous circuits presented to the public by ambitious individuals, very few are original.

The majority are merely standard circuits slightly changed but fundamentally the same.

Fig. 2



There are three general types of radio receivers in use. Detector sets—audio frequency amplifiers—and radio frequency amplifiers.

All circuits whether super-regenerative, reflex, inverse duplex, super neterodyne come under one or more of the above headings.

Many of the circuits so popular today were considered obsolete eight to ten years ago, but the demand for simple tuners brought them into vogue again.

At this point many readers will say impossible, radio is only a few years old—the writer must be thinking of wireless.

Let me point out that there is absolutely no difference between radio and wireless. Wireless does not ne-

cessarily mean dots and dashes. Code work is radio and telephony is also wireless.

Since 1912 Radio has been the recognized name for this form of communication.

Has Developed Radio Calling List

Would you like to hear a concert over a high-powered radio receiving set? Fine, you say, but how about the "high-powered receiving set," if I don't happen to own one. The answer is easy. Simply step to a telephone and call the residence of Russell Howe at Charlotte and at his earliest convenience Mr. Howe will call at your home, place his receiving set in operation and provide you with excellent entertainment for an evening gratis.

Russell Howe

Like motion pictures for the "Shut-ins," are being provided gratis to those unfortunate individuals whose ailments prohibit them enjoying that form of amusement, radio is now being provided for these people through similar channels. One of the first radio enthusiasts to conceive the idea of providing an evening's entertainment for such individuals was Mr. Howe.

When he hears of an individual who is particularly interested in America's latest form of amusement and who may be prohibited for several excellent reasons from enjoying same, Mr. Howe loads his set, with a portable aerial, into his machine and goes calling. During the last several months he has developed quite a calling list and has become unusually popular in his vicinity.

Get Around it This Way

There are many landlords and owners in the cities who, even in these days of enlightenment and science, refuse to allow tenants to string antennas on the roof and for that reason many would-be radio enthusiasts lose interest. This, of course, is not always the case where a person can get a loop set, but supposing one can't? What are you going to do? Well, there are several ways out of this particular difficulty which serve just as well for local work and even do some DX work when the set is functioning well.

Ever try using the piano for an antenna? It works quite well in the following manner and doesn't bother little sister's music lessons: Attach a wire to the iron frame upon which the strings are held. Then go ahead.

Another good idea is to string a wire around the picture moulding in two rooms, using the open end as a regular antenna.

Or attatch a wire to the bed-spring. Don't laugh and show your ignorance! WIP has been picked up on a single circuit receiver using one tube, with a bed-spring antenna.

Or if the above are not odd enough for you, try this one: Coil an insulated wire tightly around a tube (No. 16 or 18 wire is about right) and let it stand tightly coiled for a couple of days. Then gently loosen it up and leave it coiled hanging loosely near your set and use one end of it for an antenna. Or better yet, put it out your window and let it hang for about eight or ten feet. If you wind about 100 feet of wire on the coil, you will have a good antenna.

Radio Cannot Reach This

Scientists can magnify the human voice 12,000 times, according to the Brockville, Ont., Recorder, but they seem unable to do a darned thing for the voice of conscience.

New Coast Station for General Electric

Work Started this Month on Two-story Studio Building Antenna Towers and Power House in Oakland

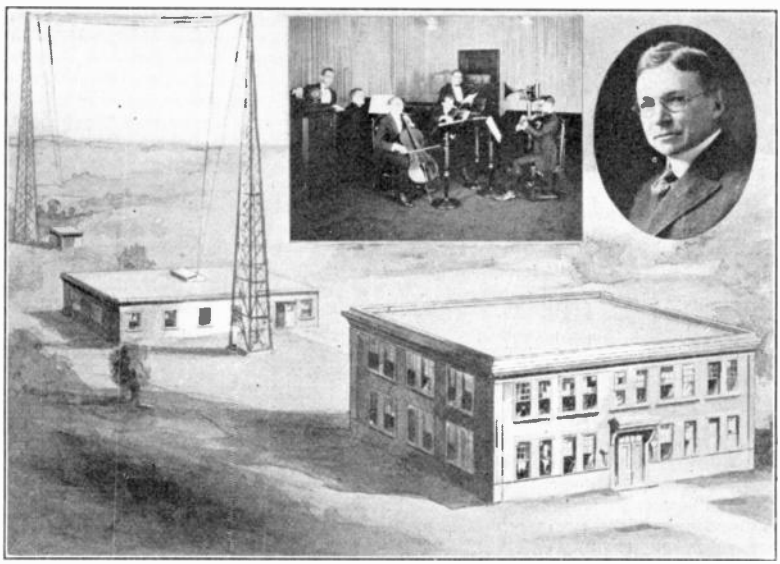
Faith in the permanence of radio broadcasting is demonstrated by the announcement of the General Electric Company that the first plant to be constructed exclusively for popular broadcasting will be erected in Oakland, California, to house the large Pacific coast station of that company.

Work will be started this month on a two-story studio building, the antenna towers and the power house. Workmen are already assembling the radio equipment. It is expected that the new station will be in the air within six months

Martin P. Rice, director of broadcasting for the General Electric Company, will direct the operating policy of the station and Dr. Thomas Addison, manager of the company's interests on the Pacific coast for the past thirty years, will have supervision of the plant.

The station will be located on East Fourteenth Street, Oakland, adjacent to the new General Electric Company factory building. The site was selected after a thorough inspection of available properties in San Francisco and vicinity. The Oakland plot was chosen because of its technical advantages, the availability of musical talent and the proximity of the site to San Francisco, the great commercial center of the Pacific coast.

The plans provide for a two story brick structure. On the first floor will be the office of the studio manager, a general correspondence room, a reception room for artists and quarters for motor-generator sets and storage batteries. There will be two studios on the second floor, the main studio large enough to accommodate large bodies of musicians such as a band or symphony orchestra and a smaller studio from which solo numbers and addresses may be broadcast. The use of two studios will make possible continuous broad-



Proposed Pacific Coast Station of General Electric Company at Oakland, Cal., Insert, How Studio will look; Insert at right, Martin P. Rice, Director of Broadcasting for General Electric Company.

casting. Research is now being carried on to determine the reverberating qualities of the ideal studio in order that the proper amount of dampening may be secured in the Oakland studio to assure maximum musical quality. The radio control room will be on the second floor.

One thousand feet back of studio building will be the power house and antenna system. The antenna will be multiple-tuned and strung between two steel towers, each 150 feet high and placed 260 feet apart. Beneath the antenna proper will be the counterpoise consisting of a network of wires, fourteen feet above the ground, covering an area of 150 by 300 feet. In addition to the power house which will be one story high, 71 by 32 feet, there will be a small building for the tuning apparatus and the end of the multi-tuned antenna.

The transmitting set will be similar to that which is now heard almost nightly from WGY, Schenectady, N.Y. and the many developments which have brought this station a reputation for exceptional transmission quality will be part of the Pacific coast station equipment. The apparatus is now being manufactured in the Schenectady works of the General Electric Company and tested at WGY.

The Pacific coast station will be operated at 1000 watts but the equipment will be designed in excess of that power for purposes of conducting tests. In operating high-powered equipment below normal rating in broadcasting, tubes and rectifiers are not subject to occasional overloads and, as a result, superior quality and greater reliability of transmission are obtained.

Six motor-generator sets will be placed in the power house and these will supply filament and plate current for the oscillator, modulator and kenetron rectifier tubes.

Every part of the equipment in the power house and in the control room will be in duplicate, assuring uninterrupted service. If one outfit or part of an outfit breaks down during the operation period another part will be ready to be brought into the circuit.

There will be six tubes in the kenetron rectifier assembly, one metal plate oscillator tube and one metal plate modulator tube. The control room in the studio building will have three stages of speech amplification made up of two 5-watt tubes and four 50-watt tubes. A fourth stage of speech amplification will be installed in the power house.

It is probable that an auxiliary studio, connected with the transmitting equipment of the station by telephone lines, will be located in San Francisco.

By means of what is known as "remote control", the facilities of a radio broadcasting station may now be brought to banquet hall, theatre or church and the audience, heretofore limited to the seating capacity of hall or church, is multiplied many times. The church is connected to the transmitting equipment by telephone lines and control of broadcast material is maintained in the church by operators.

The Pacific Coast station of the General Electric Company will utilize "remote control", to broadcast church services and musical entertainments from San Francisco and Oakland. The Pacific Telegraph & Telephone Company has offered to provide land wire connection for this type of service.

Big Naval Service

Nearly 5,000,000 words were transmitted by radio through the Naval Communication Service during the first quarter of this year. Last year this service handled nearly 16,000,000 words for the government through its coast stations. Sixteen different government departments used this service.

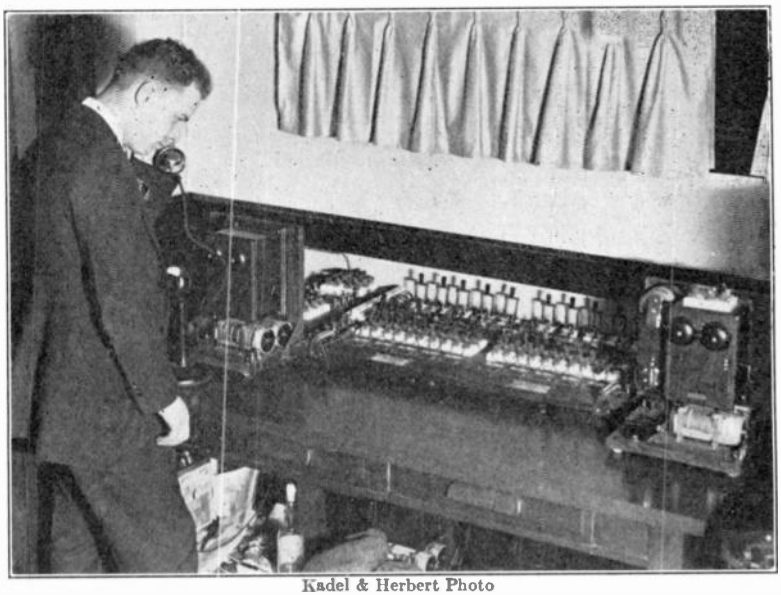
Radio on Lifeboats

Not only will the big liners carry radio, but their lifeboats will be equipped with a set, for use in case of emergency. In that case, the sea will be safer than ever.

Germany is sending radio apparatus into the American market. One of the German importations is a 26-inch collapsible loop antenna.

Foreign countries buy approximately $200,000,000 in radio supplies in the United States annually.

Switches for Land Wires to W J Z



Kadel & Herbert Photo

This control board connects the land wires which are used when broadcasting from points outside of the studio. Special lines are run from various auditoriums, churches, etc., about the city so that any time one line may be connected through these switches to the radio transmitter.

The telephones at each end of the table connect by a direct line with the operator of the radio room and the studio in Aeolian Hall. They are portable and independent of any external power. The batteries for talking are under the bell box in plain view. The standard desk telephone connects the operator by the usual city system to the distant studio providing a program.

Smithson Plans Entertainment

Frank Smithson, the stage director has been at work on a plan for radio entertainment on behalf of the Wired Wireless Corporation, a subsidiary of the North American company, which Smithson calls the "Theatrome," coined from "theater-at-home." The Wired Wireless Company is installing a large number of receiving sets on Staten Island, New York, to test its system of wired entertainment, before attacking the metropolis. This demonstration will test the practicability of General Squier's devices for receiving music and entertainment over the regular house lighting electric system.

Loud Speaker Directs

Whispers are directing the huge mobs used in some of the scenes for "The Hunchback of Notre Dame," now being filmed. Wallace Worsley, the director, has not needed to raise his voice above a monotone, yet it is carried to the farthermost portions of the seven-acre set.

This feat was made possible only through the great Radio amplifier, just installed by a Radio specialist of the Western Electric Company. The installation cost $7,000, but it saves hundreds of dollars every day and affords complete mob control.

The Truth About Radio

By Leslie A. Harber
The Radio Doctor

In the past two years there has probably been no subject more discussed than radio. Although the general public has come to regard it so, radio is not new. Radio telegraphy and radio telephony were known to scientists and a certain class of enthusiasts commonly known as "radio hams" for a good many years. But two years ago, it took someone with remarkable ingenuity and a keen insight for business to introduce an innovation which took the public by storm. It is doubtful at the time, if even he in his wildest dreams, ever looked for the boom that followed—a boom that not only spread from coast to coast in our own country, but even transmitted itself across the waters into foreign lands.

Radio Broadcasting is a new idea, but radio science is not. True, there are many more things known about radio today, than there were a few years ago, but the popularizing of the science, through what has been chiefly a new form of amusement to the public at large, has turned the minds of many brilliant men and women into new channels of scientific thought. Before there was no demand for the product of their thoughts and it is an age-old axiom that demand must always precede the supply. There are many things unknown today, that would give such an incentive as radio broadcasting has and which would become just as popular and give just as much comfort to humanity as radio is now doing.

Before broadcasting was given to the world there were only a select few who had any particular interest in radio and its kindred sciences. These few did not look upon it as merely something to amuse. It was a hobby with most of them, who were fond of experimenting along scientific lines, not so much for the good of the general public as a desire for their own education.

But it takes money to experiment and the average "radio ham" got along principally on make-shift apparatus of his own. So even he did not create enough of a demand for the manufacturer to get busy and produce high class products at a price reached by the average "ham's" pocket-book. Without this demand for manufactured apparatus the manufacturer did not feel induced to experiment himself in an attempt to improve his wares. For this reason the science of sending sounds through the air did not progress very rapidly for many, many years.

When De Forest and Fleming did their bit toward developing the present day vacuum tube, it was a big stride toward reaching the goal. It is admitted the audion bulb is the most sensitive electrical device ever invented and since that time, about twenty years ago, radio has made slow and tedious development; but in the end it got to the point where it was of practical use to humanity.

Then came the radio broadcasting craze. It took the country by storm and everyone who heard of it was anxious to "get in" on the "new" and novel method of entertainment. Broadcasting stations sprang up like mushrooms, and for once in the business history of the country, the demand for products of certain kinds exceeded all possible supply. Reliable manufacturers, both small and big strove valiantly to keep up with the tide. Others with a little or perhaps a lot of money to invest but with no particular knowledge of either radio, or even the elementary principles of electricity, saw big chances to grow rich over night.

And they did! At one time the business in the radio industry of this country exceeded $5,000,000 a week.

Radio apparatus of all kinds soon flooded the market. Most of it, be it said, was of the good reliable sort, while some was just plain trash. Extravagant claims were made of the superiority of one manufacturer's apparatus over others, until the radio fan hardly knew which way to turn. The worst of these sad, distorted claims, concerned radio itself.

No business boom that has yet occurred, ever lasted any great length of time without some reaction. But altho radio has passed thru the boom period and the accompanying slight

slump, it is coming back again and progressing stronger than ever but in a much saner manner.

Radio is here to stay! But it is small wonder that the average individual, who has no more interest in the construction of his radio outfit than has an automobile owner in the internal mechanism of his car, limits his interest to "will the thing work? If so, how well?" In my experience as a radio doctor, I have come across more than one fan who either bought a radio outfit or undertook to build one of his own and who felt keenly disappointed because he could not sit down and operate it, like a phonograph. I know of one instance right here in Rochester, where a radio fan went back to the radio store to complain about the difficulties in operating his set. The salesman, after listening to his tale of woe, quite frankly told him it was a phonograph he needed, not a radio.

The point I wish to bring out is this: In spite of the pessimistic view of some people that radio is on the decline, it will continue to remain with us as permanently as the telephone—providing it does not cut its own throat. Rash claims for any apparatus, no matter how good, will only tend to disgust the radio fan and cause him to mistrust everything that is said concerning it. Be it remembered that business of radio is as yet in its infancy and too much cannot be expected of it.

Radio Baths Effect Real Cures

Wireless waves have been performing many miracles in recent years, but they have now entered upon a new phase of development—that of allaying human pain and sickness, according to an announcement made by Dr. William S. Benson and Dr. Frank B. Schanne, both of Newark, N. J., who have perfected an invention that promises to revolutionize the treatment of many diseases, especially rheumatism, neuritis, pneumonia and the nervous afflictions.

The invention, a result of ten years of intensive study and experimentation, has been approved by Dr. Raphael Russomano, of St. Gerard's Hospital, Newark, N. J.; Dr. John William Perilli M. D., trustee of the Allied Hospitals of Greater New York and numerous others who have seen it demonstrated.

Doctors Schanne and Benson have applied the electro-magnetic wave to their invention, along with light and heat, in such form as to provide an electric bath by wireless and regulated to suit the most robust man or the weakest child. The cabinet is composed of several different modalities, or units, all of which can be utilized at the same time.

The patient is sweated or baked, as may be required in the treatment of the different diseases, is bathed in a strong electric light that is reflected upon the entire body and is subjected to a magnetic field that permeates every cell and tissue and which by means of a special mode of inductive current exercises all the muscles. This treatment is by "wireless" entirely. At no time, according to Dr. Schanne, is the patient in direct contact with an electric circuit.

So powerful are the wireless waves within the cabinet that a disconnected electric bulb held within the field of the waves will instantly glow. The invention, so to speak, places electricity "on draught" for general health and tonic purposes. In order to test the curative properties of the machine thoroughly, thousands of patients have been treated with it. Results have been satisfactory in practically every case. The new invention was demonstrated for the first time at the Edison electrical show in this city.

Broadcasted!

In no less a journal than the London *Spectator* appears the verb "broadcasted." There is no more reason for using "broadcasted" than there is for saying "casted" and "forecasted," contends the Providence, R. I., *Journal*. Long before radio came into existence the verb "to broadcast" was in good and regular standing. Its meaning, of course, was and still is, "to disseminate widely." We do not say: "He casted a stone at me," or "The weather bureau forecasted a storm yesterday." And there is no justification for tacking on a superfluous "ed" in the case of broadcast.

Constructing a Loud Speaker

By E. V. Fisher

The need of an efficient loud speaker which will reproduce sounds in their natural tone quality together with a clearness and loudness often phases the fan of moderate means.

A loud speaker which will produce natural and undistorted tones may be constructed at a moderate expense. First, procure a Baldwin Type C receiver unit. Second if it is desired, the experimenter may construct his own adapter, by building a box, 3 inches square and 2 inches deep. In the center of one side drill a hole large enough so the receiver will fit snugly and not be loose enough to receive the horn with a piece of rubber hose on the end. In the opposite side, cut a hole just large enough so the receiver will fit snugly and not be loose enough to fall out. If the

Finished Product

experimenter is not inclined to trouble himself with the manufacture of an adapter, one may be procured in several of the local stores which will be worth the price paid for it. Third, a tin phonograph horn may be used but best results are to be obtained from a horn which will not vibrate with the received music and produce a "tinny sound". A wooden horn is practically out of the question so the next best thing to do is to construct one from a material which may be easily moulded and when hard will produce what is known as a "dead horn", that is, a horn having no fundamental note of its own and which will not produce a metallic sound.

To build this horn, visit your waste paper pile and gather about four pounds of paper. This amount is of course proportionate to the size of the horn desired. Four pounds is enough material for a large horn. After you have torn the paper in small pieces, soak these in six quarts of water for twenty-four hours. When the paper has been well soaked add a quart of flour and a table spoon of alum for every half pound of flour used. Mix well and boil the mixture until enough water has been evaporated to produce a pasty mass resembling bread dough.

Apply this to the form which may be either a card board cornucopia or a former metal phonograph horn. Cover the horn with about a half inch layer of the mixture until near the end. Here only place a thin layer over the form and then construct a wire frame from No. 15 copper wire or something to serve its purpose. This wire frame is placed over the first layer to reinforce the pasty material, and also holds piece of brass tubing for adapting loudspeaker receiver.

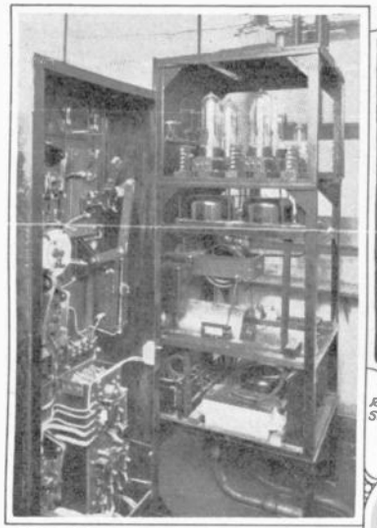
Place this frame over the end of the form after the thin layer has been applied. Then continue covering the horn up to the piece of brass tubing. Permit the horn to dry for one week in the sun if possible, then remove the form cautiously. If the form is a metal horn grasp the paper horn and drive the form through by using a wooden mallet and a piece of wood to rest against the end of the metal form.

After the form has been removed, allow it to dry another week. Then apply two or three coats of shellac and cover all with paint. When hard the horn may be used with the same facility as an ordinary phonograph horn. The horn will hold a screw or an eye if these are desired for mounting.

The results from the labor required will be gratifying. The horn reproduces very well and when painted properly will prove equally attractive as the old honograph horn.

The following suggestions may be helpful in making the horn. When applying the mixture, pat lightly with

A PHOTOGRAPHIC RECORD OF THE PROGRESS OF RADIO



REAR VIEW WITH GUARDS REMOVED OF THE 500 WATT WESTERN ELECTRIC TRANSMITTER USED AT STATION W·E·A·F IN NEW YORK

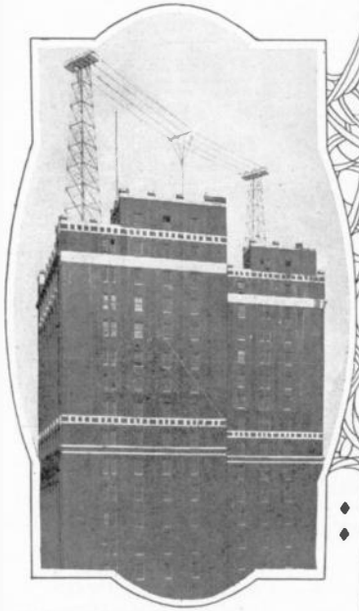
REAR ADMIRAL "BOB" EVANS ON FLAGSHIP CONN. SEATED IN WIRELESS ROOM. PHOTO TAKEN NOV. 4, 1907 © UNDERWOOD AND UNDERWOOD

A GROUP OF AMATEURS CATCHING WIRELESS MESSAGES FROM AN AERIAL ATTACHED TO A KITE PHOTO MADE IN 1905

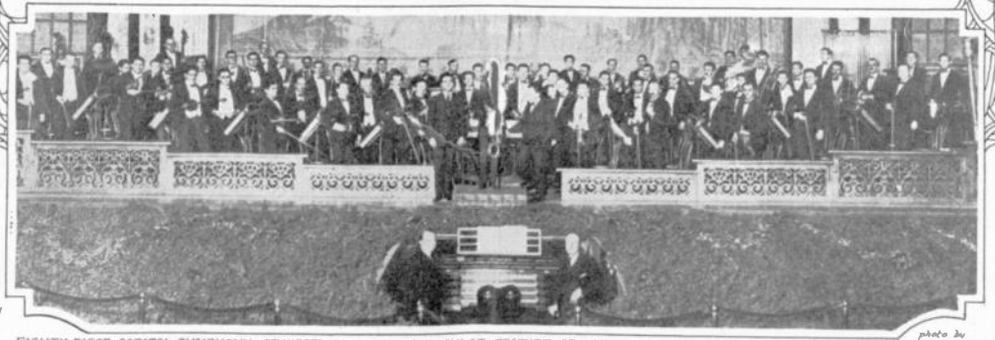
ALFRED PAGE LANE, WHO HAS PERSONALLY MADE AND ERRECTED MOST OF HIS APPARATUS. HE HAS A STATION THAT RECEIVES MESSAGES FROM 150 MILES AND CAN SEND 20 MILES. PHOTO MADE IN 1908

V. A. RANDALL, STUDIO DIRECTOR AND ANNOUNCER OF W·E·A·F, AMERICAN TELEPHONE AND TELEGRAPH COMPANY'S RADIO BROADCASTING STATION AT NEW YORK.

A VIEW OF W·E·A·F'S NEW STUDIOS AT 195 BROADWAY, NEW YORK. MANY REFINEMENTS MAKE THESE THE MOST MODERN BROADCASTING STUDIOS.



THE POWERS OF THE BROADCASTING STATION OF THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY AT 24 WALKER STREET, NEW YORK. THIS IS NOW OPERATING ON 492 METER WAVE LENGTH WITH THE CALL LETTERS W.E.A.F.



EIGHTY PIECE CAPITOL SYMPHONY ORCHESTRA WHICH IS A REGULAR FEATURE OF W·E·A·F'S PROGRAM ON SUNDAY EVENINGS. photo by RADIO L. L. HERBERT, N.Y.

S. L. ROSS, DIRECTOR OF PROGRAMS OF W·E·A·F, THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY'S RADIO BROADCASTING STATION AT NEW YORK

the hand. This will smoothen the surface and prevent the material from rolling. Go slowly and apply evenly. Do not leave any weak or hollow spots.

A 1950 Radiogram

No more we have to stop for tires
  Or smelly gasoline,
No more in trains forever late
  We crawl across the scene,
No more we suffer mal de mer
  When overseas we go,
For everybody travels now
  By radio.

The housing problem's also solved—
  No longer do we seek
A kitchenette and bathtub at
  A hundred plunks a week.
On Mars I own a sleeping porch
  And handsome bungalow—
I bought them for a trifling sum
  By radio.

We get the latest stock reports,
  The doings of the day,
A lecture and an opera,
  A poem and a play,
A doctor's diagnosis too
  Of all the ills we know,
And his prescriptions curing each
  By radio.

That tired feeling is unknown
  Because we never talk
Or think or read or write or eat
  Or work or ride or walk
Or love or hate or dance or sing
  As once we did, for lo!
We've tuned ourselves to do it all
  By radio.

—Minna Irving, in *Radio Merchandising.*

Speed

The railroad train increased speed to sixty miles, the airplane doubled that and now we have the wireless wave, which travels so fast it can encircle the earth seven times in a single second.

Some say that the Radio telephone will never be of practical value, because it is not private. Remembering what miracles science has already wrought, none dare predict that even this disadvantage will not be overcome.—*C. C. Dill.*

A Little Thoughtlessness

In a certain section of a city in the northwest owners of Radio receiving sets have a great deal of trouble with interference from a spark set in the neighborhood that paralyzes all reception. Is this the case with you in your city? It stands to reason we all have the same trouble. Just about the time you get the set working on a very fine selection, then all of a sudden the sender of a spark station near you fills the air with a carrier wave that drowns out any reception coming in.

It is not believed that anyone is mean enough to purposely do this when aware of the results. The ones doing this are not versed in Radio, but are usually some beginner that does not know of the offense.

Everyone interested in Radio should get together for the benefit of the game. The amateur has his rights and they should be, and are, respected. The beginner should respect the rights and privileges of his brother amateurs and broadcast receivers and not give all the amateurs a "black eye" because of his thoughtlessness.

Correction

The circuit diagrams for the articles in our issue of May 30th, on the "Flivver Circuit Amplifier" and "Selective Regenerative Receiver" were accidentally transposed. These circuits were printed on pages forty-eight and forty-nine of that issue.

Here's Another

Hamlin, New York
June 1, 1923.

Will W. Zimmer, Inc.,
Rochester, N. Y.

Dear Sir:

Enclosed find money order for two dollars for one year's subscription to "LISTENING IN" and "100 Radio Hookups". I would like my subscription to begin with the Memorial Day Number if it is not too late.

Have just been reading the copy for May 19 and like it.

Respectfully yours,
Delila Timmerman.

The Question Box

We will be pleased to give all the information and assistance possible thru this department. If you are having difficulty with your outfit, kindly send the wiring diagram or sketch of your circuit when possible, as it greatly assists us in locating trouble. Also give size of condensers and number of turns of wire in the coils. Address—

The Question Box Editor

About UV-199 Tube.

Question: What is the proper plate voltage to use with the UV-199 tube?

Answer: Not over forty-five or fifty volts, unless the grid is given a negative bias. If sixty volts are put on the plate the grid should be made about three volts negative.

Question: How should these tubes be mounted in a set?

Answer: They should be mounted upright and the sockets set on sponge rubber to prevent mechanical vibration of the tubes as much as possible.

Proper Size of Secondary Coil

Question: What is the proper size coil to use with my three coil regenerative set?

Answer: For the longer broadcasting wave lengths use a seventy-five turn honeycomb coil or a "secondary single layer coil." For the new shorter broadcasting wave lengths use a fifty turn honeycomb coil or "tickler single layer coil." These coils are the proper size if you are using a twenty-three plate secondary condenser.

Trouble with Amplifiers

Question: I have a Westinghouse RC set and I get good signals on the detector, but none when I plug in on either stage of amplification. What would you suggest could be the trouble?

Answer: It is possible that the detector jack is not properly adjusted so that, when the amplifiers are plugged in, circuit is not made through the primary of the first amplifying transformer. It is also possible that the winding of this transformer has gone open.

Regarding Peanut Tubes

Question: What peanut tube can I get to fit a standard socket? I have one in my set and do not want to change it.

Answer: Procure a WD-12 Radiotron tube. This tube will fit the standard socket and will require only one dry cell as "A" battery.

Desirable Grid Condenser

Question: What is the best grid condenser to use with a WD-11 detector tube?

Answer: Use a condenser of about .00025 microfarads capacity, one which has mica for its dielectric.

Loop Antenna Reception

Question: Can I hear out-of-town stations using a loop antenna?

Answer: We cannot answer your question unless you give data concerning the receiving set that you wish to use with the loop. You probably would not get satisfactory results on distant stations unless you used two or three stages of radio frequency amplification along with the detector and a two stage audio frequency amplifier.

Question: How can I connect a loop to my set?

Answer: Before answering this question it is also necessary that we have information regarding the type of set you plan to use. If you have a radio frequency amplifier set, connect the loop with tuning condenser in parallel, across the terminals which ordinarily go to the secondary coil.

Let 'em Scrap

The Crosley Manufacturing Company, of Cincinnati, has started its own publishing house as a result of the scrap between the music publishers and the broadcasters.

As a starter, "Somebody Else Is Stealing My Sweetie's Kisses" was gotten up by local talent, put on the air and is now quite the rage with WLW fans.

Ireland's Radio Policy

No definite policy had been announced by the Irish government up to April 1, regarding its position with respect to wireless broadcasting or the operation of private receiving sets. There is a small market for this class of equipment, which, since the regulations of the British postoffice and the British Broadcasting Company do not apply in Ireland, is open to foreign manufacturers.

Stock Tips Are Banned

New York.—Use of the Radio to broadcast market information or forecasts of business by its members is prohibited by the terms of a resolution adopted this week by the governing committee of the New York stock exchange. The resolution prohibits also broadcasting by Radio of any matter intended to advertise firms of members or to stimulate interest in particular securities on the stock market.

Philadelphia has seven active transmitting stations, making it one of the leading cities in the world for radio broadcasting.

The electric central stations of the United States are planning extensions and additions in 1923 which will cost more than six hundred million dollars.

Amateurs' Round Table

The Rochester Plan

Too few of the people of this vicinity who are interested in the reception of broadcasting appreciate the remarkable progress that has been made in the matter of eliminating interference in the air.

Most of us are inclined to go up in the air if a code message comes cutting into the midst of an evening's concert never for a minute stopping to think what that buzzing may mean to some one far from the sight of land. Often it is a matter of life or death and at other times may mean thousands of dollars to some one sorne where.

Its generally dollars to doughnuts that the first thing that comes to the mind will be that amateur lives around the corner. He is usually the goat and on him all blame must go. Many times he is a real amateur you can bet your last B battery he will remain quiet until after the clock has reached ten thirty, in accordance with the schedule known as "The Rochester Plan."

This Rochester Plan was adopted at a meeting held in the local Y. M. C. A. at which the members of the Radio Club of Rochester, broadcast listeners, the Radio Inspector and the officials from the headquarters of the American Radio Relay League at Hartford, were present.

This plan meant a big sacrifice to the many amateurs who previously had the entire evening to talk among themselves. They cheerfully gave up the use of their transmitting sets during the entire evening from 7 to 10:30 o'clock.

This plan has been enforced during the past year by the members of the Radio Club of Rochester working in cooperation with the radio inspector at Detroit.

It has been necessary to secure the assistance of the federal officers in a few cases but all things considered the amateurs of this section have shown a spirit of cooperation which may well be practised by every one interested in this great radio game.

This Rochester Plan is now known from coast to coast and wherever there is a member of that great brotherhood of brass-pounders who alone know the greatest thrill of radio, to hold a chat with a fellow bug hundreds and sometimes thousands of miles away.

Most of the code messages which occasionally break in on our music before 10:30 P. M. are the commercial stations on the lake boats on shore stations of the great lakes or the Atlantic coast.

Broadcasting Grows

Broadcasting stations in the United States increased almost 16 fold in one year. There are 570 stations today. A year ago there were 36.

Fake Radio Inspector

A fake radio inspector has been issuing "licenses" to amateur and broadcasting stations in Minnesota, the Department of Commerce has been advised. Using the return stub of an amateur application blank secured from the department, an individual giving his name as Cecil Osborne is said to have supervised the installation of a radio station in Minnesota and issued what he called a license.

This imposter claimed that he was a former radio operator of the Navy Department and a member of the Naval Reserve. The only record of a man of that name in the files of the Navy Department, is that of a deserter who served for a time as an apprentice and seaman. He deserted in San Francisco in July, 1922, the official records state.

All radio inspectors of the department, the officials in Washington point out, are supplied with means of identification, including official badges and identification cards bearing their photographs. Amateurs and broadcasters are advised to ask for identification cards and to pay no fees for licenses. Although the White Radio Bill contemplated the payment of fees for licenses, it failed to pass. The present law provides for the licensing without charge.

Neighborhood Talent

Houston, Tex.—Fred Mahaffey, Jr., 15-year-old high school student, claims to be the youngest broadcasting station operator in the world. He has regular programs daily except Sunday at 7:30 to 8 p.m. with his own violin selections, piano solos by neighbors and vocal numbers. Mahaffey's station is KFCV, 360 meters. He uses 10 watts antenna input and is heard all over the Southwest.

Bequeaths Radio Set

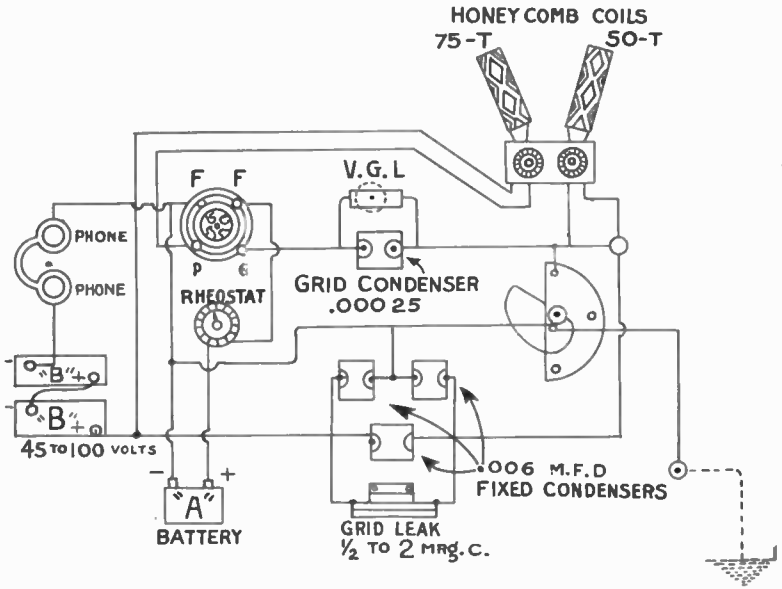
The first case on record of a Radio receiving set being specified in a will was revealed when the will of J. J. O'Heir was probated in New York. He bequeathed a "Radio set and tools, valued at $500," to William Watson.

Everyone is reading "Listening In," how about you?

The Radio Builder

The Flewelling Receiver

The Flewelling circuit was developed this spring by Mr. Flewelling and has gained popular favor because of the remarkable results obtained with this circuit and a few parts which may be purchased for approximately $15.00.



Distance and volume are among the things most sought after by the average radio experimenter. The Flewelling Circuit seems to have secured both of these from a single tube and the hook-up is properly tremendously popular. Since very little apparatus is required to assemble this set, we believe that the radio fan will be well repaid for the time and money spent in constructing it.

It is a variation of the Armstrong Super-Regenerative Circuit, the "variation frequency" being secured by means of the condenser bank and resistance. On account of the very great amplification obtained, it will be found that extreme care must be taken in the adjustment of the grid leak.

There are only a few standard parts with the grid leak and condenser mounted on the panel. Since the grid leak must be frequently adjusted while the set is in operation it is desirable to control this by a knob on the front of the panel. There are new grid leaks on the market now designed for this circuit It should not have the grid condenser too near the knob for the capacity effect will cause the outfit to squeal. All of the apparatus used should be of the highest grade and on account of the critical adjustment of Super-Regeneration, only sockets such as Condensite should be employed.

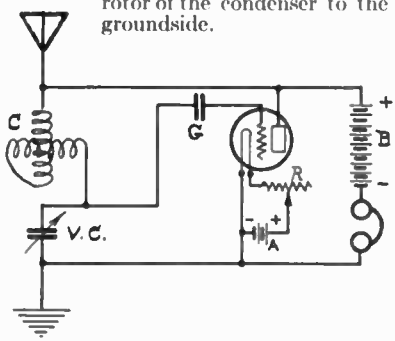
Experience shows that this arrangement works best with the antenna alone (no ground), or with a loop. In case a loop is used the terminals should be connected in place of the antenna and ground connections shown.

A variocoupler may be used in place of the two honey-comb coils shown, the rotor being rewound so as to hold about 75 turns of wire. As a high plate voltage is used, only mica condensers should be used in this circuit.

A hard tube, such as a UV-201-A, 202, or W.D. 11, is preferable, and while satisfactory results may be secured with 45 volts on the plate, greater volume is secured when this is increased.

Latest Radio Flivver

We are presenting here the latest form of the Radio Flivver receiving outfit. The use of a variometer instead of the honeycomb coil for short wave work, improves the flexibility, causes the set to regenerate over a greater range and increases the signal strength greatly. The set is as sensitive and selective as any other single circuit receiver. Capacity effects can be almost entirely eliminated by connecting the rotor of the condenser to the groundside.



This circuit requires a good mica insulated grid condenser because the full plate voltage is on one side. An efficient variable grid leak shunted around the grid condenser will be an improvement when the adjustment is correct. Try a high resistance about 4 megohms. Also try a phone condenser .001 mfd across the head set terminals.

Following is the apparatus needed:

1—Variometer with the total turns about 75-80.

1—Variable Condenser, 13 plates, app. .00035 mfd.

1—Grid condenser, mica insulated .00025 mfd.

1—Variable grid leak of reliable construction.

1—Filament Rheostat.

1—Phone condenser .001 mfd.

1—Tube socket with good spring contacts.

1—Formica or Celeron panel 6″ x 12″.

1—Open circuit jack.

Accessories

1—Vacuum Tube WD-11 or UV-199.

1—Dry cell for filament lighting.

1—B Battery.

Hints for Home-Built Set

Be sure to ground the shield if the panel is shielded.

Solder all connections. This is especially important in tube sets.

Arrange the cabinet so that the tubes can be removed and replaced easily.

Avoid sharp turns and bunching of wires. Make all connections as short as possible.

Use good material when building a radio set. The results will be well worth the slight difference in cost.

If jacks are used be sure that they are making good contact. Do not use wood for a panel. It is very inefficient.

As the vacuum tubes generate considerable heat, make some provision for ventilation. One or two small holes in the cabinet will be sufficient. A small screen or bezel adds to the appearance.

Reunites Family Circle

To those who fear that scientific inventions are to destroy the home I commend contemplation of the radio. If the automobile and the picture show have tended to entice people away from homes, the wireless telephone has come to reunite the family circle. It appeals to all. It fascinates the youth in school. It entertains them as they grow older and instructs and educates men and women in every walk of life, of every condition and of every age and all this too around the family fireside.

Like the automobile and the picture show when they first came the radio's first use was to amuse and entertain. Now the automobile is an established part of our industrial life.

The motion picture show equals, if not surpasses, most of our newspapers as an educational force in the community where it exists. Just so, I believe the wireless telephone is destined to play a tremendous part in the education and civilization of the future. —*C. C. Dill.*

If you want to get a line on what is new in radio, read "Listening In."

Radio Lessons for Beginners

Primary and Secondary Circuits

By Edward T. Eastman

The primary and secondary circuit is the part of a radio outfit which we adjust when tuning in a station. The dials are sometimes marked wave length control. These two circuits may be in one coil and one adjustment or two coils and two adjustments. This gives us the single or double circuit type of an outfit.

The primary circuit is the path traversed by the radio wave in going from aerial to ground. The primary circuit may be traced from the aerial through the lead into the aerial slider, through about one-third of the turns of wire, out the other side and down the ground wire to the earth.

By induction, a magnetic principle of electric currents, another current is induced in the same tuning coil and it traverses the secondary circuit in the following manner: From the coil out the end to the crystal detector D, down through condenser C and around return wire to slider rod and through slider back into coil.

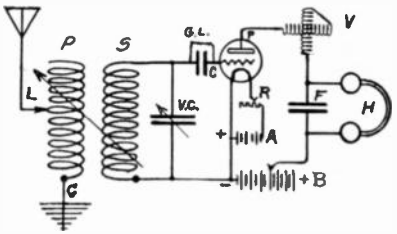
This is called the single circuit tuner because one coil of wire carries two electric currents through it. Remember that a coil means several turns of wire wound together, thus forming an inductance. The single circuit arrangement has many points in its favor. It is easy to build and less expensive than the two circuit tuners. It is a little easier to tune and gives slightly louder signals. However, its selectivity is lower so it is not easy to tune out interference.

The primary circuit is as follows: From the aerial and lead-in wire to slider and into the coil, coming out at the lower end, from there it passes on into the ground. The secondary winding is not connected, but may be moved back and forth inside the primary.

The current induced comes out through some special flexible connection, goes to the detector, condenser and then returns by another flexible return wire to inside the coil.

Generally, a switch lever inserted here gives the variation of the number of turns of wire. The primary may be varied by the slider or switch points with a variable condenser in series.

Here we have two circuits in entirely separate coils and so this method derives its name. It is more selective when adjusted with care by pulling out the secondary or tuning it at an angle, if a rotor is used.



The Primary and Secondary Circuits using a Two Circuit Tuner

The above diagram shows the usual method of connecting a loose-coupler with a tube outfit. The use of single and double circuit applies to tube outfits, in the same manner, except the right half of the wiring is adapted to tubes.

Amplifier Noise

Question: How can I stop the slight whistle in my second stage of amplification?

Answer: By placing a grid leak of from two to six megohm resistance across the secondary of that transformer.

A letter signed "Patients of the Vermont Sanatorium" was recently received by WGY, the General Electric Company broadcasting station at Schenectady, N. Y., acknowledging the pleasure and entertainment they get from the radio programs. The 60 patients are suffering from incipient tuberculosis and most of them depend upon WGY for the Sunday religious services. They wrote that they get the 7:45 p. m. concert, but have to be tucked into bed at 8:30.

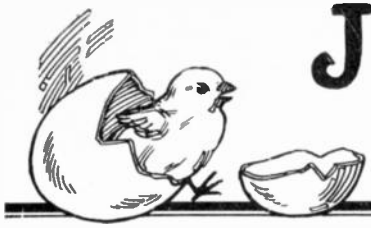
Jazz Still Restricted

Publishers of standard music have adopted the recommendation of the Music Publishers' Association of the United States and will allow standard music to be broadcasted by radio without charge. This does not affect the stand taken by the American Society of Composers, Authors and Publishers several weeks ago, forbidding radio stations to broadcast their music except upon payment of a license fee. Practically none of the jazz selections and popular songs will be radiated by the majority of the stations.

It is understood that WEAF, the American Telephone and Telegraph station, has a temporary license to broadcast copyrighted music controlled by the American Society of Composers, Authors and Publishers, Broadcast Central, at Aeolian Hall. WGY at Schenectady and all Westinghouse stations are among those which have refused to get licenses.

English and Loudspeakers

"There are two languages in America today," said Dr. Charles P. Steinmetz, the famous electrical wizard, at a banquet in Chicago recently. "They are English and Loudspeaking." The applause that followed emphasized the general dissatisfaction that exists today with the existing devices for reproducing radio messages. The public wants its radio entertainment to be reproduced so that it may be heard in a room with the same ease and pleasure that now attaches to a high grade phonograph. There is nothing that the manufacturers of radio can do to stabilize radio, to increase its sales and to win and retain a larger measure of public approval, than to put on the market at a reasonable price any amplifying or loud-speaking device that will operate without painful distortion of sound, that can be operated without the aid of complicated accessory apparatus, and which will enable one to adjust the volume of sound easily to the size of the room and the audience.



Just Out

New Apparatus, Devices and Patents

Great Lakes Station to Help Save Lives

Buffalo, N. Y.—For the first time an independent Radio broadcasting station will be a factor in saving the lives of those imperiled by violent storms on the Great Lakes and amateur Radiophans can now picture to themselves the scenes on shipboard described in their favorite sea stories when they receive the thrilling news of an approaching storm. This weather information will be broadcast partly in a code of letters and figures by the powerful Federal Telephone & Telegraph company's station WGR at Buffalo, N. Y., at 10:45 a. m. and 10:45 p. m., Eastern time, every day. Interested fans may obtain the key to this code by writing to the weather bureau, Telephone building, Buffalo, N. Y.

Prize of $50 Offered

An English radio manufacturer is offering a prize of $50 for the first English amateur who is successful in receiving a message from WDAP of Chicago, Ill. The stipulations in connection with the prize are that no more than three stages of radio frequency amplification shall be used in the successful test.

Radio Heats Water Bottle

Something brand new in the line of domestic comfort is now on the threshold of appearing on the market. Built along the scheme of the electric bottle, it will derive its power from wireless waves, which will heat it to the proper temperature as soon as you press a button.

No Change in Time

Station WOC will continue to broadcast all musical programs, market quotations, weather reports and lectures according to Central Standard Time, the same as heretofore and those living where Daylight Saving Time is being used will have to be governed accordingly.

German Wave Will Down Airplanes

French aviation investigators in Germany reported today that the Germans have discovered a Radio process which forces airships, however powerful, to land. Serious alarm is felt in French airplane circles at this news, which vitiates every effort in the development of France's chief weapon, aviation. Radio waves of extraordinary potency and of special quality are used to stop the airplane motors.

Cuban Station Tunes In Cleveland

The new cuban Station 6KW, operated by Frank Jones, is now working on a wave length of 315 meters. Mr. Jones recently entertained the whole town of Tuinicu with a Cleveland News Radio concert broadcast from the Union Trust Company's station. A loud speaker was placed in the window of the studio and connected to the receiving set. The entire populace listened to the "wave from Lake Erie" roll in.

A New Police Plan

An international police identification system was proposed by Hakon Jorgensen of Denmark at the recent New York police conference.

If his plan is carried out the fingerprints and identification marks of all criminals would be coded and indexed. They could then be transmitted anywhere by radio for quick capture of fugitives from justice

Another Radio Faculty

Still another college is testing the possibilities of radio as a means of getting education to the public. The faculty of Marietta College in Ohio has decided to broadcast a full set of its courses and to give regular credit toward a degree for courses taken in this way. It will be necessary for the radio student to register in the usual way, but aside from that he need not go from his own house.

Desirable Set for Use by Farmers

In regard to a set for the farmer it must be considered that he probably has not the facilities to make or opportunities to procure the parts necessary for a radio outfit. Thus in recommending a set for farm use, we would suggest that a completely made up set be purchased.

As the storage battery would be an undesirable feature, a set which uses any of the peanut tubes, the U.V.-199, W.D.-11 or W.D.-12. Dry cells may be used to light the filaments of these tubes. The Radio Corporation of America has placed on the market several sets utilizing these different tubes. Three of these are particularly worthy of mention for a farmer's set.

First, there is the Aeriola Senior, a single tube regenerative set, requiring only one dry cell for filament heating and one block of plate battery.

Then there is the Radiola R S set using two W.D.-11 tubes and requiring two dry cells and two blocks of B battery. This set is a very compact little outfit and may be closed up when not in use. It is also a very simple set to tune.

The Radiola 2 set is one using the U.V.-199 tubes, and is made in the form of a small valise. The current for the filaments of the tubes is supplied by two flashlight batteries, which plug into clips in the inside of the set. As this set may be entirely closed up for carrying it makes a very good portable set, for which use it was originally made.

Any of the above sets will give satisfaction to the farmer if used with an antenna about seventy feet long and thirty-five feet high.

A lightning arrester of any reliable brand should be used with the antenna. A ground for the lightning arrester should be of such construction as to be approved by the Fire Underwriters.

A number of bureaus and departments of the government are considering, it is understood, the advisbility of using the radio to send out instructions to their field agents. The matter of using radio in place of the telegraph is being given consideration.

New Broadcasting Test

When it was announced that both WEAF and WJZ would place microphones in the Metropolitan Opera House to pick up speeches delivered by men of prominence in honor of General and Mrs. Ballington Booth and the Volunteers of America, there was some objection against two powerful stations broadcasting the same material simultaneously.

The test proved successful. There was not the slightest interference caused by the words traveling through space on WJZ's 360-meter wave length and the same words broadcasted by WEAF on 400 meters. At the same time station WBAY was broadcasting the Chamber of Commerce meeting at the Hippodrome on 492 meters. Never before has the ether around New York met such exactions. Not even for an instant did the waves of the three stations conflict.

Reports from radio listeners throughout the Eastern States and Middle West indicate many persons were pleased with the dual broadcasting. Receiving sets which experienced interference on WJZ's wave length merely had to tune in WEAF on 400 meters, and those who ran into interference on the 400-meter wave just shifted the tuning adjustment to 360 meters.

Another advantage of dual broadcasting of an important event is that if one station breaks down the other is still in the air and the message is not completely lost. Another important advantage of dual broadcasting was that a transmitting aerial has directional effects—that is, it radiates more efficiently in one direction than in another. In this respect WEAF and WJZ differ and some receiving stations in certain localities can hear the Newark signals louder and with less interference than those of New York.

This was demonstrated recently when Frieda Hempel was about to sing "Home, Sweet Home" before the microphone of WJZ. A high wind preceding an electrical storm carried a section of the Westinghouse aerial from the masts and thousands of radio listeners were disappointed. If another station had placed a microphone before the singer her audience could have enjoyed the selection.

Honeymoon Is Broadcast

We suggest that they install a gigantic broadcasting station up at Niagara Falls right over the falling waters.

This will allow the roar of the great falls to be heard throughout the country and will save millions of dollars in honeymoons alone.

All a young couple will have to do is tune in for Niagara, hold hands and let their gosh darn imagination run riot.—*Radio Digest.*

Swedish Hospitals Give Aid

Free medical advice via wireless to Swedish ships at sea will be given on demand from leading hospitals in Stockholm and Gothenburg, providing the Swedish government grants the request of the Department of Telegraphs to transmit such advice without cost. Sweden will be the first country in Europe to inaugurate this kind of service, already tried out in this country.

Hypnotic Radio

Vishnu, the celebrated hypnotist has succeeded in doing it by radio, and Miss Beatrice Kyle, of Birmingham, Ala., was the victim of his mental suggestions.

The broadcasting was done from WSY, operated by the Alabama Power Company, a half mile from the theatre where the radio receiving set was located and where the effects were seen by an audience.

N. J. Doctors Laud Radio

Hackensack is a small New Jersey town—but not so small at that. It's an average American city, with some 18,000 citizens, many of whom commute to business in New York, Newark and nearby centers. It is far enough from Broadway to have a definite individuality of its own, and an unmistakable civic consciousness, yet it is near enough to have within its grasp most of the advantages of the big city at the price of a ride in the train—or the installation of a radio receiving set.

Radio Wild

And Hackensack—which, like New York, was founded by Dutch settlers—is eagerly grasping the advantages of radio. Antennas stretch in every direction over lawn and garden from housetop to garage or tree or pole. In that Hackensack is not at all extraordinary. Thousands of communities are just as well provided with sets. What puts the city in a little niche all its own is the fact that its doctors have been responsible for the installation of a great many of the sets that are bringing so much pleasure and profit to its residents.

Real Epidemic

Hackensack doctors, as a body, are enthusiastic over radio. Anybody might guess it from a walk around town, for when you see a doctor's sign you only have to look in the air to find an antenna. That's not 100 per cent. perfect—nothing ever is—but you will find the antenna nine times out of ten, and if there is any town that can show a better average among its doctors, it still has to be discovered.

But you have to call upon those doctors to get the really astounding facts about radio as seen from a medical point of view in Hackensack. You will find them all enthusiastic—and all saying the same thing, whether they be homeopath, allopath, chiropractor, eclectic—even the dentists agree with the rest.

Broadcasting Service For everyone

More than 90 stations, both telegraph and telephone, now broadcast market news by radio and with the contemplated additions to the service, farmers will be able to get radio reports wherever they may be located.

In the early days of radio telephony farmers were slow to take up the radio idea and depended largely upon town organizations such as banks and merchants to receive and relay the market news by wired telephone. But in more than half the letters received by the U. S. Department of Agriculture in response to an inquiry sent out by the Bureau of Agriculture Economics, the writers state that many farmers in their immediate territory now have their own radio sets, and that many other farmers are planning to make installations.

One-third the total population of the United States lives on farms; combined with the number of people in villages and small towns, the rural population is estimated at more than half the total population. Here is a fruitful field for radio expansion.

The Latest Necessities

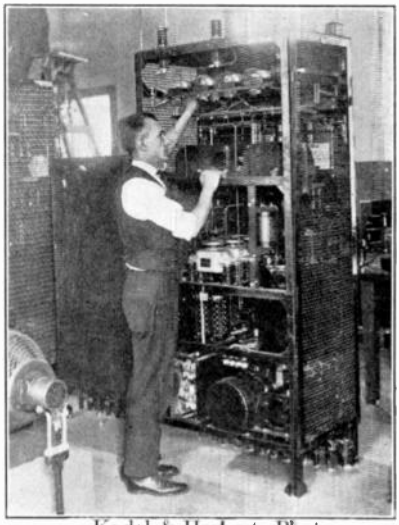
An automobile and a radio receiving set may be considered luxuries for city people, but they are necessities for the farmer. The auto enables the farmer's family to come to town almost daily on business or pleasure, and the radio gives him the market quotations, weather and road conditions and all the big news during the day and plenty of music and other entertainment at night.—Capper's Weekly.

Which Side is Positive

The positive side of a battery is that from which current flows to the external circuit. Negative is the return circuit to the battery. This applies only in direct current.

The ringing of three silver chimes announces programs from KFI.

Latest Double Transmitter In Aeolian Hall Station



Kadel & Herbert, Photo

Photo shows Carl Droher, control operator, with the new type double transmitter half open. He is seen inspecting parts of this new piece of equipment, which is declared to be the last word of broadcast ideas used at WJZ-WJY.

Eliminates Howls

Grounding the cores of amplifying transformers, as well as the negative pole of the "A" battery, to the tinfoil shields of the panel has been found to aid in eliminating squeals and howls caused by "body capacity".

Radio Announces Death

A musical concert at a radio broadcasting station in Boston was halted one evening last week while the announcer told of the death of a boy, run over by an automobile, in the hope that the news might reach his father aboard a fuel steamer in Chesapeake Bay.

One of the uses of Radio is the taking of speeches, news and lectures by shorthand students, thus increasing their efficiency and speed.

Your Vacation and Radio

Human nature is endowed with a more or less predominating trait which causes one to be continually on the alert for some novel form of amusement or entertainment. This, for the most part, accounts for the sudden boom which accompanies the introduction of some new entertaining idea on the market. It might also be pointed out that this same trait was the reason why radio was greeted with such wild enthusiasm when it first swept the country.

The question now arises as to whether or not the advent of the summer months is going to result in radio enthusiasts losing about ninety per cent of their enthusiasm?

In some instances this may be true, but in the majority of cases there is considerable evidence to the contrary. Every day hundreds of new radio fans who have only recently become inoculated with the radio germ are purchasing receiving sets of all types and description.

Of course, there are good reasons for them doing so. For instance, vacation time is already upon us and what other form of entertainment can be found that abounds with such novel qualities as that of making a radio receiving set your companion on your vacation trip?

No matter how remote the spot that you select for your vacation may be, with a radio set of the right type, you can invariably keep in touch with the affairs of the world about you. You may hie yourself off to the last raveling on the fringe of civilization, but if you take a receiving set with you, you will not lack the pleasures which big symphony orchestras, jazz music and other popular forms of instrumental and vocal selections can bring to you.

With this view in mind several radio manufacturing companies have placed upon the market a variety of compact, handy receiving sets especially designed for the use of vacationists. If the idea was not practical, is it reasonable to believe that the manufacturers and dealers both would invest their money in such a proposition?

There has been a great outburst of protest during the past few months regarding the handicaps which will be imposed on radio enthusiasts as a result of summer static. This has had a tendency to cause a great many former radio fans to lose interest in this most fascinating of all amusements.

Perhaps those who are shouting the loudest about summer static can explain how it is that receiving sets are found to function properly the year round in tropical climates. At any rate, there are hundreds of radio receiving sets that are going to be used this summer on vacation tours and the radio fan who does not avail himself of this latest form of novel entertainment is going to realize at some future date that he really "passed up" something worth while.

The Crystal Set Comes Into its Own

There seems to be a predominating idea among radio enthusiasts that with the advent of the summer months it will be necessary for them to place their receiving sets in "cold storage," so to speak, for the duration of warm weather.

This idea seems also to have invaded the realm of radio dealers and as a consequence these individuals, whose business it is to increase the distribution of radio sets, are more or less inclined to "lay down" during the summer.

When one stops to consider the number of high-powered broadcasting stations in and near Rochester, this idea of placing the radio receiving set on the shelf with other antique equipment during the warm weather is dissolved into thin air—for the idea, when one comes right down to brass tacks, is nothing more than a myth at the best.

We are willing to admit that there is a possibility of owners of tube sets encountering some static interference, especially during the presence of a thunder storm in the immediate vicinity, but the owners of crystal sets have nothing to fear.

The little crystal set, which has come in for more than its share of insignificant interest and general "panning", is bound to come into its own this summer. The ability of the crystal set to continue receiving during the hot weather, just as faithfully and without a doubt considerably more accurately than the tube sets, if located within a radius of 15 miles of broadcasting stations, and is bound to result in this kindergarten member of the radio family being elevated to a more respected position than it has occupied in the past.

Radio for Vacationists

Some few people seem to think that because they can go to shore or mountain the stay-at-home has no form of amusement, forgetting entirely Radio, probably the most popular of all forms of amusement yet devised.

Likewise, these same shore or mountain vacationists are missing a lot of good things that are broadcast from every part of this country. As a matter of fact, there are any number of thousands of vacationists who carry their sets with them, erecting an aerial at the vacation point.

Campers, automobilists on tour, canoe tourists and others will take along sets and trade in Radio equipment should not fall off so appreciably as it is fallaciously predicted that it will every year. Most vacationists and especially those who go to places other than the big resorts, are literally snatched away from a jazz point and something must be provided to fill the aching void. The Radio receiving set does the trick.

(*Continued from Page 8*)

may seem strange, but nevertheless it is true.

The reason for this is that regeneration is the finest type of R. F. amplification there is but it cannot be used satisfactorily with added R. F. amplification, as it makes the set very unstable and requires very critical adjustment.

Because of this fact it takes a little over one stage of R. F. to compensate for the lack of regeneration.

With two stages of R. F. we therefore are getting a little better results than we had with our regenerative set. Therefore it is advisable, if you desire to increase your range greatly, to add three stages of R. F. for it is really only on the third stage that any great difference in amplification is noticed.

There are a great many makes of R. F. transformers on the market today but there are only a few that are at all satisfactory in fact the really good can be counted on one hand.

One of the best types that I have used is the Federal, its amplification curve over a wave length range from 275 to 600 meters is much better than any that has come to my notice.

The coils are well made and designed in such a manner that capacity between them is reduced to a minimum. The insulation is the best and the mounting is very practical.

At least half of the R. F. transformers made use fiber for an insulation with all the connections bunched together on one small piece. Such methods result in loss of amplification.

Many of the R. F. Amplifiers built have proven a failure because of poor transformers or because of the bad arrangement of the instruments to each other. I cannot lay too much stress on the importance of keeping the grid and plate leads *short* and in bunching the rest of the wire close together.

An amplifier using three stages of R. F. with detector and two stages of A. F. is shown in Fig. 2.

The tuner is wound on a three and one quarter inch formica or bakelite tube (don't use painted cardboard or cheap composition). The primary is wound with twenty turns of No. 18 S. C. C. wire. Next to it is wound the secondary with 50 turns of the same size wire. The primary condenser is a 46 plate Mignon and the secondary one is a 26 plate with venier.

Any good make of condenser with heavy aluminum or brass plates and good insulation will do providing they have the approximate capacity required in Fig. 2.

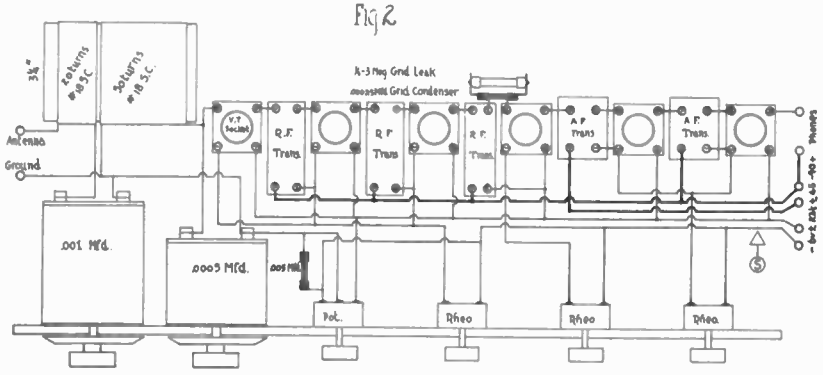
The bypass condenser across the potentiometer is a Micodon so also is the grid condenser. The size of the grid leak will depend on the tube, used as the detector.

(POT) is a 200 to 400 ohm potentiometer. The three (Rheo's) are Bradleystats, they were found to be superior to the conventional wire wound type, because of the low ampere tubes, that were used.

In wiring up these amplifiers a No. 16 soft drawn copper wire covered with

(*Continued on Page 52*)

Fig 2



3 Stage R.F. Detector and 2 Stage AF Amplifier

Broadcasting Benefits Farmers

That the daily broadcasting schedules given by Station WOC, at Davenport, Iowa, are of special benefit to the farmers is becoming more evident continually.

Farmers who have not already installed receiving sets visit their neighbors who have this wonderful new means of communication with the daily activities and see what benefits are to be derived.

The inspiration behind the Palmer School of Chiropractic has always been that of public service and this institution has ample opportunity to carry out this idea of service through its radio programs. Located as it is in the middle west and the center of a large farming population, it has been mindful of the fact that a large percentage of its potential audience is made up of farming folk and has endeavored to make its schedules of interest to them in particular.

Some of the services given daily by radio from Station WOC are: Weather reports and storm warnings, stock and market quotations, including current prices of all farming commodities a few minutes after the stock market closes. These reports are of inestimable value to the farmers particularly. In fact no one can say of how much benefit they are during the year in dollars and cents to every farmer who avails himself of the opportunity of getting these reports. It is nothing out of the ordinary to have farmers or their wives go up to Radio Station WOC and say they want to see the place which has saved them so much money.

The baseball fans get the baseball scores; then there are musical programs rendered by high-class artists, educational talks, lectures on subjects of interest and sermons. In fact the programs are directly applicable to farm life, being both a source of profit as well as most entertaining.

Neither the telephone nor the automobile has made so great an advancement in the farmer's contact with the village and city as the radio is doing. The time element in dispatching certain news to the farmer is a big factor. In cutting grain or hay, an hour's loss in receiving a weather report may mean a loss of thousands of dollars. The daily report of market prices enables the farmer to dispose of his products to a greater advantage. The radiophone solves these problems.

In some localities, especially throughout the eastern states, groups of boys who were interested in the work, established central receiving stations, from which telephone calls and messengers were sent to neighboring farmers with weather and crop reports and as a result of the work of those youngsters the people of the communities received their first evidence of the benefits to be derived from radio. Gradually sets were installed in their own homes and the parents became as great radio fans as the boys.

From the standpoint of entertainment, it is unequaled. The evening concerts, lectures and sermons bring into the farmer's living room a form of entertainment and instruction never before dreamed of.

How many receiving sets have been installed in the homes of this country during the past year cannot even be estimated with a fair degree of accuracy and it is often the topic of discussion among radio fans. Not long ago a radio enthusiast made the statement that there are three times as many radio sets in use as there are automobiles and no one could disprove his statement.

(continued from page 50)

"spaghetti" was used so that all the wires with the exception of the plate and grid could be bunched together.

Type of Tubes to Use

In the R. F. circuit the new De Forest tube was found to be the best, due to the low capacity of the elements. This is a four volt tube drawing .25 amps on the filament.

The U. V. 199 is also a good R. F. amplifier but is not quite the equal of the De Forest.

Since the De Forest tube uses but four volts, care must be taken not to burn the filament too bright.

For detection the De Forest or the U. V. 200 can be used. In the A. F. circuit the U. V. 201A is the one to use. The De Forest is not so good.

Before putting any tubes in their sockets, be sure that the rheostats are all the way off and that the circuit has been wired the same as in the diagram. When you have made sure of this insert the tubes and slowly turn on the rheostats.

The De Forest tube should burn just a little above the point that it first lights at. The radiotion can be turned up brighter.

Set the primary condenser at around half of its capacity and adjust the secondary one until some local station is tuned in. Then slowly readjust the rheostats until maximum volume is reached.

The pointer on the potentiometer should be placed, at first, about halfway between the extremes, then it should be moved toward the negative side until distortion takes place. The maximum results will be just below this point.

In both diagrams an arrow is shown marked (S) at this point in the negative side of the filament battery a "Cutler-Hammer" switch should be placed. This will be of great help, because when the proper filament adjustments are found the set can be shut off or on in an instant.

The diagram shows this set wired for antenna and ground use and can be used in this manner, where there is very little electrical interference from trolley car, motor, etc. In case such interference is present, it can be eliminated to a great extent by use of a loop.

The loop is placed in the circuit in place of the secondary wire and the tuning is done with the secondary condenser.

The secondary and primary wires are not used and should be switched out of the circuit.

(*Continued from Page 22*)

cissae and the wave lengths as ordinates. The two or three known wave lengths are plotted against the dial settings obtained when these stations are received. A straight line is then drawn through these points.

From this graph the wave length of any station received may be determined by noting the dial setting, and finding what point on the ordinate (wavelength scale) corresponds to that dial setting on the graph. A calibration curve like this is shown in Figure III.

A Letter From a Subscriber

Long Island, N. Y.,
May 23, 1923

Will W. Zimmer, Inc.,
47 North Clinton Avenue,
Rochester, New York.

Dear Mr. Zimmer:—We have received the two first issues of the "LISTENING IN" Radio Magazine and think pretty well of your new publication. We would like to see more articles on electrical science in connection with radio and also some new hook-ups.

We would also like a description of a radio set for farmers who have no electricity for it is too much trouble to take the storage battery to town to be charged once or twice a week.

We are enclosing our check for $100.00 to pay for one share of the capital stock in your company as we believe you have a big future ahead with your magazine and we desire to get in on a share of the profits which the original stock holders should eventually receive from their investment of a few dollars in your company.

A description of a desirable radio receiving set, designed especially for use of individuals living in rural districts, can be found on page 44 of this issue.

Hourly Broadcasting Program From Principal Stations

KYW—CHICAGO, ILL.
Daylight Saving Time
Friday, June 15, 9:30 A. M.
Late news and comment of the financial and commercial market. "This service is broadcast from KYW every half hour thereafter until 1 P. M.

WWJ—DETROIT NEWS.
Eastern Standard Time
"Tonight's Dinner," and a special talk by the Woman's Editor.

WWJ—DETROIT NEWS
Eastern Standard Time
9:45 A. M.
Department of Labor bulletins and talks on subjects of general interest.

WWJ—DETROIT NEWS
Eastern Standard Time
10:25 A. M.
Official weather forecast.

WOC—DAVENPORT, IOWA
Central Standard Time
10:55 A. M.
Time signals.

KYW—CHICAGO
Daylight Saving Time
Naval Observatory time signals.

WOC—DAVENPORT, IOWA
Central Standard Time
11 A. M.
Weather and river forecast. Opening market quotations.

KDKA—EAST PITTSBURGH, PA.
Eastern Standard Time
11:30 A. M.
Music. Weather forecast. United States Bureau of Market reports furnished by the National Stockman and Farmer.

KYW—CHICAGO, ILL.
Daylight Saving Time
11:35 A. M.
Table talk by Mrs. Anna J. Peterson, of the Peoples Gas Company.

WWJ—DETROIT NEWS
Eastern Standard Time
11:55 A. M.
Arlington time relayed by the Western Union.

WOC—DAVENPORT, IOWA
Central Standard Time
12:00 Noon
Chimes concert.

WWJ—DETROIT NEWS
Eastern Standard Time
12:05 P. M.
The Detroit News Orchestra.

KDKA—EAST PITTSBURGH, PA.
Eastern Standard Time
1:00 P. M.
Time signals.

KYW—CHICAGO, ILL.
Daylight Saving Time
1:20 P. M.
Closing market quotations.

WOC—DAVENPORT, IOWA
Central Standard Time
2:00 P. M.
Closing stocks and markets.

KYW—CHICAGO, ILL.
Daylight Saving Time
2:15 P. M.
Late financial comment and news bulletins.

KYW—CHICAGO, ILL.
Daylight Saving Time
2:30 P. M.
Closing stock quotations, Chicago Stock Exchange.

KYW—CHICAGO, ILL.
Daylight Saving Time
3:00 P. M.
Late news and sport bulletins.

WOC—DAVENPORT, IOWA
Central Standard Time
3:30 P. M.
Educational talk by C. E. Wilent.

WWJ—DETROIT NEWS
Eastern Standard Time
Official weather forecast. Market reports.

KYW—CHICAGO, ILL.
Daylight Saving Time.
4:00 P. M.
Late news and sport bulletins.

KYW—CHICAGO, ILL.
Daylight Saving Time
5:00 P. M.
Latest news of the day.

WWJ—DETROIT NEWS
Eastern Standard Time
Markets and baseball scores.

WHAS—LOUISVILLE, KY.
Central Standard Time
4 to 5 P. M.
Concert by the Mary Anderson

(Continued on Page 56)

Theater Orchestra, Ollie Jones, conductor. Police bulletins. Weather forecast for Kentucky, Indiana and Tennessee. "Just Among Home Folks," a daily column running in the *Courier-Journal*. Selections by Clifford Gordon playing the Rialto Theater organ.

WOC—DAVENPORT, IOWA
Central Standard Time
5:45 P. M.
Chimes concert.

KDKA—EAST PITTSBURGH, PA.
Eastern Standard Time
6:00 P. M.
FARM PROGRAM
Ball scores. Current events. Literary program by Marjory Stewart. Special farm program prepared by the National Stockman and Farmer. The visit to the little folks by the Dreamtime Lady. Band concert by the Westinghouse Band, under the direction of T. J. Vastine.

KYW—CHICAGO, ILL.
Daylight Saving Time
6:30 P. M.
News, financial and final market and sport summary. Financial summary furnished by the Union Trust Company

WOC—DAVENPORT, IOWA
Central Standard Time
Sandman's visit.

KYW—CHICAGO, ILL.
Daylight Saving Time
6:50 P. M.
Children's Bedtime Stories.

WOC—DAVENPORT, IOWA
Central Standard Time
Baseball scores.

WWJ—DETROIT NEWS
Eastern Standard Time
7:00 P. M.
The Detroit News Orchestra; the Town Crier; Miss Athelia Bird, mezzo-soprano; Dennis Taylor, baritone; Florence Adams, pianist; Percival Peters, tenor.

WHAS—LOUISVILLE, KY.
Central Standard Time
7:30 P. M.
Forty-five minute concert by Charles Jackson's Novelty Orchestra; Paul Martin, piano; George Lynch, saxaphone; Clarence Jackson, trombone; Carl Hoover, banjo; Charles Jackson, clarinet and director; Wilbur Wells, drums.

Soprano solos: Miss Myrtle Stinger, accompanied by Miss Marie Dover.

Tenor solos: H. Archee Culmer, accompanied by William E. Conen.

Soprano solos: Mrs. Murray Nicol, accompanied by Mrs. Eugene C. Converse, Jr.

Baseball scores.

Reading: An interesting historical episode.

Official central standard time announced at 9 o'clock.

KYW—CHICAGO, ILL.
Daylight Saving Time
8 to 8:50 P. M.

Musical program to be given by the following artists: Jewell Lovejoy, soprano; Phelps Cowan, accompanist.

The Speakers Club of Chicago will hold a debate on the subject, "Is Woman Man's Equal?" The speakers will be Richard J. Flannigan, H. C. L. Sanders, Julian Skinner and Henry F. Antes.

WBZ—SPRINGFIELD, MASS
Eastern Standard Time

News of the day. Baseball scores. Concert by Miss Imogene Gordon, pianist; George C. Gordon, violinist; William C. Shaw, baritone. Laughs from *Life* by special arrangement with *Life* Magazine. Continuation of musical program. Bedtime stories for grown-ups, prepared by Orison S. Marden. A few minutes with Benjamin Franklin.

KYW—CHICAGO, ILL.
Daylight Saving Time
9 to 9:25 P. M.

Naval Observatory time signals. News and weather reports. Reviews of the latest books given by Llewellyn Jones.

WGY—SCHENECTADY, N. Y.
Eastern Standard Time
10:30 P. M.

Irish night. Instrumental Medley of Irish Airs, including several quartette selections.

Saturday, June 16, 9 A. M.

KDKA—EAST PITTSBURGH, PA.
Eastern Standard Time

Musical program for two hours.

KYW—CHICAGO, ILL.
Daylight Saving Time
9:30 A.M.

Late news and comment of the financial and commercial market. (This service is broadcast from KYW every half hour thereafter until 12:30 P. M.)

WWJ—DETROIT NEWS
Eastern Standard Time

"Tonight's Dinner," and a special talk by the Woman's Editor.

Department of Labor bulletins and talks on subjects of general interest. Official Weather forecast.

KYW—CHICAGO, ILL.
Daylight Saving Time
10:58 A. M.

Naval Observatory time signals.

WOC—DAVENPORT, IOWA
Central Standard Time

Time signals.

KYW—CHICAGO, ILL.
Daylight Saving Time
11 to 12 Noon

Weather report. Table talk by Mrs. Anna J. Peterson, of the Peoples Gas Company. Late market reports.

WOC—DAVENPORT, IOWA
Central Standard Time

Weather and river forecast. Opening market quotations. Chimes concert.

WWJ—DETROIT, NEWS
Eastern Standard Time

Arlington time relayed by Western Union. The Detroit News Orchestra.

KDKA—EAST PITTSBURGH, PA.
Eastern Standard Time

Music. Weather forecast. United States Bureau of Markets reports furnished by the National Stockman and Farmer.

KYW—CHICAGO, ILL.
Daylight Saving Time
2 to 3:00 P. M.

Late financial and news comment. Closing stock quotations, Chicago Stock Exchange. Late news and stock bulletins.

WOC—DAVENPORT, IOWA
Central Standard Time

Closing stock and market quotations. Educational talk by C. C. Hall.

KDKA—EAST PITTSBURGH, PA.

Concert. Scores, inning by inning of baseball games played today.

KYW—CHICAGO, ILL.
Daylight Saving Time
3 to 4:00 P. M.

News and sport bulletins. Late news and sport bulletins.

WWJ—DETROIT NEWS
Eastern Standard Time

Official weather forecast. Market reports.

KDKA—EAST PITTSBURGH, PA.

Blow by blow report of the bout,

(Continued on Page 61)

(Continued from Page 10)

for her handkerchief; sniffs again; presses the handkerchief to her nose; reddens as she endeavors to suppress the sneeze that would be heard by thousands. I bet with myself whether or not friends of mine listening-in back home will hear the sneeze, but she finally gets the sneeze under control. She sighs, I sigh. The program does on.

Miss Ethel Clayton, renowned pianist is to play several selections. She seats herself upon the piano bench, nods to the announcer who switches on the microphone beside him at the other end of the room.

"WGY, General Electric Company, Schenectady, N. Y. Miss Ethel Clayton, pianist, will play the 'Love Song' by Levanti—one moment please."

And he switches off his microphone and switches on the one upon the pedestal near the pianist, who begins playing to her invisible audience.

A wire from the microphone carries the music to the large control room. Here four different types of first-stage amplifiers are provided and are selected according to the pick-up device used. Certain amplifiers are assigned to various classes of service. Each studio has its own announcing amplifiers.

The output circuits of the first stage amplifiers may be plugged into either one of two second-stage amplifiers. The input circuit of the second-stage units includes a number of jacks connected in multiple thus permitting a number of first-stage amplifiers to be plugged into one second-stage unit.

The output of the second-stage amplifier may be plugged into either of two third-stage amplifiers. Both second and third-stage units use one tube (UV-203) operated at a plate potential of 600 volts.

Three thousand feet away is the power house to which the music of Miss Clayton's piano travels before it reaches the antenna on top the power house. The antenna is of the multiple-tuned type having two tuning points. An extensive counterpoise system is utilized.

The towers are placed 352 feet apart and are 165 feet high above the building top which is itself 95 feet from the ground. This makes the aerial a total of 260 feet from the ground. The length of the flat top portion of the antenna system is approximately 200 feet.

It is only through extended courses of experimentation that the operators know that Miss Clayton's voice is to reach its listeners. The acoustic properties have been carefully arranged and there is only one correct way to broadcast concerts, solos, talks and sermons. This way must be found through practice and study.

Presently Miss Clayton's program is ended. The microphone beside her is shut off. The one beside the announcer is turned on. The next program is announced. The green light appears. The program is given in the auxiliary studio and Miss Clayton takes her seat among the visitors.

There is no applause for her, there never is to these broadcast artists, except by morning mail!

Thus goes the program until the time comes for signing off, which is done by

the announcer with taps played on an xylophone; and in this manner the listening ears of the world are bade—"Good-night."

Continued from Page 9

It is, of course, not to be expected that the UV-199 should give as great power amplification as the UV-201-A. The UV-201-A is a larger tube, having large electrode surfaces and requiring greater filament energy and naturally is capable of supplying large power amplification. However, it does not have the advantage of dry battery operation except in limited cases.

As a detector, the UV-199 functions very well in any of the usual circuits and is particularly well adapted to use in single tube sets where small size and weight are desired.

The capacities between the elements of the UV-199 are exceptionally small and for this reason this tube is an excellent radio frequency amplifier and little trouble is experienced with undesired oscillations.

In common with all vacuum tubes and in fact almost any sort of electrical apparatus, to obtain best results it is necessary to observe a few simple precautions. These are described in detail on the instruction sheet furnished with each tube so that it is only necessary to mention a few of them briefly here.

Of first importance perhaps is the injunction to take care that the plate battery does not become connected to the filament by accident. The UV-199 filament requires such a low voltage for normal operation that the twenty to eighty volts of the plate battery will burn it out instantly and unless one is looking at the tube the burnout may occur so quickly that he does not know what has happened. A ten watt Mazda lamp placed in series with the plate battery will prevent any such accidental burnout.

Instructions as to proper filament, plate and grid voltages are important. Do not forget that if you operating a single tube from three dry cells, you must have a thirty ohm rheostat in series with the filament, and if you are using a six volt battery you must have about sixty ohms in series. Otherwise, the filament voltage will be excessive and will shorten the life of the tube.

When the tube is used as a radio frequency amplifier or as a detector, the

plate voltage should not be more than 45. For audio frequency amplification the plate voltage may be increased to 80, but in this case a grid battery should be used to prevent distortion and also to limit the plate current and so prolong the life of the "B" battery. The correct connections for the detector and amplifier tubes and the location of the grid battery are clearly shown on the instruction sheet. This also shows the arrangement of the contact pins in the base. The arrangement is not the same as in the UV-200, UV-201 and UV-201-A, the change having been made in order to bring the grid and plate terminals on opposite sides of the socket and to make possible very short leads between tubes and transformers.

The UV-199 and UV-201-A are easily distinguished from other tubes by the colored or silvered appearance of the bulb. There is often a considerable variation in the amount of coating, but this has no detrimental effect on the action of the tube.

The X-L filament has made possible one other important improvement which appears in both the UV-199 and UV-201-A. This is the almost complete elimination of tube noises. It is true that the term "tube noise" is often used to cover everything from loose connections to howling due to improper circuit adjustments, but true tube noises may be divided into two classes.

First, a sort of crackling which resembles some forms of static and second, a steady hissing or roaring noise. The crackling noise is characteristic of high temperature filaments and is obviously absent in tubes containing X-L filaments. The hissing noise is due to the presence in the tube of traces of gas and since X-L filament tubes utilize an extremely high vacuum, this source of noise is greatly reduced.

This high vacuum also serves to maintain uniform operating characteristics throughout the entire life of the tube.

(*Continued from Page 58*)

Jimmy Wilde, world's flyweight champion, and Pancho Villa, former American champion.

KYW—CHICAGO, ILL.
Daylight Saving Time
4 to 7:00 P. M.

Stock report and late news bulletins. News and sport bulletins. Latest news of the day. News, financial and final market and sport summary, financial summary by the Union Trust Company. Children's bedtime stories.

WOC—DAVENPORT, IOWA
Central Standard Time

Chimes concert. Sandman's visit. Baseball scores.

WWJ—DETROIT NEWS
Eastern Standard Time

Market reports and baseball scores.

WHAS—LOUISVILLE, KY.
Central Standard Time

Concert by the Mary Anderson Theater Orchestra, Ollie Jones, conductor. Police bulletins. Weather forecast for Kentucky, Indiana and Tennessee. Soprano solos by the pupils of Miss Alice Monroe, of Jeffersonville, Ind. "Just Among Home Folks," a daily column running in the *Courier-Journal*. Selections by Clifford Gorman, playing the Rialto Theater organ. Local livestock, produce and grain market reports. Baseball scores. Official Central Standard time announced.

KDKA—EAST PITTSBURGH, PA.
Eastern Standard Time

Baseball scores. Organ recital from the Cameo Motion Picture Theater, Howard R. Webb, organist. Current events. "One Day Trip by Auto," prepared by the Automobile Club of Pittsburgh. "Under the Evening Lamp," prepared by the Youth's Companion. The visit to the little folks by the Dreamtime Lady. Talks of interest to men prepared by the J. G. Bennett Company, Pittsburgh.

KYW—CHICAGO, ILL.
Daylight Saving Time
7 to 9:00 P. M.

Musical program, courtesy of the W. W. Kimball Company, program will include selections on the Kimball Pipe Organ. Program will be announced by radiophone. Selections by Wendell W. Hall, KYW's "music maker."

Naval Observatory time signals. Weather report.

"Under the Evening Lamp," service including stories, articles and humorous sketches. This service is furnished by the *Youth's Companion*.

WOC—DAVENPORT, IOWA
Central Standard Time

Dance program (one hour) P. S. C. Orchestra.

WBZ—SPRINGFIELD, MASS.

Baseball scores of the Eastern, National and American leagues. Fairy tales. Literary evening, "Under the

Evening Lamp," from the *Youth's Companion*. Musical program to be announced by radio. Laughs from *Life*, by special arrangement with *Life* Magazine. Continuation of musical program. Bedtime stories for grown-ups, prepared by Orison S. Marden. A few minutes with Benjamin Franklin.

Sunday, June 17, 10:00 A.M.

KDKA—EAST PITTSBURGH, PA.

Eastern Standard Time

Services of the East End Christian Church, Pittsburgh; sermon by Rev. John Ray Ewers, pastor.

1:30 P. M.

Bible story for the children by Rev. W. A. Logan, pastor of the Alpha Lutheran Church, Turtle Creek, Pa.

Concert. Vesper services of the Shadyside Presbyterian Church, Pittsburgh, Pa., Rev. Hugh Thompson Kerr, pastor.

Baseball scores.

6:45 P. M.

Services of the First Baptist Church, Pittsburgh, Pa., Rev. C. Wallace Petty, pastor.

Tuesday, June 19

7:30 to 8:00 P. M.

Eastern Standard Time

WHAM—ROCHESTER, N. Y.

Harding's Orchestra.

Wednesday, June 20

Saxaphone Band.

Thursday, June 21

Radio Minstrel Show.

Programs Received Too Late For Classified List

WWJ—THE DETROIT NEWS

Eastern Standard Time

Monday, June 18.

9:30 a. m.—"Tonight's Dinner" and a special talk by the Woman's Editor.
9:45 a. m.—Public Health Service bulletins and talks on subjects of general interest.
10:25 a. m.—Official weather forecast.
11:55 a. m.—Arlington time relayed by the Western Union.
12:05 p. m.—The Detroit News Orchestra.
3:30 p. m.—Official weather forecast.
3:35 p. m.—Market reports.
5:00 p. m.—Markets and base ball scores.
8:30 p. m.—The Detroit News Orchestra; Anne Campbell, Detroit News poet; the Town Crier; the Packard Glee Club; Fred Protheroe, director.

Tuesday, June 19.

9:30 a. m.—"Tonight's Dinner" and a special talk by the Woman's Editor.
9:45 a. m.—Public Health Service bulletin and talks on subjects of general interest.
10:25 a. m.—Official weather forecast.
11:55 a. m.—Arlington time relayed by the Western Union.
12:05 p. m.—The Detroit News Orchestra.
3:30 p. m.—Official weather forecast.
3:35 p. m.—Market reports.
5:00 p. m.—Markets and base ball scores.
8:30 p. m.—The Detroit News Orchestra; the Town Crier; Hudson Tschirhart, Japanese zaddle; Miss Thelma Hull, pianist; Charles Marjanian, tenor.

Wednesday, June 20.

9:30 a. m.—"Tonight's Dinner" and a special talk by the Woman's Editor.
9:45 a. m.—Public Health Service bulletins and talks on subjects of general interest.
10:25 a. m.—Official weather forecast.
11:55 a. m.—Arlington time relayed by the Western Union.

12:05 p. m.—The Detroit News Orchestra.
3:30 p. m.—Official weather forecast.
3:35 p. m.—Market reports.
5:00 p. m.—Markets and base ball scores.
8:30 p. m.—The Detroit News Orchestra; the Town Crier; Mrs. Violet Hunter, pianist; Miss Genevieve Zeinner, soprano; Herbert Lamb, baritone.

Thursday, June 21

9:30 a. m.—"Tonight's Dinner" and a special talk by the Woman's Editor.
9:45 a. m.—Public Health Service bulletins and talks on subjects of general interest.
10:25 a. m.—Official weather forecast.
11:55 a. m.—Arlington time relayed by the Western Union.
12:05 p. m.—The Detroit News Orchestra.
3:30 p. m.—Official weather forecast.
3:35 p. m.—Market reports.
5:00 p. m.—Markets and base ball scores.
8:30 p. m.—The Detroit News Orchestra; the Town Crier; Mr. Wray, tenor; Fred Walters, baritone; the Detroit Lyric Trio.
11:00 p. m.—The Detroit News Orchestra; Fred Walters, baritone; the Watson Saxophone Four.

Friday, June 22

9:30 a. m.—"Tonight's Dinner" and a special talk by the Woman's Editor.
9:45 a. m.—Public Health Service bulletins and talks on subjects of general interest.
10:25 a. m.—Official weather forecast.
11:55 a. m.—Arlington time relayed by the Western Union.
12:05 p. m.—The Detroit News Orchestra.
3:30 p. m.—Official weather forecast.
3:35 p. m.—Market reports.
5:00 p. m.—Markets and base ball scores.
8:30 p. m.—The Detroit News Orchestra; the Town Crier; William M. Schumaker, tenor; C. Bruce Myers, baritone; Mrs. Eva Devlieger, mezzo-soprano.

Saturday, June 23

9:30 a. m.—"Tonight's Dinner" and a special talk by the Woman's Editor.
9:45 a. m.—Public Health Service bulletins and talks on subjects of general interest.
10:25 a. m.—Official weather forecast.
11:55 a. m.—Arlington time relayed by the Western Union.
12:05 p. m.—The Detroit News Orchestra.
3:30 p. m.—Official weather forecast.
3:35 p. m.—Market reports.
5:00 p. m.—Markets and base ball scores.

Sunday, June 24

11:00 a. m.—Church services from St. Paul's Cathedral.
4:00 p. m.—The Detroit News Orchestra.

WBAP—FORT WORTH, TEXAS
Saturday, June 16

9 to 9:15 a. m.—Opening market quotations.
11 to 11:30 a. m.—United States weather report; late cotton and grain quotations; first call cotton seed oil; Department of Agriculture, fruits, vegetables and cattle divisions quotations.
12 noon to 12:15 p. m.—Markets.
1 to 1:15 p. m.—Markets.
2 to 2:15 p. m.—Markets.
3 to 3:30 p. m.—Closing market quotations.
3:45 to 4 p. m.—Financial review.
5:30 to 6 p. m.—Major League baseball scores.
6:30 to 6:45 p. m.—Texas League baseball scores and sport review.
7:20 to 7:50 p. m.—Sport review.

Sunday, June 17

11 a. m. to 12:15 p. m.—Complete services of the First Methodist Church, Rev. J. W. Bergin, D. D., pastor; Will Foster, organist.
5:30 to 5:45 p. m.—Baseball bulletin.
6:30 to 6:45 p. m.—Complete Major and Texas League baseball scores.
7:30 to 7:50 p. m.—Final sport review.

Monday, June 18

9:30 to 10:45 p. m.—Concert by the orchestra of West, Texas. (The Hired Hand announcing).

Tuesday, June 19

9:30 to 10:45 p. m.—Concert by Fred Cahoon's Texas Hotel orchestra. (G. C. R. announcing).

Wednesday, June 20

9:30 to 10:45 p. m.—Concert by E. Clyde Whitlock and his violin ensemble. (G. C. A. announcing).

Thursday, June 21

9:30 to 10:30 p. m.—Concert by the Lion Tamers' Club orchestra of Decatur, Texas. (The Hired Hand announcing).

Friday, June 22

9:30 to 10:45 p. m.—Concert by the Fort Worth Chamber of Commerce. (G. C. A. announcing).

Saturday, June 23

7 to 7:30 p. m.—Review of the interdenominational Sunday School lesson by Mrs. W. F. Barnum, leader of the Barnum Bible Class of the First Methodist Church.
9:30 to 10:30 p. m.—On Saturday and Sunday The Star-Telegram observes a "silent night," courtesy to its tube set listeners wishing to try for long distance records.

KSD—ST. LOUIS, MO.
Central Standard Time

Monday, June 18

8:00 p. m.—Broadcasting light opera "Prince of Pilsen" by Gustav Luders from the Open Air Municipal Theatre in Forest Park, St. Louis.

Tuesday, June 19

8:00 p. m.—Program by Choir of St. Roch's Church.

Wednesday, June 20

8:00 p. m.—Recital by C. W. Williams of Eustice, Florida.
8:45 p. m.—Concert by Rotary Club Band of Independence, Kansas, 110 pieces.

Thursday, June 21

8:00 p. m.—Broadcasting St. Louis Reception to President Harding. Secretary of Interior, Dr. Hubert Work, Secretary of Agriculture, Henry C. Wallace, Secretary of Commerce, Herbert C. Hoover, Assistant Secretary of War, Dwight F. Davis.

Friday, June 22

8:00 p. m.—Broadcasting light opera "Prince of Pilsen" by Gustave Luders from the Open Air Municipal Theatre in Forest Park, St. Louis.

Saturday, June 23

8:00 p. m.—Program to be announced.

Wrong Connection

Diagram on page 49 of May 30th issue, shows a connection between end of the rheostat and the negative side of the A battery. There should be no connection at this point. The error was due to a mistake on the part of the person who submitted the drawing.

The DuBois Press, Rochester, N.Y.

"Builders Of Appetites"

Tip Toe Inn

The Rendezvous of Radio Fans

Metropolitan in Style
Cosmopolitan in Atmosphere
Bohemian If You Like

A Personal Message

To all who like to dine on wholesome food of fine quality, properly prepared and served at a cost low enough to increase your enjoyment of the meal.

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SPECIAL LUNCHEON
At 60 cts. Per Plate

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TABLE D'HOTE DINNER
Every Evening, for $1.25 Per Plate

In addition, our RESTAURANT DE LUXE offers the widest imaginable assortment of a la carte dishes. Our DELICATESSEN EXTRAORDINARY provides a sumptuous variety of cold and seasonable dishes for our restaurant and for you to take home to serve on your own table.

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