

On the Air

A MAGAZINE OF RADIO

October
1925

15 cents



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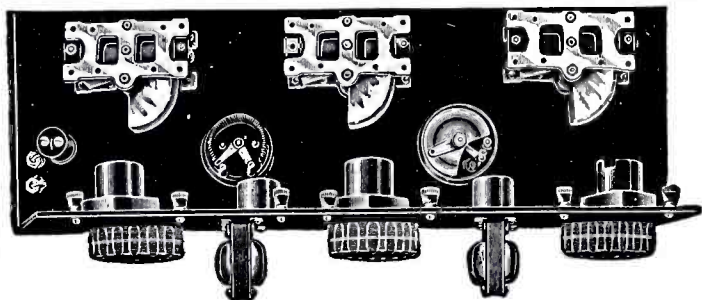
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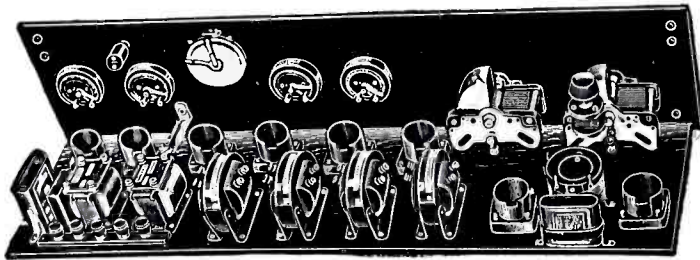


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OUR CATALOG

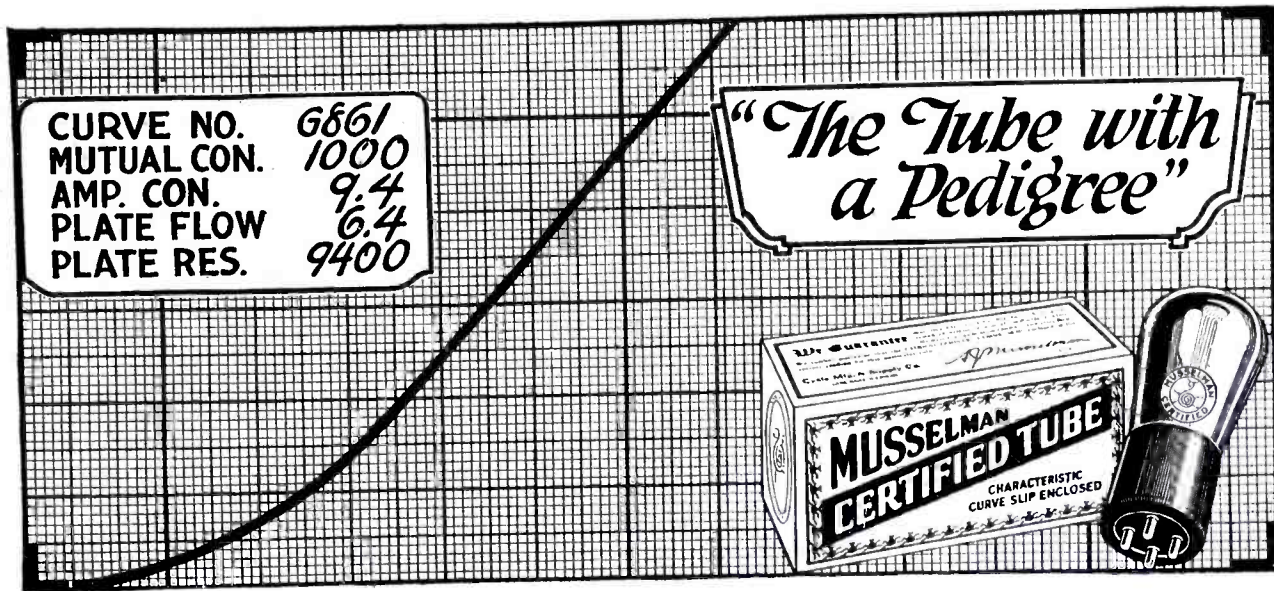
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Complete Book of Radio Information; Practical news and items of great value to all Radio Set Owners. Helpful suggestions on construction and operation of Radio Receivers.

Table of Contents:—

Pages 2 to 26—List of broadcasting stations alphabetically by call letters.

Pages 24 and 25—Broadcast map.

Pages 26 to 29—Broadcasting stations alphabetically by cities.

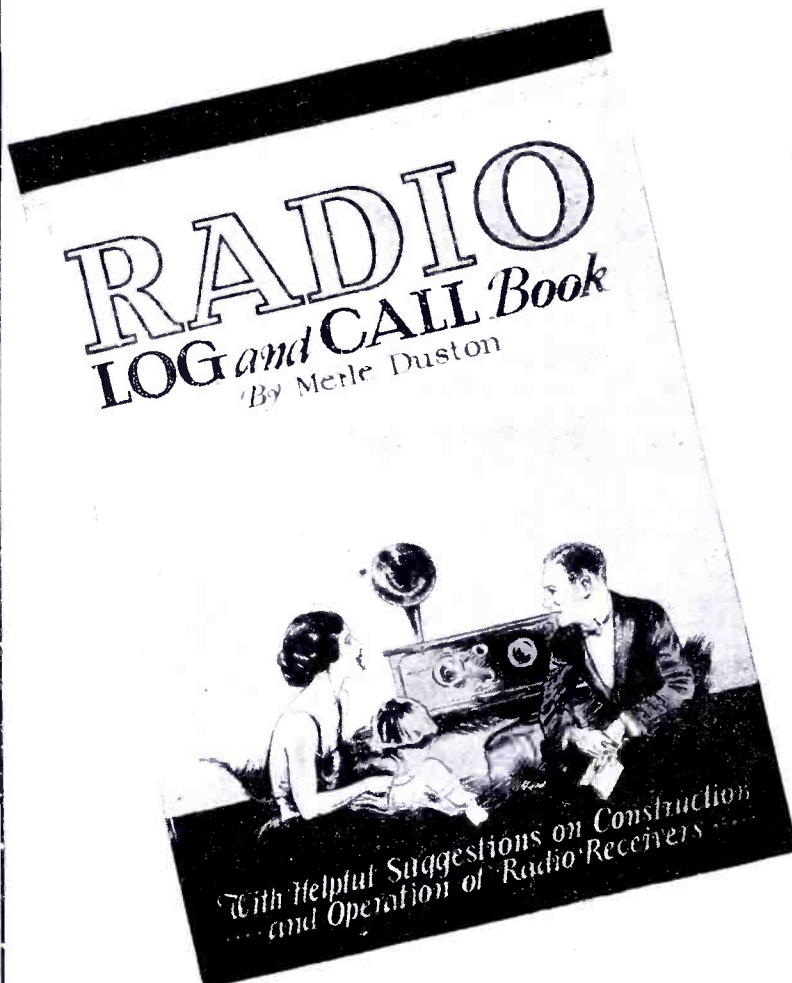
Pages 29 and 30—Class "B" stations by wave length.

Pages 31 to 34—Foreign broadcasting stations.

Pages 35 and 36—Radio station log.

Pages 37 to 48—Helpful suggestions on construction and operation of radio receivers.

Suggestions on Construction and Operation of Radio Receivers



Testing and care of "A" battery.
Some things to do and not to do to your Radio Battery.

Testing and care of "B" battery.
Care and operation of Radio Tubes.

Construction and installation of aeri-als and ground.

Locating trouble in a Radio Set.

If the set fails to operate at all.

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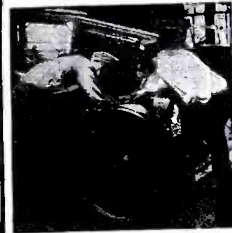
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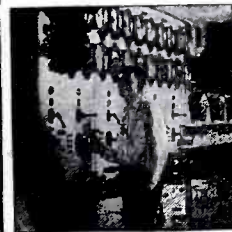
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On the Air

A MAGAZINE OF RADIO

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On the Air is a monthly Magazine published by the On the Air Publishing Company, Mount Morris, Ill., and 1322 Kimball Bldg., Chicago. A magazine devoted to the development of the radio science and to the amusement, enlightenment and instruction of the American radio enthusiast. Published on the 15th of each month.



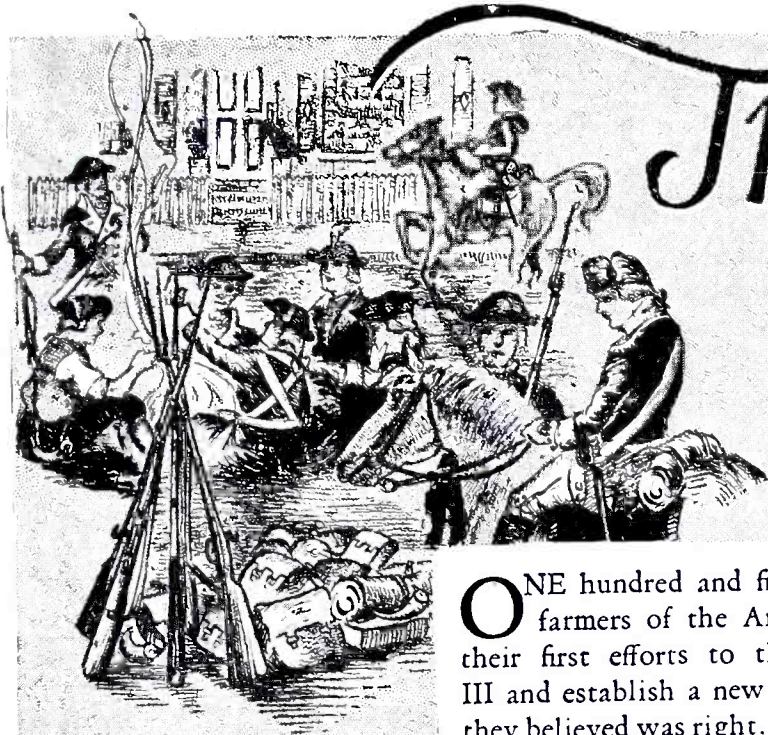
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CHANGE OF ADDRESS. Instructions for change of address should be sent to the publisher at least two weeks before the date they are to go into effect.
ADVERTISING FORMS close on the 20th of the month preceding date of issue. That is, forms for the November issue close October 20, Issued on the 15th.

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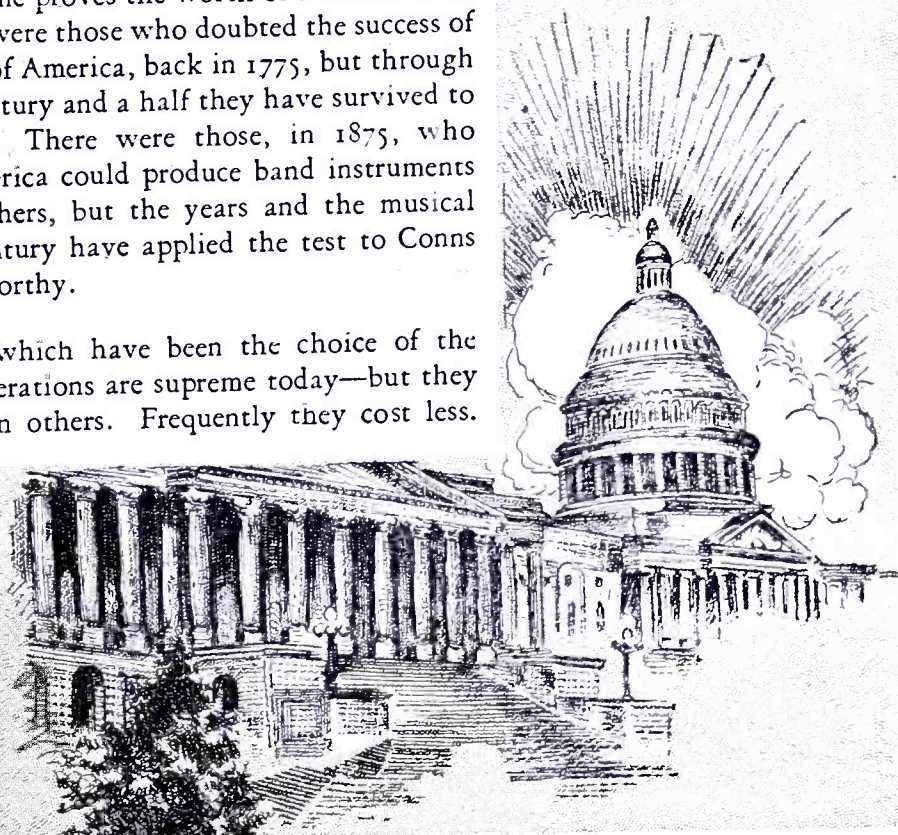
The test of TIME

ONE hundred and fifty years ago this summer the farmers of the American Colonies were making their first efforts to throw off the yoke of George III and establish a new government according to what they believed was right. They were laughed at then, but time proved their ideals, and the United States of America, the greatest power in the civilized world, is the result.

Fifty years ago this summer C. G. Conn was making his first effort to provide American musicians with American instruments that should be true in tune and beautiful in workmanship. Foreign competition struggled desperately, but the Conn ideal was supreme, and time has demonstrated that fact. The largest band instrument factory in the world is the result.

The acid test of time proves the worth of a nation or of a product. There were those who doubted the success of the United States of America, back in 1775, but through the storms of a century and a half they have survived to prove themselves. There were those, in 1875, who doubted that America could produce band instruments superior to all others, but the years and the musical stars of half a century have applied the test to Conns and found them worthy.

The instruments which have been the choice of the artists of two generations are supreme today—but they cost no more than others. Frequently they cost less.



1875 — CONN'S GOLDEN ANNIVERSARY — 1925

EDITORIALS



RADIO has adequately demonstrated its value both to business and the home. It has a great future—a future so abundant with possibilities that no man dares to prophecy what heights it will attain.

Like other developments, radio is at the present time having severe growing pains, but has learned its lesson well. The radio producing field has been overcrowded just as many leading industries have been in the past. Last year, when the radio boom was at its height, thousands of companies were hurriedly organized to take advantage of quick and easy money. Everything went along all right because the manufacturers were woefully behind in their orders. Then came the crash and the early months of 1925 saw the collapse of public demand. Prices were slashed to the core. The industry was top heavy.

Leading companies refused to participate in the sacrifice and have succeeded in maintaining their integrity. By a severe disciplinary campaign they kept their profits on a satisfactory basis. They weathered the storm and today are stronger than ever.

There is an enormous demand for radios in this country. The surface has barely been scratched. There are more than 10,000,000 phonographs in the United States. Latest figures show that there are more than 15,000,000 automobiles being driven. Yet there are only approximately 4,000,000 radio tube sets in operation. Careful surveys of the situation lead the most prominent observers in the country to predict that more than 10,000,000 radios will be in American homes by 1930.

Right now the market is beginning to boom. The coming winter should show a sharp expansion. Winter time is the radio manufacturers' paradise, and the coming season should break all previous records. The leading companies in the radio industry are concentrating as never before on perfected sets, and prices have never been so attractive.

We believe that the radio industry will grow stronger and stronger year by year. Like the motion picture, it has a definite place in the amusement and educational field, and is destined to reach even closer to the hearts of the people than the product of Hollywood. It has passed the stage when it can be considered a luxury—radio is as necessary to the home today as textbooks are to the school.

Improvements in operating qualities and refinements in appearance have added tremendously to the value of radio receiving sets. There is a most profitable season ahead of the radio dealers who work hand in

hand with the manufacturers. The consumer-buying season is open. The consumer wants a radio set he can depend upon, and the dependable radio set is here.



THE farmer needs radio. With the coming of winter he will need it more than ever. Hundreds of thousands of receiving sets are to be sold within the next few months to farmers who are more or less isolated from the rest of the world. They read in their newspapers and magazines about the wonders of radio; the hours of pleasure and entertainment it will bring to them and the money they can save on crops by being able to hear the weather and market reports. Farmers really have a greater need for radio than any other part of the population.



TO the buyer of a radio set, no matter whether on the farm or in the city, whether he wants a multi-tube or a crystal set, we advise him to buy a *Reliable* product from a *good* dealer NOW.

There are good sets now on the market giving excellent service to millions of listeners. Receptive qualities are practically standardized, especially those produced by reliable manufacturers. In just a little while the cool weather will be here—the cool nights of perfect reception, and the best entertainment on the air will be available to all.



THE American radio public should thank its stars that it is free from governmental abuses. Time and time again, certain predatory interests have attempted to usurp the sacred rights of the radio listener—and each time they have failed. The most recent evidence of radio selfishness comes with the information that one company is attempting to get a government license whereby it could broadcast *for private use only* by means of a specially constructed set that would be the only one able to receive a certain "high class" program. Naturally, the specially constructed set would be sold by the company interested—at an exorbitant cost. This plan is but one of many now being devised to limit the use of the ether to a favored few; but the ever-watchful Department of Commerce is suspicious of such attempts, at air-monopoly. When Congress opens **this Winter**, make it your duty to see that your representative is warned of the radio vultures that hover about him.

On the Air

A MAGAZINE OF RADIO

Vol. 2

OCTOBER, 1925

No. 2

Do You Know What Causes

FADING SIGNALS?

- Q *DO YOU KNOW* that there are several varieties of fading phenomena in daily radio listening?
- Q *DO YOU KNOW* the remedy for fading signals?
- Q *DO YOU KNOW* why signals can be heard farther at night-time?

I KNOW of a peculiar twist of radio phenomena that nearly every enthusiast has experienced and pondered over, and no doubt there have been times when its manifestation has caused embarrassment to the reader. Specifically, I refer to the phenomena of fading; a phase of radio reception that has been much discussed, and until recently little investigated.

I know that nearly every radio set operator has experienced the humiliation of having a signal fade completely out of existence just at the crucial moment when the call letters were being announced, while you had your most ardent radio rival witnessing the performance of your set, and because it has happened to me, I know how frantically you turned to the set in a vain endeavor to recall the weakening signal.

What Fading Is

THESE are several varieties of the so-called phenomena of fading in radio reception, but probably the most evident one is the varying in intensity of the signal strength of a far-away station. The problem presents itself in the form of ideal reception; a strong signal, and then a sud-

By Clarence Harwood

den decrease in the volume of the station until the signals are almost inaudible, more often absolutely gone. From tests along this line, it has been determined that the most chronic variety is a heavy, slow decrease in volume, then a complete return to normal reception, and then again, after a period of abnormal reception, the complete manifestation of the entire process over again.

There is at the present time no absolute remedy for this limitation upon radio reception, unless it takes the indirect form of an increase in the respective powers of the broadcasting stations themselves. The fading bugaboo is indirectly responsible for the advent of the new

super-power stations that are being installed throughout the country, and only time can tell whether or not the experiment will justify itself in permanent form.

The Remedy

The best remedy I can offer in this connection is only half effective in any case. If the phenomena is bad, the best way to avoid it is to install a receiver that is more sensitive, and if the signals still persist in fading to the extent of making the program a nuisance instead



Electrical storms and atmospheric disturbances are important factors in the study of fading phenomena. Barometer readings and variations in temperature are also important considerations.

of a pleasure—why, play the phonograph until a better night comes along.

If you have the virtue called patience in your makeup, another simple remedy is to exercise a control over your fingers which are usually mad with a desire to turn the dials. Let the controls of the set alone, and sit back patiently for a short while, and without question the inconsiderate signal will again boom forth from the loudspeaker or phones for a period of unknown duration. If you suspect the batteries of the set, give the filament control a slightly higher setting, and then wait. This signal invariably returns

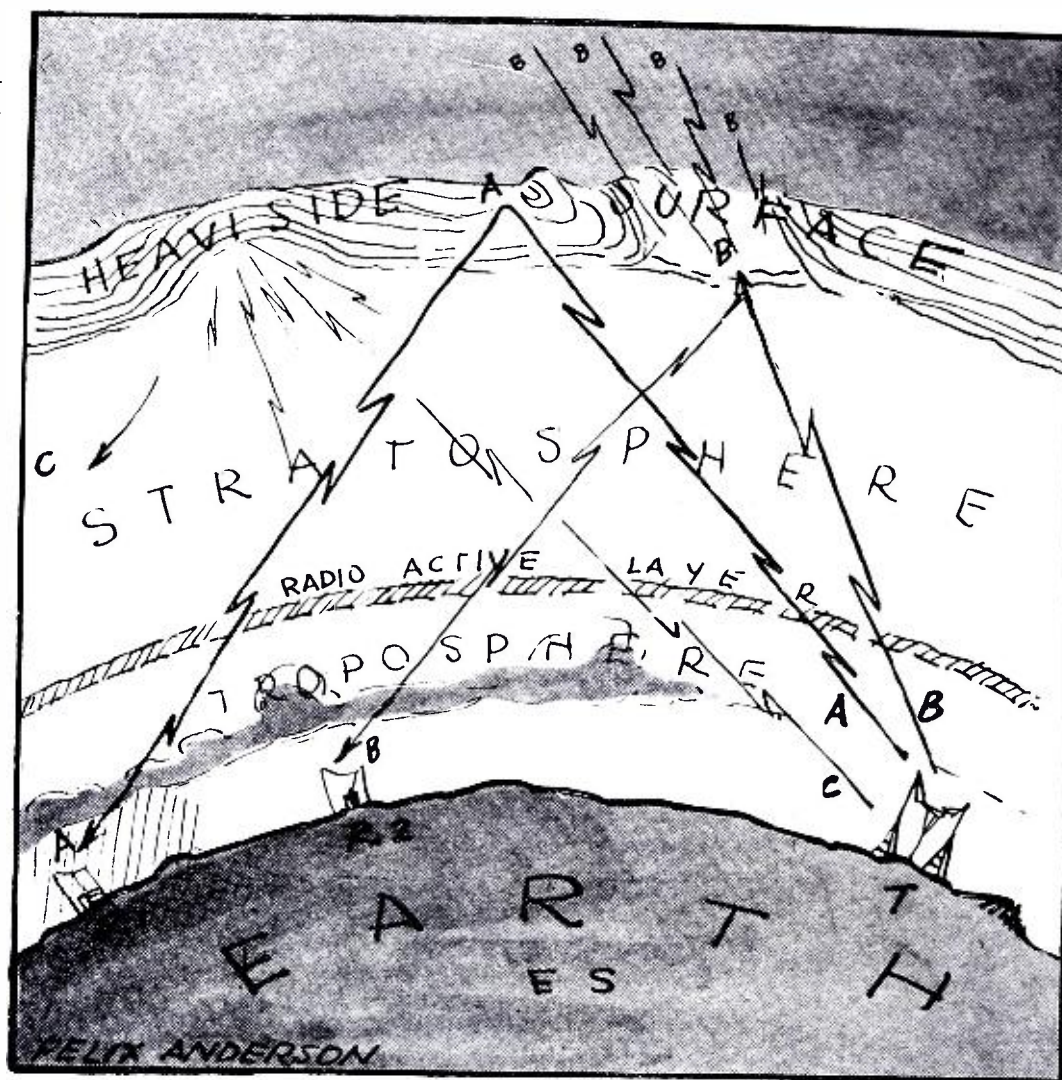
if you have heard it before with any reasonable degree of intensity. If the signal does not return after a reasonable wait, you are justified in concentrating your efforts on some stronger transmission.

The most acceptable explanation of radio signal fading, among the many that have been propounded, is the logical Heaviside theory, which antedates radio as a means of long distance communication by a number of years. The original idea was published by the man for whom it was named, Professor Heaviside, in 1900, and at that time was largely independent of the radio phenomena, inasmuch as it was given as an analysis of the atmosphere surrounding the earth. How it is interpreted into radio terms can best be explained by reference to the accompanying illustration.

Heaviside Theory of Fading

The theory divides the space enveloping the earth into the following divisions, illustrated in the drawing.

ES represents the earth's surface, which is a relatively poor conducting medium of radio signals. Directly above the earth's surface and extending upward for approximately 10 kilometers, we have what is known as the Troposphere, the region which wherein our meteorological phenomena and breathing atmosphere are confined. Above this, is a radioactive layer, the existence of which is not clearly established. It does not materially affect the explanation of the radio phenomena. This radioactive layer is located between



The diagram illustrates the theory advanced by Heaviside long before radio tended to substantiate his thesis. The text explains the application of the theory as it affects radio reception.

the Troposphere, and the Stratosphere. The Stratosphere is an isothermal layer, approximately 100 kilometers thick, which due to ionization in the daytime by the sun's rays, becomes a poor conductor in the daytime. At night, the recombination of the ions composing this layer, makes it a relatively good conductor of radio signals.

Directly above it, and with a fluctuating and undulating limit is the Heaviside surface, a permanently ionized region, and almost a perfect conductor of radio signals.

This Heaviside surface is the region of permanent aurora, and is so good a conducting medium that the radio signal impulses cannot penetrate it and escape into space. Any waves reaching can only slide along it, just as the waves travel along the comparatively poorer conducting surface of the earth.

Why Night is Better Than Day in Radio

IN DAYLIGHT, the Stratosphere becomes highly resistant to radio signals, by the action of the sunlight, which causes ionization of this space. The radio signals cannot reach the Heaviside surface, and must resort to the next best conducting medium, which is the earth's surface, and due to the absorptive properties of the earth as a conducting medium, the waves do not travel as far as during the night. At night, however, the Stratosphere becomes a non-resistant to radio waves, and the signals reach the Heaviside layer, where they are not absorbed to such a great extent, hence traveling to much more distant points before they diminish in strength.

However, the radio signal is not entirely free from absorption, in this more efficient path of propagation. Irregularities in the Heaviside surface, in stratosphere and in the adjoining regions cause absorption and resist the progress of the wave, and we have in proportion to the amount of absorption and resistance a correspondingly weaker signal. On the other hand, exceptionally good conditions existing in these layers will produce abnormal results, and we have what is termed "freak" receptions.



The radio bedtime story man at WGBS, New York, tries out his tales on two young friends, in a sort of "laboratory test," and he is highly pleased with the results, as the photo shows.

I Like This Business of Broadcasting—It is Fascinating and Keeps You Always Alert; It Makes You Feel Like a Pioneer—Says

DAILEY PASKMAN

Director of WGBS

SEVERAL years ago, if anyone had told me that I would now be a director of a radio broadcasting station, I would have laughed in his face. Then, while Marconi was a familiar figure in my mind, I was scarcely aware that there was such a thing as broadcasting. Radio to me meant the sending of messages through the air, from a port to a ship at sea, or between liners on the ocean.

Most of my years have been spent in the theater. I have been associated with Morris Gest for a considerable time—Morris Gest, who is a nationally known figure through such productions of his as "The Miracle," "The Moscow Art Theatre," "The Chauvre-Souris" "Chu Chin Chow," and many others. My experience has been helping in the actual production of a play; writing lyrics and adapting the works of foreign authors and composers.

When WGBS was first being got in readiness for operation early last fall, executives of the firm were

looking about for a man to direct the policies of their station. Many men were approached and interviewed: men of intelligence, education and a certain background. But they were not satisfied; they wanted someone who had taken the public's pulse: someone who had some definite idea of what was generally liked and what was invariably disliked. When I was approached at first the whole thing seemed far removed from me: something entirely out of my scope. But I soon saw the field as a new branch of the world's oldest art—the art of amusing, and in amusing giving the people something that will remain with them.

Then I saw, too, how closely radio was concerned with the theater—the theater that has been my life work. "Radio," I said to myself, "is an unlimited field—a field as yet sparsely developed. There is no limit to what can be accomplished in it." I decided to accept the position. And, looking back, I have always been glad of that decision. . . .



Miss Flo Henrie, who is becoming known as a gloom chaser because of her wonderful rendition of "Blue Songs." Her voice is perfect for radio recording and the number of telephonic requests at the studio on the nights she appears at WTAS proves that she is rapidly becoming one of Chicago's most popular radio artists. Watch for her every Tuesday and Thursday night at 9:30.



Mary Brian, who made her film debut as "Wendy" in "Peter Pan," acquitted herself so well in that production, that she was assigned the title role in Herbert Brenon's "The Little French Girl." Since her phenomenal success she has made numerous appearances over the microphones of many western stations.



Miss Ruth Etting, who has earned the title of "Chicago's Radio Sweetheart." She is giving her admirers a few last chances to hear her before she sails for Europe this month. She has signed an indefinite contract at the Piccadilly, one of the most exclusive supper clubs in London. Miss Etting will be glad to sing request numbers as part of her Tuesday night programs from WTAS, the ELGIN Station.

*Ruth Etting
Chicago*



Mlle. MARIA GAMBERELLI .

This little wisp of feminine loveliness would be a creditable addition to the repertoire of artists in any station. WEAf of New York City certainly has a good reason to be proud.

The BALLET MISTRESS Goes ON THE AIR

By GOLDA M. GOLDMAN

HAVE you ever seen a great crowd which the moment before had been laughing become suddenly hushed in the presence of something beautiful? That is what happens when Mlle. Maria Gamberelli appears before the vast audience in the Capitol Theatre of New York City. All the world knows that the Capitol was until recently under the management of that master showman, Mr. Samuel L. Rothafel, whom the radio world knows so fondly as "Roxy." Roxy's organization was a tremendous thing reaching from prima donnas and symphony orchestras down to stage hands and

electricians, but every part of that mechanism had to be perfect. That adjective just about describes Mlle. Gamberelli. Slim, small, with that pure gold hair which North Italy so frequently bestows upon its vivacious daughters, charming in manner, the epitomy of grace. That is Gamberelli!

It seems that Maria's mother longed to dance, but the blue blood of a long line of Italian nobles forbids that in her native Italy. Then it happened that for business reasons she and her husband came to America, bringing with them their eight-year-old little daughter, and her younger brother. In America,

"The Land of the Free," she found it to be no disgrace to let the little girl's twinkling toes take their natural way to dancing school.

Maria had her own troubles, however; she was a bright pupil in school and the principal and teachers decided that she should be trained for the profession of teaching also. When they discovered that she was taking dancing lessons after school and had her heart set upon becoming a dancer, they invented all sorts of pretexts for keeping her after school. It was not so easy, however, to drive out this artistic desire, for as Maria herself says, "My brother is a sculptor; my family is all musical. All European families are that way, though," she adds, "Americans are getting more so." So she kept on with her dancing lessons, which she had begun when she was ten.

Her teacher at the Metropolitan Opera Ballet School, Mme. Cavalizzi, took her under her wing as her special protegee. Not that this was, by any means, the easiest life in the world for little Maria. Mme. Cavalizzi knew she was a bright pupil and an Italian like herself. She therefore expected great things of her, and when they were not always forthcoming, had unpleasant ways of making Maria "step lively." This she said was in order to develop more temperament in the little girl.

New York Claims Her

GRADUATION from the Metropolitan Ballet School was followed by a year as solo dancer in the Metropolitan Opera. Then she joined Pavlova at the Hippodrome. Theodore Kosloff started on a cross-continental tour taking the young girl with him as his premier danseuse. On her return to New York she was engaged at the Capitol for a period of ten weeks. That was five years ago. Since then she has never danced anywhere else. Three years ago Mr. Rothafel promoted her to the position of ballet mistress. She was then only eighteen, the youngest ballet mistress in the country.

"I had always arranged my own dances," she confided to me, "because I wanted to express myself. To me it is like writing little stories, but I did not know whether I could arrange them for others." Three years of gigantic audiences at the Capitol can answer that question for her, if she is still in any doubt. There is a great deal of hard work involved in arranging and presenting dances, and so Mlle. Gamberelli finds it necessary to do much reading and studying. She finds that by reading the history and costumes of the time, she can plan an Oriental, Siamese, or Spanish dance.

She made a great confession to me, "I love fairy stories," she said, "and I can never understand why



Contrast this serious-countenanced "Gamby" with the one on the preceding page. Absorbed and high idealed, it portrays only one mood of this lovely and talented woman.

Golda Goldman—

interviews another celebrity next month. Watch for her stories.

people say to me, 'Why don't you read something more worthwhile?'

"I want to do Cinderella or Alice in Wonderland in ballet. I love children, and I find that they love me most. Lovely letters come to me all the time from girls from fourteen to sixteen, who are just in the idealistic age, and who want me to help them in their problems."

Among the most lovely of the things that she does, are her solo dances; "The Dying Swan," "The Music Box," "The Sugar Doll," and "The Glow Worm." Her big ballets include "Pappilions" for eighteen people, "The Dance of the Wilds" with fourteen, and "The Toy Parade," at Christmas which is such a great hit with the kiddies.

A Dual Personality

She originates all ideas, and sketches the costumes both for herself and for her partners. Mr. Rothafel then works out for her his beautiful setting and lighting effects. But so far you have only met Mlle. Gamberelli, a serious little lady with big eyes and high ideals, with the power of putting them into existence. If you do not live in New York and have not seen her in the Capitol, you are much more familiar with her radio personality, the person whom you know as "Gamby," a frolicsome, rollicking little songster, who sings little Italian songs, which she learned as a girl, in a funny little untrained voice, which the radio audience seems to love even more than the cultivated tones of other vocal artists. To Gamby, deadly serious when it comes to her dancing, the greatest joke in the world is her singing. She is never a set part of the program. Roxy delighted in calling upon her unexpectedly to sing a little solo, or to announce the tie-up of stations in Italian, and she delighted to respond to his call. Major Bowes, who has replaced Roxy at the microphone, and has taken over the management of the Capitol and the leadership of the "Gang," seems to find her just as delightful as did his predecessor. It amuses her much to have people write in and request her to sing "The Rosary" or "The Last Rose of Summer." Roxy said she could sing "The Rosary" only over his dead body.

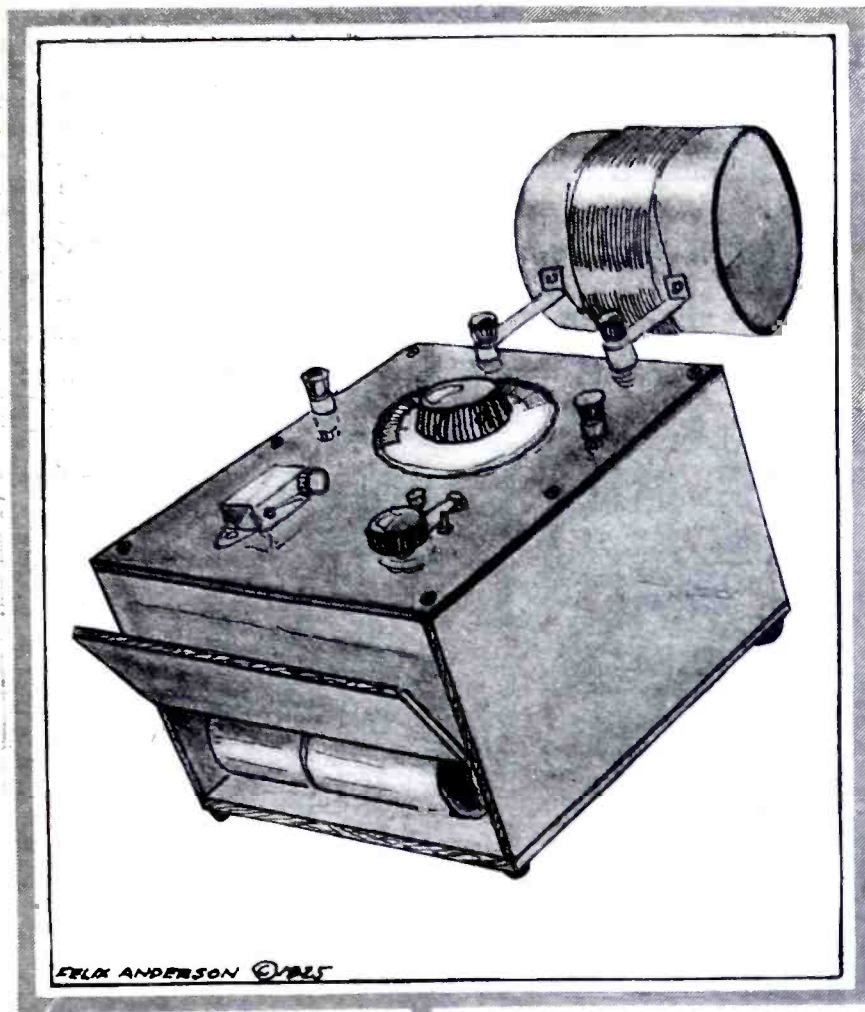
"I am like a child," she says, "who only gets ice cream on Sunday, and so all week long he is waiting and waiting for that Sunday to come. The radio is my ice cream. On the stage I am a serious grown-up person, but on the radio I am someone else."

If you ask her who her greatest aid has been, she will tell you that it was her mother.

"She never praised me out of place," she says; "I had to be perfect for the praise. She watched me so helpfully, and looked for the weak spots, and was always constructive. I suppose it was because I was doing the thing that she had always wanted to do."

Stories of dual personalities are not always so pleasant.

You Need a Wavemeter



To Enable You
To Get the Most
Out of Radio

By FELIX ANDERSON

type of radio bug. Its uses are so varied and many, and it involves so many interesting phases of the radio phenomena, that I feel I am not erring in devoting these pages to its explanation.

To stop to list its varied usefulness and to enumerate in detail the reasons why a wavemeter is a handy article to have about would be a reiteration of its virtues. Hence, I am going to wade right into the technical description of its construction, trusting that the

reader will realize as I proceed to describe the various methods of application, that the wavemeter is an article that is effective whether in the hands of the technical enthusiast or in the possession of the most indifferent entertainment-seeking variety.

The combination wavemeter and "driver" that I am about to describe is not an imposing affair. On the contrary, it is so simple that one is inclined to convict it as silly. When one stops to consider

AS TECHNICAL Editor of this magazine, I have been constantly looking for a subject or a device that I could write a good article about, which would give my readers the greatest return for the effort they expend in reading my contribution. It has been my object and purpose to devote my efforts to describing and explaining such problems and innovations as interest the majority of the readers of ON THE AIR. I can assure you that this business of satisfying everybody with the kind of technical material they need is one that requires much thought, great deliberation, and careful decision.

Then too, I want to write an article that is appropriate for this gratifying enlargement of ON THE AIR, something that represents the technical department's efforts to make ON THE AIR the leading radio magazine, and I have long pondered over the title of this story, feeling that it should be characteristic of the general expansion of the publication.

I believe no better way can be found to attain this objective than to describe the construction and employment of the wavemeter. It is a device that strikes me as being so generally valuable that it cannot help but be interesting and instructive to any

THIS is the third of a series of technical features—written exclusively for ON THE AIR by Felix Anderson. We believe these papers represent some of the most interesting and instructive features yet published in current radio magazines. This story of the construction and application of the wavemeter will fill a long felt want of the radio public. Write us and tell us how you like this type of technical feature.

—THE EDITOR.

that all our measurements, all our readings and all our wave-allocations are made with this simple device, one first begins to realize the important part the wavemeter plays in radio. Without wavemeters, our broadcasting stations would be far off their waves, we would have interference many times worse than we have now—truly this wavemeter is a small but important cog in the scheme of things as far as radio is concerned.

The wavemeter is comprised of a simple oscillatory circuit—inductance and capacity—a coil and a condenser. To make it a driver we include a small generator of radio frequency impulses—a buzzer and a battery.

The Necessary Materials

THE assembly of this unit requires the following materials which may be of your own choice:

1 Wavemeter box (homemade) of clear pine, size 10 inches long, 7 inches wide, and 7 inches deep. The cove for the battery must be made as is shown in the illustration on page 17.

- 1 Formica Panel 7 x 10 x 1/2 inches.
- 1 Bremer-Tully SLW 11 plate .00025 MFD variable condenser.
- 1 Cardboard tube 3 1/2 inches long and 4 inches in diameter.
- 2 pieces of brass 2 3/4 inches long and 3/8 inches wide. Any fairly heavy gauge will do.
- 1 half pound spool of No. 22 DSC Green Belden Wire.
- 4 EBY Binding Posts.
- 1 Erla Metal Dial 0 to 100 degree reading.
- 1 High frequency buzzer. Manhattan Electric Supply Co. type.
- 1 Switch Lever King Quality.
- 1 Burgess 4 volt C battery round type. Two cells.
- 2 Switch taps King Quality.
- 2 Switch stops King Quality.
- Busbar, mounting screws, solder and

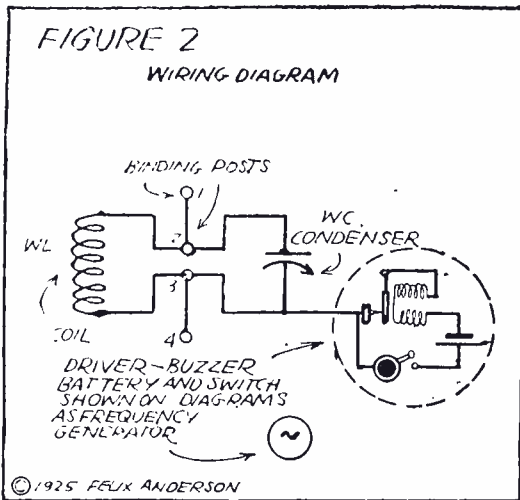


Figure 2. The wiring of the wavemeter is illustrated in the above cut. Note especially that the buzzer is connected to the rotary plates and that the energy wire comes from the buzzer adjustment screw.

the usual assortment of accessories necessary for radio construction.

The above list includes everything you will need. As a word of caution, stick to the apparatus specified, especially with regard to the condenser, since the coil specifications are made with this condenser in mind.

Building the Wavemeter

BEGIN the construction and assembly of the meter by making the cabinet specified. Make a neat job of the construction, because the unit is so simple that any flaws you admit will glare in the finished unit. The average fan is somewhat of a carpenter and cabinet maker, and the job is not especially difficult.

When the cabinet has been constructed, fit your panel over the top, and mark the holes for the mounting screws. About four is all that is necessary—but if you seek greater strength, three along the two 10 inch sides are not excessively many.

Next drill the condenser holes, using the template for that purpose, or better still if you use a Bremer-Tully locate the hole for the shaft and mounting

screw, and drill it. Before this final mounting is done, it is well to scratch (engrave would be a better word) an indicating line very carefully at right angles to the shaft to act as the indicator. Make this line very fine but deep, since readings will be made of a fraction of a degree.

The holes for the binding posts, the switch and switchpoints and the mounting for the buzzer should be made at this time. A hole just opposite the adjustment screw should be drilled to allow the wire for the connection to the condenser. If you use a buzzer of the type illustrated, it will also be necessary to drill holes in the panel to allow for the battery connections.

Your next job is to screw all the apparatus in place on the panel, and get ready to wire.

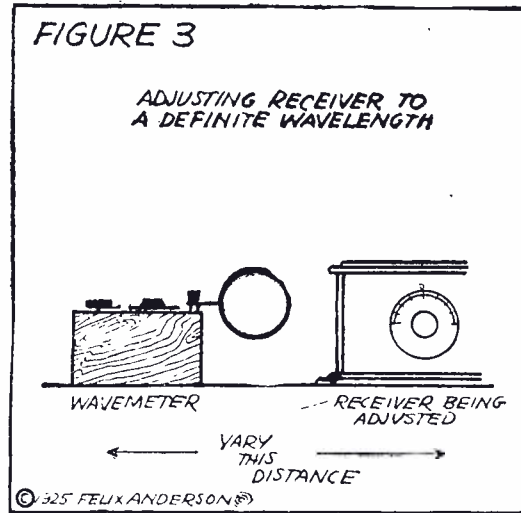


Figure 3. When the device is used as a station finder or calibrator it is merely brought up to the receiver, and operated with the driver working. The distance between the set and driver is variable to effect the sharpest tuning.

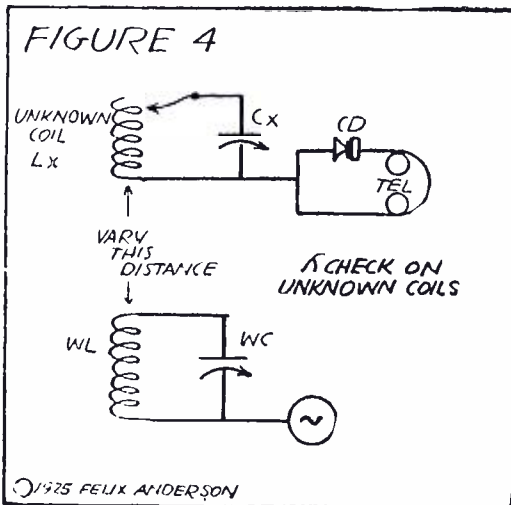


Figure 4. Here's a simple way to find out whether or not that coil you are winding will be too small or too large. The hookup shown above will help you to proportion better coils, and to get a better Ic ratio on all your inductances.

Figure 6. This direct reading scale is the wave finder for the degrees on the dial of the device. It is computed and plotted from the wavelength curve shown in Figure 9. This scale will NOT fit your wavemeter.

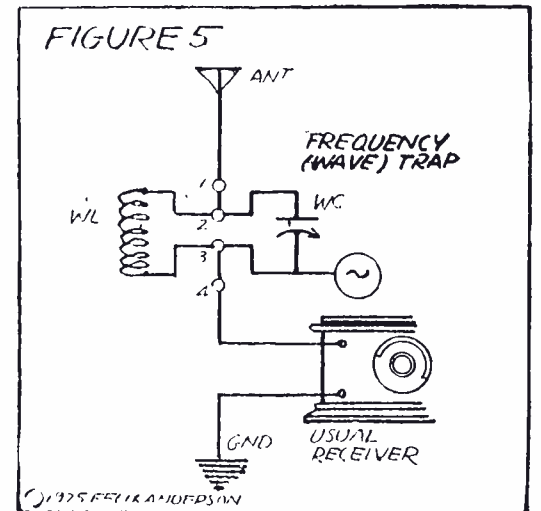


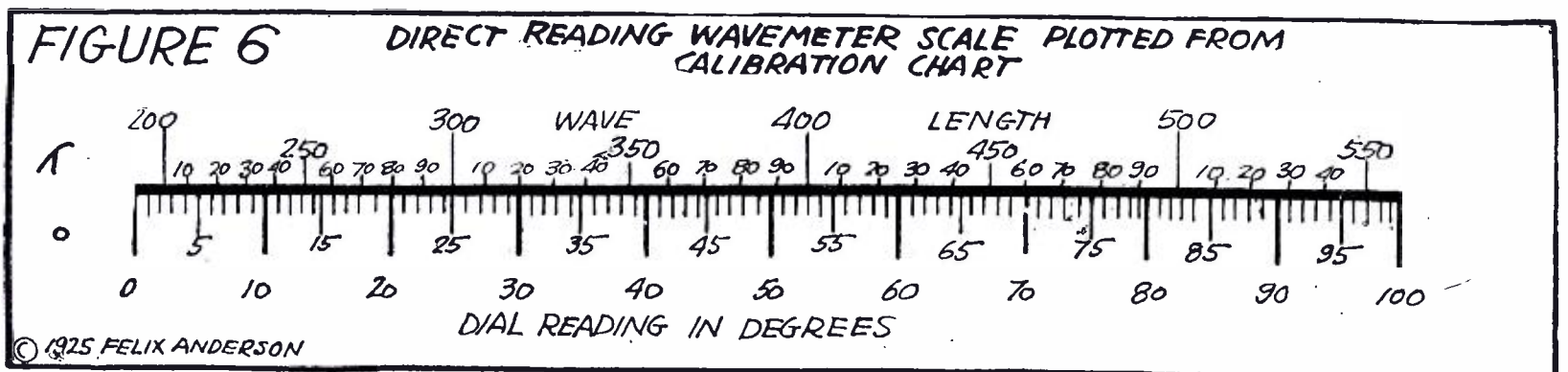
Figure 5. Like a patent medicine, the wave trap is a cure all as well as a definite help. In this case it really is a cure for unwanted signals—used as a wave trap as shown above it does wonders with undesired frequencies.

Wiring

RUN A piece of bus bar from the binding post on the end of the panel to the rotor plates of the condenser. Then from the other post on the same end (see illustration page 17) run another bus bar connection to the stator plates of the condenser. As shown in Figure 2, binding posts Nos. 1 and 4 are connected to 2 and 3 respectively. These posts are to serve as connections for later experiments with the device. Binding posts 2 and 3 are for the coil terminals only.

Next connect the rotary plates of the condenser to the adjustment screw or to some point on the adjustment screw frame that makes good contact, using

(Turn to page 40)



FAIRY TALES COME TRUE IN RADIO

A Story of the Garden Hose and

Radio Silver

By R. H. HOPKINS

THE proper way to tell about McMurdo Silver would no doubt be to say "Once Upon a Time," or, to become somewhat more modern, we might head the dissertation "from nothing to something," or one might even resort to the time-honored, and (we hope) buried, style of Horatio Alger.

But none of these styles seems to fit properly, so we will confine ourselves to (not the regal, but the editorial "we") a plain statement of facts concerning the not altogether uneventful life of a young man badly bitten with the radio bug, who at the age of 23 is the president of a prominent radio concern and whose name is more than well known to many thousands of radio fans.

Born in a small college town in western New York, his early years were spent uneventfully in causing his fond parents just a little bit more than the usual amount of consternation, for at a very early age his thoughts turned to things mechanical. The result was no more than could be expected. Many peculiar and supposedly original contrivances made their appearance, most of them designed to provide a hearty and stimulating welcome for the college students who called upon his father in search of wisdom.

Frequently the searchers were discouraged, but it is interesting to the casual observer of later years to perceive that these and sundry other arrangements most frequently resulted in the acquisition of wisdom.

Enters Study of Radio Early

RADIO first impressed McMurdo Silver's activities early in 1912. Someone, read him an account of "Wireless Telegraphy" and how it enabled ships at sea to keep in unbroken touch with the world while they were out upon the bounding brine. At the same time an account was also read, with true relevance of the Mexican Rurales, a troop of mounted police recruited from criminals by the simple and masterly expedient of catching one, putting a rope around his neck, placing him upon a horse all ready to be gently stroked with a whip, and asking the individual so situ-



McMURDO SILVER

who at twenty-three is the president of a busy mail order concern, the creator of several unusual sets, and who is an associate member of the Institute of Radio Engineers.

ated if he wished to become a Rurale, or if he preferred to dismount from his steed post-haste and remain in the unenviable position of hanging by his neck to a nice tree limb, separated from it by several feet of rope, and from the ground by several more feet. The answer, unless choked off by the culprits' emotion, or the executioner's desire for a negative reply, was invariably "yes."

Some Early Experiments

STRANGE as it may seem, these two bits of instruction stuck firmly in the young man's mind. The next day the cook, called to the backyard of the family residence, by unearthly yells, beheld a strange sight. Sitting astride a saw-horse was a young Mexican boy hurriedly conscripted for the part of the convict. His hands were tightly tied, and a very heavy rope, almost thicker than his pudgy arms, connected his unwilling neck with the limb of a small tree directly above him. He was calling loudly upon all the saints known

to him in a somewhat unintelligible imitation of Spanish. Next to him stood one of the "Silver Gang," asking loudly and repeatedly whether he "joined or died." The executioner, in anticipation of the reply, held the nozzle of a length of garden hose in his hand.

Some distance away, in the wash-boiler, stood the instigator of this new game, holding the other end of the hose in one hand, while in the other was another piece of hose which reached back to the gibbet and terminated in the grimy grip of the assistant executioner. As the victim's cries were uttered, the executioner shouted them into one hose, through which they were presumably transmitted to the ship at sea, represented by the wash-boiler. From there, through the other hose, the verdict was again shouted in a high falsetto to the assistant executioner, who in turn put the all important question to the prisoner.

In this way wisdom was assimilated by the analytical mind of McMurdo; communication with ships could only be through rubber hose, since one couldn't shout several thousand miles. And to use "wireless telegraphy" one had to have a reason, which was oppor-

adequate standard with which to compare results and it is only natural that he demands perfection.

The average radio listener who buys a set is interested in results. To the experimenter whose chief enjoyment in life is in building up and tearing down circuits, a heart rending squeal is often as satisfying as a soul stirring concert, but not so with the average listener. He is after quality and when he doesn't get it he blames the set. He does not realize that radio must function under certain natural limitations, and cannot understand that even with what is supposed to be the best set available, perfection is not attainable.

This brings us to a discussion of interference. Interference takes many forms and constitutes one of the larger problems in radio. Most everybody is familiar with the type of interference caused by two or more broadcast stations transmitting on or near the same wavelength. This is probably the most familiar type of interference and also the kind most easily overcome. Its solution is largely one of correctly allocating wavelengths and in properly directing the time stations are on the air.

Static interference, although well known by name, is less easily recognized. In the case cited above, my acquaintance did not seem to understand that the trouble he attributed to his set was largely one of static interference and that it was an external condition over which his set had no control. He could not understand why if he had no trouble with static in receiving from nearby high powered stations, he should have trouble with stations over, say, 500 miles.

Static as Natural as Wind and Rain

NOW, static; that is atmospheric static, is a natural phenomenon, just as natural as wind and rain, and we have about the same chance of controlling the production of static as we have of controlling the wind and rain. It is true, however, we can minimize its effect upon radio reception by certain apparatus such as, for instance, the McCaa anti static device. Such equipment will minimize static interference but is as yet only in the experimental stage and not available to the broadcast listener. For the present, therefore, we will have to tolerate static.

In the reception of radio signals through static we are concerned not so much with the intensity of either the signal or the static but with the ratio of signal strength to static strength. Reception from a nearby high powered station is unaffected by static of even strong intensity while on the other hand weak signals cannot be heard satisfactorily through moderate static. It is purely a question of their relative intensity.

What applies to true static, atmospheric static, in this connection applies equally well to other types of interference which will be discussed later.

For any given set of conditions the mean strength of static interference is constant. The strength of signals from a radio transmitting station however diminishes rapidly as the distance between the trans-

mitting station and the receiver increases. This relation between static and signal strength is illustrated in the chart shown in the accompanying illustration. Here the smooth curved line represents the strength of the signal from the transmitting station at any point up to a thousand miles from the station, while the irregular line represents the static strength. It is evident that for receivers at distances up to around 500 miles the static interference shown would be weaker than the strength of the signal, consequently it would not be noticeable. At distances over 500 miles, however, it will be noted the strength of the signal is lower than the static strength making reception impossible.

THIS effect is well illustrated in the case of our friend referred to at the beginning of this article. His set, an extremely sensitive one, was able to pick up weak signals from remote distances. On what he termed local stations no difficulty was encountered since their signal strength was sufficiently above that of static to render the latter unnoticeable. On more distant stations whose signals were weak, however, the static was noticeable and although he could hear the signals they were not clear. As stated previously the fault was not in his receiver but in his unreasonable demands. Such a misunderstanding of the natural limitations of certain phases of radio is common. It is one of the manufacturer's problems to correct this misunderstanding.

Sets are too Sensitive

It may be said that many sets used today are too sensitive. Any receiving set capable of picking up the signals from broadcast stations on the opposite coast or from stations in Europe will naturally pick up a lot of extraneous impulses, none of which have their origin in a regular transmitting

station. Static is only one of the offenders and is often the least troublesome to deal with.

In our everyday life we use innumerable devices which are sources of radio interference; in fact anything electrical is capable of producing noise in your receiving set. This type of interference, although produced by man-made devices is practically impossible to eliminate. Much of it originates in the listener's own home. Every flat iron, every toaster, every electric fan, every door bell is a potential source of interference. These devices and a thousand others, all contribute to produce a certain noise level in the ether just as in a large city a certain noise level is produced by trains, street cars, automobiles, etc.

Our ears are sensitive only to sounds of moderate intensity and in the city we do not as a rule notice the noise which is everywhere present. Suppose, however, that we walked around town with a pair of headphones over our ears through which every sound was magnified a thousand times; the noise would be unbearable. Yet that's just exactly the condition we have in our super-sensitive radio receiver. Not only does it pick up the signals we want to listen to,

(Turn to page 59)

Radio's Bugaboo

"In our everyday life we use innumerable devices which are sources of radio interference," says Mr. Kramer in this interesting dissertation. "This type of interference, although caused by man-made devices, is practically impossible to eliminate. Much of it originates in the listener's own home."

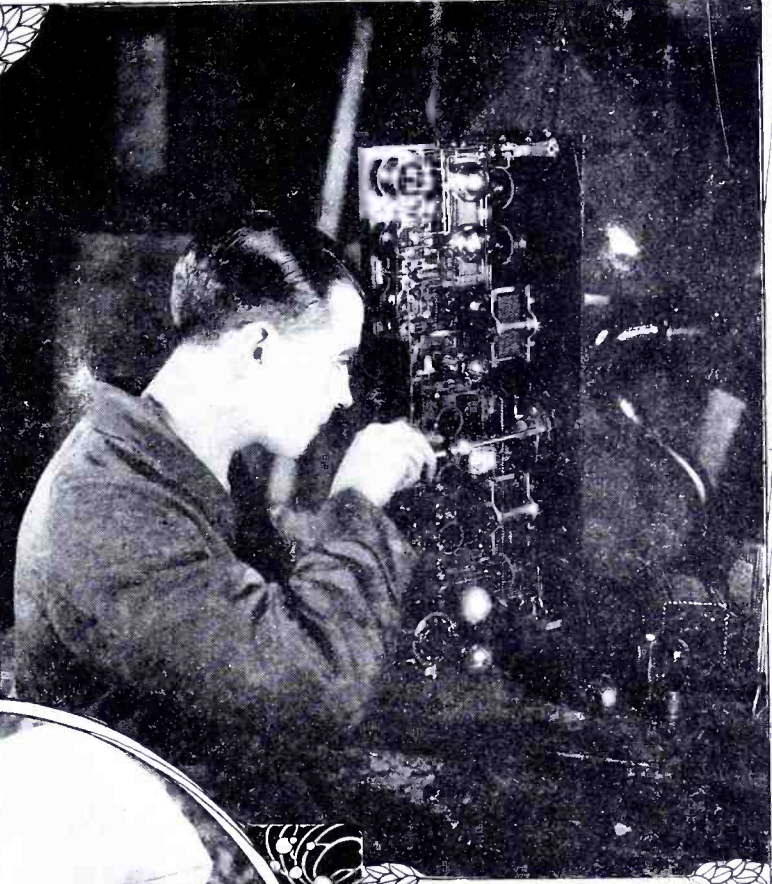
What these causes of poor reception are, and how best to handle them, is revealed in a manner comprehensible to all. Study this article and perhaps it will explain just why your set isn't "perking" as it should.

—THE EDITORS.

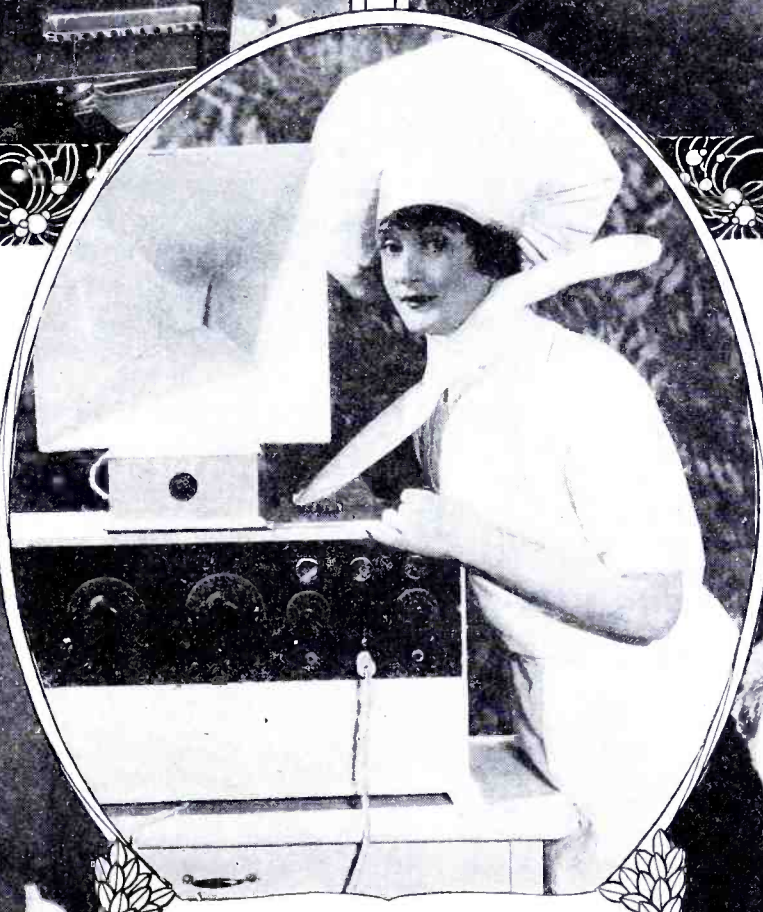
RADIO'S HALL OF FAME



Governor Al Smith of New York, who has started something in appealing to the electorate directly over the radio.



Richard Barthelmess, the motion picture star spends his spare moments with his studio radio. Incidentally Mr. Barthelmess used this radio in a number of scenes of a recent film.



BILLIE BURKE, who, in private life is Mrs. Florenz Ziegfeld, wife of the Follies producer, as she appears in the title role of "Annie Dear" with the kitchen radio set deluxe. Billie is a radio fan and her preference in programs is one which includes recipes for new and novel dishes. So keen is her love of the new science that Mr. Ziegfeld has just purchased the set pictured.



Harold A. (Shorty) Fall, assistant director of KYW, Chicago. Football announcer, singer and conducts KYW'S Friday night minstrel show.



Joseph Parsons, one of the most finished artists who ever appeared before a microphone. He was a leading baritone at the New York Hippodrome for six years.



"The Play's the Thing" at KGO



The photo shows Wilda Wilson Church in the control room of KGO listening to one of the plays she directed. She telephones her corrective instructions to the studio as the play progresses.

Says G. W. RHODEHAMEL

Production of Radio Dramas Demands a Really New Technique to "Put Across" Human Emotions; Wilda Wilson Church of KGO Tells How It's Done

THE play's the thing!" Shakespeare observed long before the days of broadcasting. If countless letters received at KGO, the General Electric Pacific Coast Station, are to be believed, many Western listeners regard the drama as the most vital form of radio entertainment.

Much as the public enjoys radio plays, however, it is doubtful if they get any more of a thrill out of it than the producers and KGO players before the microphone.

For the producers, radio drama has all the thrill of pioneering in a new form of art. It demands a technique as distinct from the "legitimate" stage as the movies; and many problems of this technique have yet to be solved.

Wilda Wilson Church, who has done notable work at KGO, finds that producing such masterpieces as Drinkwater's "Abraham Lincoln" or Shaw's "You Never Can Tell," offers the most interesting experience in a lifetime devoted to dramatic production. Mrs. Church graduated from the Boston School of Oratory years ago. She has taught English and dramatics at numerous leading colleges and schools throughout the country. She took an interest in the movies at one time, but found the work disappointing and is now convinced that the most interesting adventure in play producing lies in radio.

"The conditions are different from any other work of this nature," she says. "There is, of course, no scenery, no setting or costume to create the necessary atmosphere, and everything

has to be done by the voice alone, or by accessory sounds, such as the ringing of telephone bells or the slamming of a door. I try to use as few accessories as possible, getting the effects by speech alone.

"One advantage of radio drama is that the parts can be read without being committed to memory. We usually need only three rehearsals. And, of course, there is no stage business to be learned, either.

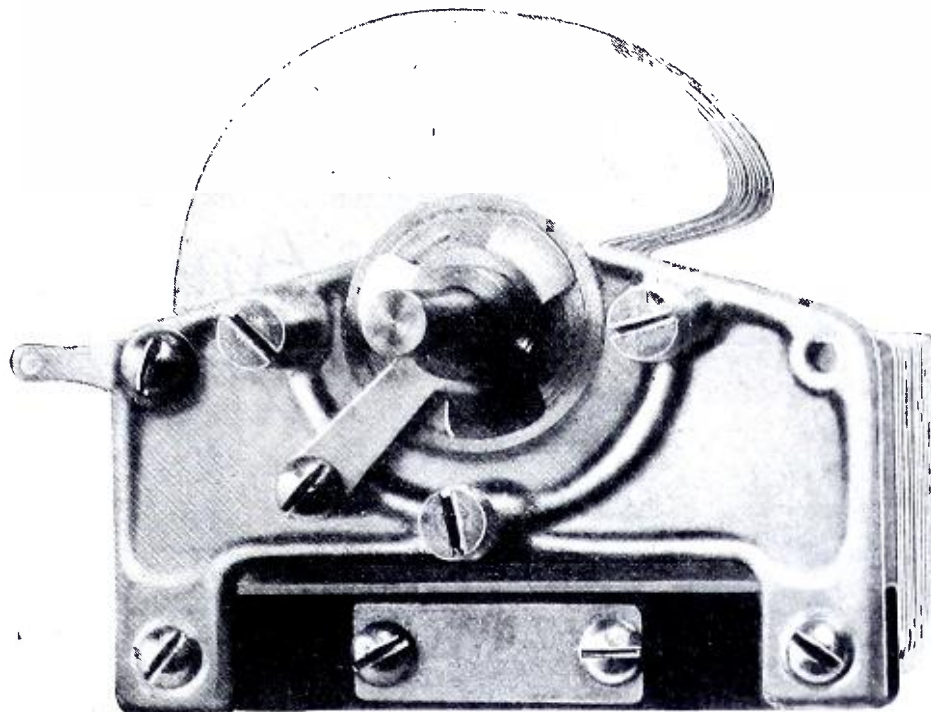
"Our players find that previous experience on the stage is a great help, but not without its drawbacks. Those accustomed to depend to any extent upon facial expression, costume or action, are often at a loss when they find everything must be done by vocal inflection alone. For this reason, it is often possible to train beginners with no stage experience whatever so as to get excellent radio results. But a trained dramatic intelligence is a great advantage.

"Another advantage is that parts can be doubled, the same player undertaking more than one role and differentiating between them by accent, pitch of voice, vocal inflection and so forth. This, of course, reduces the cost of production, but adds to the difficulty since the player must be careful to distinguish between the two parts so that each is identified with the same name and vocal characteristics throughout the play.

"A good deal of stage business has to be 'voiced in,' the plays being edited so that the listener is (Turn to page 60)

S-L-W Versus S-L-F

Reasons for
the Sudden
Interest in
New Type
Condensers;
Why Some
Fans Must
Experiment
Before
Deciding



Do You
Want Low
or High
Wave
Stations
on Your
Receiver?
Choice of
Condensers
Is Then Made

By ERNEST R. PFAFF

THREE months ago even the most hardened debater might have been forced to admit that the variable receiving condenser as meat for an inkwell war in the radio press was assuredly badly mangled, and so badly mangled that it hardly presented an object worthy of the steel of any of the clan. Thus far had condenser design progressed; thus had the poor instrument been dragged willingly or otherwise from the primordial slime of moulded mud up to the present mechanical era of silver plated brass and varying form of insulation, each with a more unpronounceable name than its predecessor.

But just as the last rites were being held, some insurgent individual became tired of tuning in three-quarters of his stations in one-third of his dial space; so, getting out his tin-snips, he started improving the product of which Mr. Cardwell proudly declaimed, "It can't be done."

So, in one single stroke was the condenser swept back into the arms of the controversialist, that he might hold forth on just how the rotor plates should be cut away or patched onto, in order to spread stations out nicely and evenly over the tuning dials.

First came the straight-line-wavelength condenser, so called because it gave an even wavelength variation per dial division. Immediately the uninformed technician rushed to the radio store armed with a straight-edge, bound upon securing a condenser with a straight-line something-or-other. Disappointment reigned supreme; the straight edge was useless, for this straight line thing didn't even support a respectable, according-to-Hoyle curve. Solemn and serious assurances were offered by salesmen, to the effect that some kind of a straight line would result from their use; possibly to the padded cell if the purchaser tried to figure out the why and wherefore.

Behind all this straight-line curve business there may be a reason. In fact, there frequently is behind such things. So let us consider what variety of curves is available, and why, and then let us pick the nicest looking curve (to us) and swear by it for evermore.

First we have the straight-line-capacity curve, in which the capacity increases uniformly as the dial graduations. Then we have the S-L-W or straight-line-wavelength type, in which the capacity increases slowly at first—then more rapidly, with dial rotation. It is called "straight-line" because the wavelength varies a uniform number of meters for each dial graduation. Next comes the S-L-F or straight-line-frequency condenser, which might be described as an aggravated type of S-L-W, physically, and which varies a uniform number of

kilocycles for each dial graduation in conjunction with a given coil only. The first commercial application of this type was in the Grebe Synchronphase, and it is heralded as the cure for all selectivity. Let us see whether it is.

There is little use considering the S-L-C (straight-line-capacity) type, since station crowding on the dials is very bad on short waves, and the separation unnecessarily great on the high waves. There are other extreme types that might be considered, but they are impracticable, so let us pass to the S-L-W type. Here stations are separated on the dial by wavelengths; let us say 100 degrees on the dial will tune from 200 to 550 meters, or cover 350 meters. Thus, we get 3.5 meters per dial degree, and with only a few meters separating some of the low wave stations, crowding is bound to result. We will probably tune in 300 meters at about 29 degrees, and 400 meters at 58 degrees, with 500 meters at about 87 degrees.

Because the Department of Commerce allots stations their operating waves by frequency rather than by wavelength, and to get a truer separation, the S-L-F condenser was developed. Here, we cover the same wavelength range of 200 to 550 meters, on a 100 degree dial. But this, in terms of frequency, is roughly, 1,500,000 to 545 kilocycles. Thus, we cover a range of, let us say, for convenience, 1,000,000 cycles, which gives 10 kilocycles per division. Thus, a 300-meter station comes in at 50 degrees, a 400 meter one at 75 and 500 meter one at 90. Compare these figures with those of the S-L-W condenser.

All this is fine; our separation, according to the Department of Commerce's rating, is ideal and our worries are over, for we have a place for each little frequency, and each little frequency has its place. But there is a dark cloud on the horizon; power; nothing more and nothing less. It is quite nice to separate our stations perfectly, except that we have made no allowance for transmitting power. Heretofore we have discriminated against the short-wave, lower-power fellows; now we are all for them.

But let us not forget that the stations below 300 meters are Class A stations, which means low power, intermittent service, and comparatively poor programs. Above 300 meters, crowded into one half of our dial, on an S-L-F condenser, is practically every high power, worth-while station in existence. Queer, we didn't think of that; with the S-L-F condenser all our good stations are jammed into half of the dial.

Now, before choosing our condenser, let us remember that

(Continued on page 62)



Another Expedition

Don't You Want To Come Along?

WE ARE going to explore Radioland from coast to coast, from studio to studio; each month we will meet new radio celebrities, new stars, and learn about new wonders of radio. Over the bounding radio waves we'll travel, twelve times a year.

WE ARE going to explore all the mysteries and the workings of the wonderful new radios that are being made for this winter. We are going to learn all about the little details that keep us from getting the most out of radio.

AS PILOTS we will have H. J. Meister, Felix Anderson, Paul Green, Harry Marx, E. M. Boyd, Brainard Foote, Golda Goldman, E. E. Mattson, W. K. Randall, Marvin Hughes, Clarence Harwood—and many other able radio navigators

FOR THE small sum of one and one-half dollar you can make this trip each month—to different places, learning about new things, seeing great people. Don't you want to come?

Twelve Trips to RADIOLAND with

ON THE AIR

Suite 1323 Kimball Bldg.
306 S. Wabash Avenue
Chicago, Illinois

VOYAGE COUPON

Name.....

Address.....

City..... State.....

wishes to journey with

ON THE AIR

1323 Kimball Hall
CHICAGO, ILL.

.....Times for which \$.....is enclosed to pay twelve trips to

RADIO LAND

one trip each month.

Note: 12 months subscription is \$1.50
6 months subscription is .75

"SEN" KANEY
 didn't want to forego
 his INDIVIDUALITY
 so he became an

INFORMAL ANNOUNCER

By E. E. MATTSON



PROBABLY every radio fan in the United States is familiar with the work of A. W. "Sen" Kaney, a member of the announcing staff of Westinghouse station KYW at Chicago. It is very likely also, that the majority of listeners know "Sen" as the first announcer who became more than an announcer. Just how Kaney established the enviable reputation he now holds is an interesting study in the development of broadcasting.

In the earlier days of radio, an announcer was only an announcer. Altogether he was a rather mechanical sort of individual whose principal job in life was to tell the listening world what to expect next and in so doing, use the utmost care in diction and pronunciation. An announcer was not expected to inject his own personality into his work. On the contrary he was hired as a mouthpiece to give utterance to the studio director's written announcements. With these existing circumstances, it was only natural that an announcer was destined to become a thoroughly well behaved automaton.

Rebels Against Announcing Methods

PERHAPS it was the fear of becoming a lifeless "cog" which set "Sen" Kaney wondering or perhaps it was only another step in the development of radio, but in any event, this



Photo by Drake Studios, Chicago

"Sen" Kaney, popular announcer at Westinghouse station KYW and recipient of several thousand "mash notes" from admiring damsels from coast to coast, has slipped. And it came out of a clear sky, too. It was just a short time ago that "Sen" startled his associates with a telephone message.

"Say," came the cheery voice that is now known to millions, "Maybe I won't come down to work today."

"What's wrong? Not sick?"

"Naw," came the nonchalant answer. "Just married."

It was true. "Sen" had capped a real radio romance at the altar. The girl in the case was Vera DeJong, of the well known St. Louis family of that name. It all started three months ago on a former Chicago visit. Miss DeJong and her mother were being entertained at a radio party.

"What station?" asked the hostess.

"KYW," answered Miss DeJong. "There's an announcer there that I'm wild about, and I don't even know his name."

The hostess smiled. It just happened that she knew the "gang" at the station mentioned. Miss DeJong heard the voice of "Sen" and the following evening was surprised to find him among the guests at dinner. The Hostess had arranged that.

That started it. And now there's a Mrs. "Sen" and the answer to the popular announcer's catch line, "Everybody happy?"—is—"Well, I guess yes."



versatile member of KYW's staff registered a strong "howl" over the role of which he had been cast.

"Sen" filed his complaint in a rather forceful manner one day, when he had been called into the office of Wilson Wetherbee, director of KYW, to discuss the work of the preceding night.

"Sen," said Wetherbee, "you sounded unusually dead last night."

"Dead!" Kaney exploded, "How can I help sounding dead when I'm not permitted to live?"

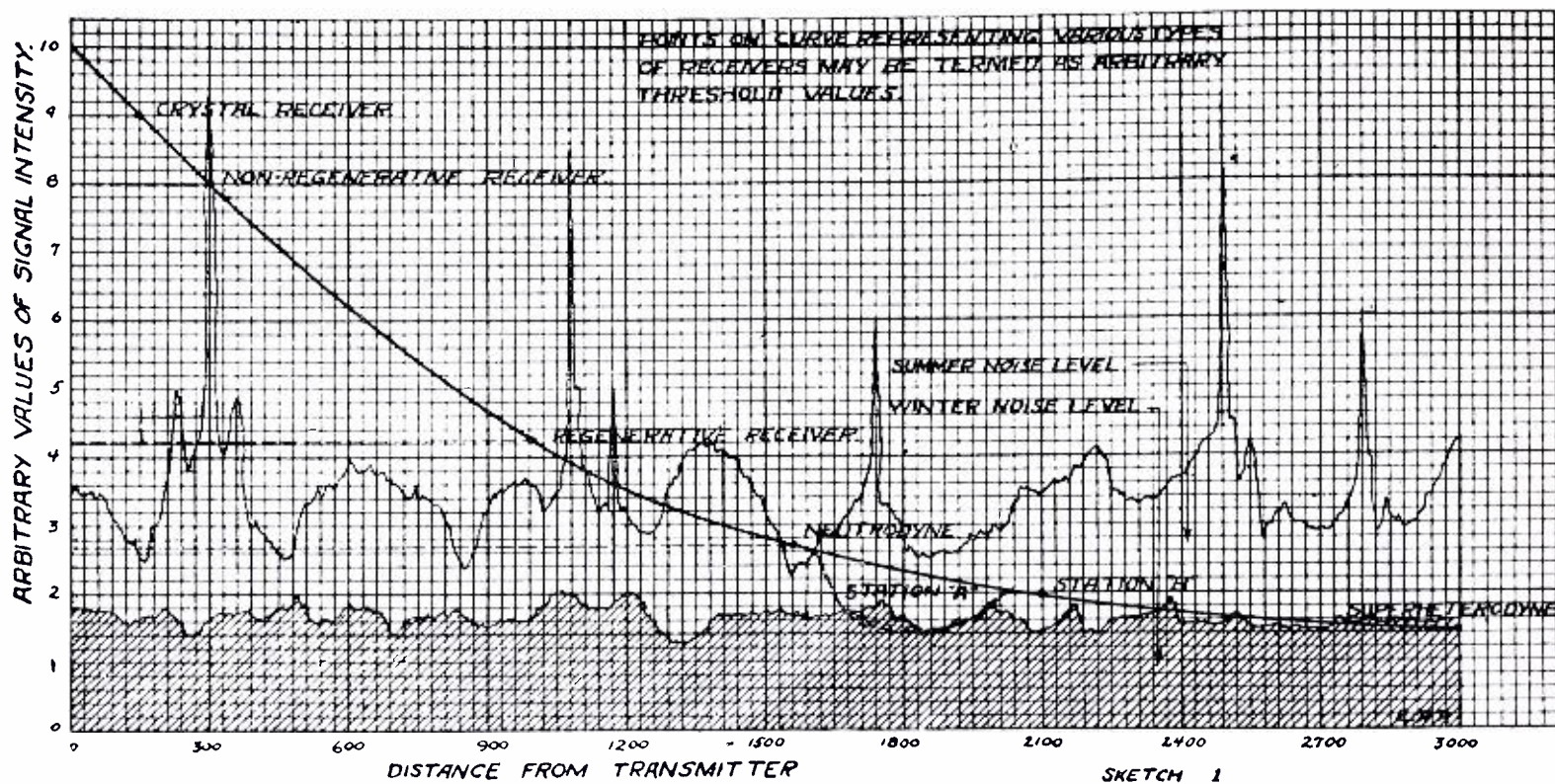
"I know what you mean," Wetherbee replied. "You don't like somebody else to do all your thinking for you. Am I right?"

"You are."

"Well, I've decided to make a few changes. Tonight when you announce the midnight revue, the studio director will give you only the names of the performing artists and the selections they will present. You can make your own announcements. In other words, I want you to be part of the show. You can sense what's going on around you. Tell the listener about it. Let the world know what's happening in the studio and let's see what happens."

That conference marked the beginning, in the West at least, of the so-called "informal" announcing.

During the midnight revue that evening, a stray cat wandered into the studio. Kaney im- (Turn to page 61)



Sketch 1. An idea of the sensitivity of several types of receivers is indicated by the curve in this illustration. The line curving from left to right shows the gradual decrease of signal intensity of a broadcasting station of a specified power at various distances from the source

LIMITATIONS of RADIO RECEPTION

IN VIEW of the fact that the more or less experienced radio amateur, as well as the novice,

By CECIL W. PRESTON

the chart from left to right indicates the gradual decrease of signal intensity of a transmitting station

is confronted with such a variety of confusing and conflicting information regarding the range of various receiving sets, a non-technical discussion of the factors limiting long distance reception will undoubtedly be appreciated by many enthusiasts.

It is the purpose of this article to point out the limitations of radio reception in general, since the varied conditions under which an instrument may be operated makes it practically impossible to estimate the range of a receiver with any degree of accuracy. This is due to forces entirely beyond our control, such as atmospheric conditions involving the amount of moisture in the air, electrical charges which accumulate upon particles of dust and moisture causing various forms of static, man-made electrical interference, interference between direct waves and waves which have been reflected from the upper strata of the earth's atmosphere, which manifests itself in a fading of signal strength and deflection of radio waves by large metallic masses. These factors will be dealt with in somewhat greater detail in the following paragraphs.

Theoretically, increasing the sensitivity of a radio receiver will increase its range, because the energy necessary to operate it will be reduced. The value of signal strength necessary to operate any receiving system is generally called the threshold value. The accompanying curve will show the approximate threshold value for the most common types of receivers. Abnormal conditions sometimes cause results which may vary considerably, but these results are termed "freaks" and are not worthy of lengthy discussion.

The curve in sketch 1 gives an approximate idea of the relative sensitivity of several very general types of receiving equipment. The line sloping down across

of a given power, at various distances from the source. It will be seen from the curve that it will take approximately nine units of energy to operate a crystal receiver.

The threshold value of a regenerative receiver is lower, therefore, decreasing the amount of energy necessary to operate it to about eight units; similarly the regenerative and the neutrodyne receivers require even less energy. Lastly the super-heterodyne requires but one unit of energy to operate it and we are consequently at the point where a further increase of sensitivity will be of no avail, since at this point the noise becomes louder than the signal. In other words, if we decrease the threshold value of the super-heterodyne which is shown on the curve, there will be no increase in the range of the set because it is already capable of picking up any signal that is audible above the most favorable winter noise level.

The summer noise level is so high that the lightning discharges are made audible in the most unsensitive receiver. It should be noted that the noise apparently increases as the sensitivity of the receiving instrument is increased. In order to make the received signal audible, it is obvious that it must be of greater amplitude than the noise level. The neutrodyne is capable of reaching the summer noise level and during the summer months would have a range equal to that of any set. The super-heterodyne, however, has the distinct advantage of obtaining the maximum range which is possible under the very best conditions of noise level and interference.

IN VIEW of the above mentioned facts, it would be useless to build a receiver of greater sensitivity than the one which was last mentioned. Adding addi-

tional intermediate frequency amplification or preceding a good super-heterodyne with a radio frequency amplifier would only serve to complicate matters. Future development in radio receivers will probably be along the lines of increasing selectivity so that one may pick out any station desired from others which may be operating at approximately the same wavelength. There will also be an endeavor to simplify this type of receiver so that the same degree of sensitivity and selectivity may be had with less equipment and consequently less cause for trouble.

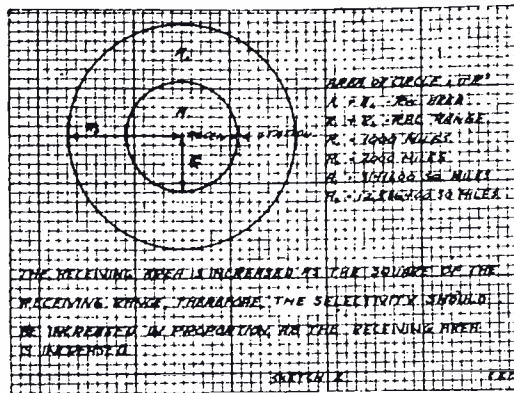
By referring to the above mentioned curve, it may be of interest to note that the signal intensity decreases as the first power for distances up to 200 miles; for distances greater than this the signals will decrease according to an exponential and inverse first power law. These laws are more nearly accurate when the transmission is over water because water is better conductor than the earth.

We are often startled when we are able to receive a station at some considerable distance with comparative ease, but experience difficulty in receiving a more powerful station which is not so distant. The cause of this dead spot or semi-dead spot is usually found to be some absorbing or deflecting medium between the transmitting and receiving station. The most common causes of these dead spots are ore deposits, mountain ranges, heavily wooded tracts of land, or groups of steel buildings. Any very large substance which is a conductor of electricity may cause this effect. By referring to the chart, it is evident that station "B" which is 2100 miles from the receiver, is to be received with much greater ease than station "A" which is only 1700 miles from the receiver, because the line of signal intensity has been caused to follow the dotted line of the curve by some conducting object which is responsible for this attenuation.

With the advent of the more sensitive receivers, many other limiting factors have been realized. The most common hindrance to good reception is "lack of selectivity." It is evident that the number of stations within the range of a receiving set is increased as the square of the sensitivity; therefore, selectivity becomes increasingly important as the threshold value is lowered. This fact is illustrated graphically in sketch 2. However, this factor has been greatly diminished, if not entirely overcome, by the super-heterodyne type of receiver which permits a very marked degree of selectivity.

The Super and the Loop

THE super-heterodyne receiver has another advantage: that of being highly efficient when used with a loop antenna, whereas most of the other types of receiver require an outdoor antenna to realize any great degree of sensitivity.

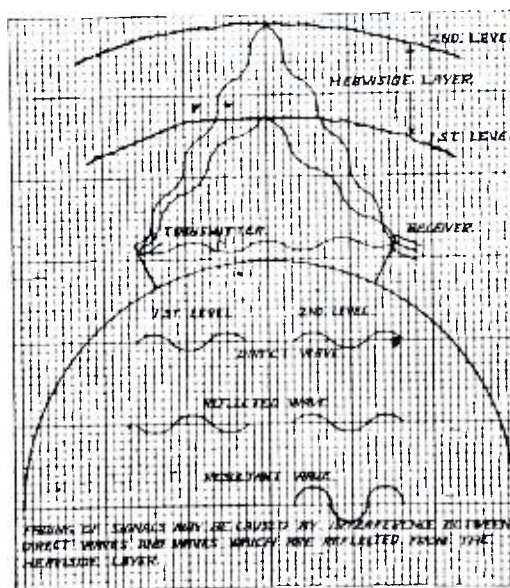


Sketch 2. The number of stations within the range of a receiver is increased as the square of the sensitivity, so selectivity becomes much more important as the threshold value is lowered. The illustration graphically shows this.

amount of noise which is always prevalent in the atmosphere, regardless of whether it is made by natural sources, power lines or electrical devices. The causes contributing to this phenomenon of noise level are numerous, but may be divided into two general classes, namely, "man-made interference" and "atmospheric disturbance."

If one is located in the city, the factor of man-made interference becomes very serious. This disturbance may be due to any arc or spark such as would be produced by a faulty connection in an electric light socket, vibrating battery charger, electric furnace, tree branches rubbing against a power line or induction from any motor driven apparatus such as a washing machine or electric dish washer, etc. Violet ray machines and "x"-ray devices also are a common source of interference.

The factor of atmospheric disturbance is a universal one, but varies during certain parts of the day and is more prevalent in summer than in winter. It is commonly known that reception over great distances is made difficult, if not entirely impossible during the summer months because of atmospheric disturbances. It has also been demonstrated that reception is greatly enhanced on a clear, cold night. A brief consideration of the electrical constitution of the atmosphere is necessary in order to clearly understand the phenomenon known as static.



Sketch 3. Showing how both direct and reflected waves travel from the broadcast transmitter to the receiver. The reflected wave travels much farther than the direct wave and is subject to being out of phase with the second wave.

The greatest advantage of the loop receiver is not its portability or ease of erection, but rather in the directional qualities which enable one to entirely separate two stations operating on the same wavelength if they are located at right angles to each other with respect to the location of the receiver.

Since there is no reasonable limit to the possible degree of sensitivity of a well designed super-heterodyne, one would naturally come to the conclusion that there is no limit to the range of a receiving system of this nature. However natural this supposition may be, it is erroneous, since the principal limiting factor of radio reception is the

The atmosphere contains a distributed positive charge, which, as a whole, approximately equals the permanent negative of the earth. Franklin proved that there was a difference of potential between the earth and the atmosphere when he succeeded in drawing a spark from the cord which was holding his kite. The regular increase in voltage between the earth and the air at various heights is called the potential gradient. The vertical potential gradient varies between thirty volts per foot at the earth's surface and one volt at the height of six miles. This condition of the air is generally conceded to be due to ionisation of the gases which compose the earth's atmosphere, by cathode rays or other corpuscles from the sun and radio-active constituents of the earth's crust. The process of ionization consists of breaking up the atoms which con-
(Turn to page 61).



"Johnny" Weaver and his famous actress-wife, Peggy Wood, are frequent visitors before the microphone of WGBS, the Gimbel Brothers station in New York. Johnny is a well known writer-poet.

Growing popularity for radio during hot weather has been further attested by the introduction of new thirst quenchers on the soft drink market which are identified solely by radio terms. If you're an experimenter with beverages you'll be asked to sample "static punch," "ether shorts," or "antenna sundaes," at one counter. The manager at a second counter reports a land office business in "radio specials." These concoctions, he said, "consist of a little bit of everything."

Broadcasting of Marion McKay's Orchestra from the Swiss Gardens, Cincinnati, as a regular feature over WKRC, gives the radio fan popular music of the highest type. John Church, Chief Radio Engineer of the Kodel Radio Corporation, who is a bachelor and not particularly susceptible to the wiles of the Swiss Gardens, is handling the microphone from the WKRC studio located in the ball room of this fashionable place.

A series of special programs, two each week, to continue through the fall, winter and spring, from the new 1000 watt station, WKRC, will commence on Thursday, October 1, and continue every Monday and Thursday night thereafter. Leading artists from all over the world will be presented by the Wurlitzer Company. Monday evening's program will be a popular one, with the leading jazz orchestras of the country being featured and on Thursday night a classical hour will be offered under arrangements made with Bertram Tuttle, manager of the Cincinnati Conservatory of Music. Famous artists and conductors from the leading symphony orchestras of the country; vocalists and instrumentalists will be featured.

Rio de Janeiro is planning to install two radio fire stations for use in its Fire

Studio Gossip

By
ALLISON BUDLONG

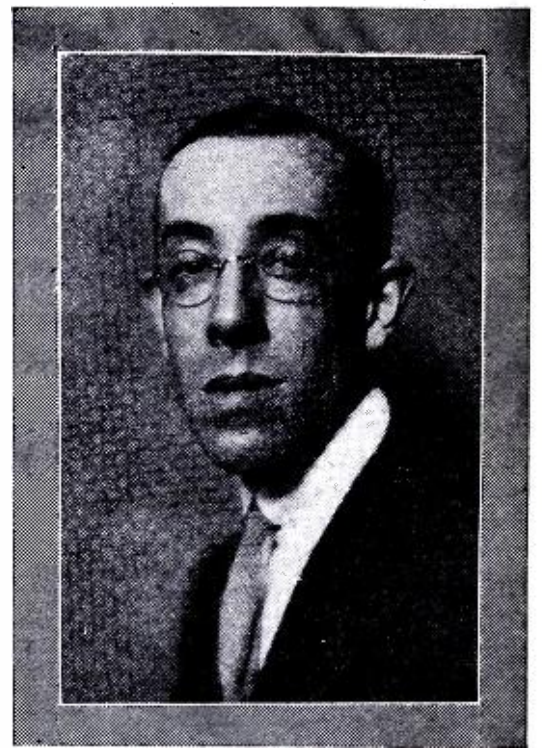
Department; one on its main building at Praca da Republica and the other on its maritime station on the Illha de Santa Barbara, Consular advices state.

One of the most popular features of radio entertainment of the Chicago stations is the daily afternoon popular program for Shut-ins from WIBO.

Maxine Brown, "The Sweetheart of the Air," will visit the principal broadcasting stations in the East during the fall season. Miss Brown has been declared by studio directors where she has appeared to have the perfect radio voice. During the past six months she has been broadcasting nightly, singing from stations WTAS, KYW, WEBH, WJJD, WGN, WCEE, WLS, WQJ, WBHN, WTAM and WCX.

Interest in radio is growing in Czechoslovakia and with the completion of the new American built \$90,000 broadcasting station at Prague, increased demands for receivers is anticipated. The new broadcaster is a 5-kilowatt type and will transmit on 500 meters. Smaller, 1-kilowatt stations, will also be erected at Brno, Bratislava and Kosice, advices to the Department of Commerce state.

The so-called radio season is getting longer. June, July and August were considered void of radio interest in past years, but since the advent of super-power broadcasting, the summer months are almost as full of entertaining novelties as in the winter months. There were more broadcasting stations



The gentleman gazing at you so condescendingly is none other than Oliver Sayer, the author and dramatic critic, a regular feature at New York radio stations. He reviews books and plays over the air.

operating this summer than in past years and the quality of their programs was of the same high level as in other months.

Dealers report greater sales in radio equipment this summer than in previous years. A majority of these sales are for portable-type sets. There is something more to the portable receiver than its use for "taking your entertainment with you." A portable receiver makes it possible to have the batteries renewed and hooked-up at any service station, just as it is possible to leave an automobile to be "tuned-up."

The National Radio Chapel sponsored by super-station WHT from the Wrigley Building in Chicago, is one of the longest non-stop programs broadcast from any station in North America. Commencing at nine o'clock every Sunday morning, the Radio Chapel services are kept on the air without a single stop until 11:30 p. m. The service is under the direct supervision of Rev. Paul Rader, one of the most distinguished evangelists in America. The entire program is relayed from the Chicago Gospel Tabernacle.

Starting daily at 5:30 p. m., WBBM is running a daily program for the kiddies from their Broadmoor Hotel Studio. It is in the form of a club meeting, run by Joy-Digger, Tiny Dave, Uncle Charlie, and various other performers. The club is known as the Joy-Digger Club of WBBM and the motto is: "Dig a little joy out of everything every day; it's there if you only dig deep enough." The programs of the club will consist of songs, stories and instrumental numbers, many of them put on by the kiddies themselves.

All children from six months to sixty years are eligible for membership.

COMING RADIO EVENTS

Sept. 28 to Oct. 3—American Radio Congress and National Radio Exposition, combined; American Exposition Palace, Chicago, Ill. Directed by International Trade Exposition Co., 440 So. Dearborn St., Chicago.

Oct. 5 to 11—Washington Second Annual Radio Show; Washington, D. C. Directed by Radio Merchants Association, Inc., 233 Woodward Bldg., Washington.

Oct. 10 to 16—National Radio Show; City Auditorium, Denver, Colo.

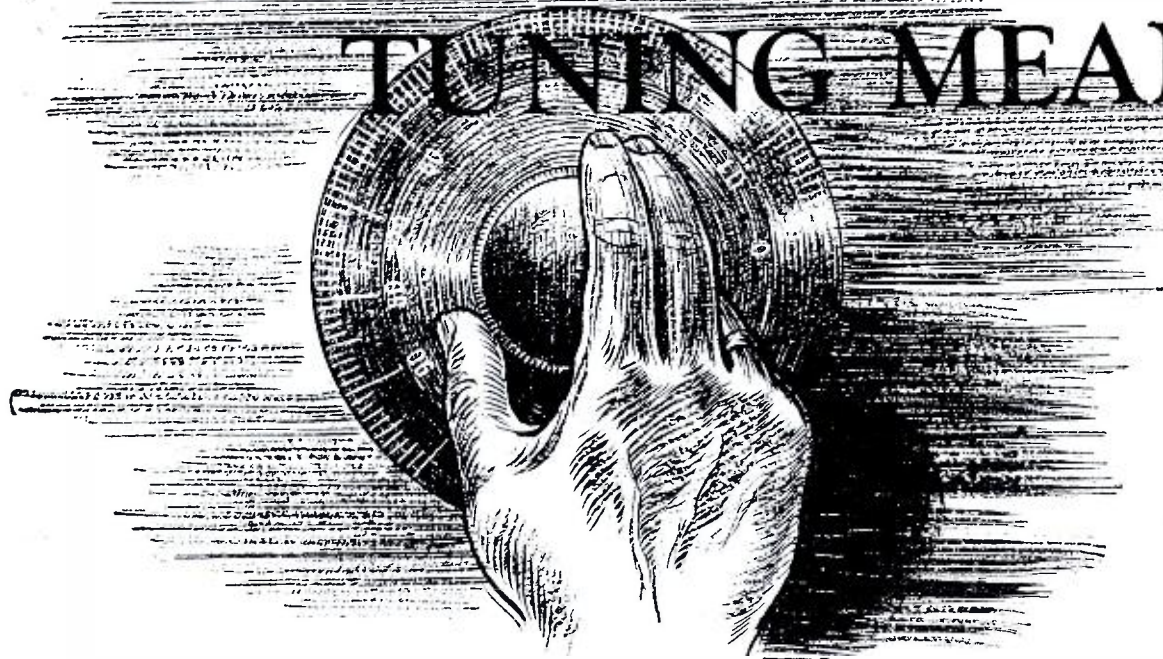
Oct. 17 to 24—Brooklyn Radio Show; 23rd Regiment Armory, Brooklyn, N. Y. Directed by Joseph O'Malley, 1157 A. Jantlic Ave., Brooklyn.

Nov. 9 to 15—Milwaukee Radio Exposition; Civic Auditorium, Milwaukee, Wis. Directed by Sidney New, Chairman; Julius Andrae & Sons, Milwaukee.

Nov. 17 to 22—Fourth Annual Chicago Radio Exposition; Second Radio Worlds Fair; Coliseum, Chicago, Ill. Directed by Herrmann & Kerr Exposition Co., Cort Theatre Bldg., Chicago.

Dec. 1 to 6—Boston Radio Show; Mechanics' Hall, 209 Massachusetts Ave., Boston, Mass.

WHAT DOES TUNING MEAN?



What's All This Mystery About?

VERY OFTEN, I am asked by novices, to explain the theory of tuning; it seems in the course of their turning dials, their interest is aroused in what takes place behind the knob of the dial they turn. Mystery seems to enshroud the factors relative to the ability of a radio set to select programs from one station and exclude the transmissions from another.

For the purpose of explaining the phenomena I always resort to the more readily understood analogy of telephone numbers.

In ordinary telephony, it is customary to consult a directory for the number of a specific person when a call is to be made. When you have ascertained the number you must call to reach your party, you simply remove the receiver from the hook, and transmit your number to a central operator, who makes the desired connections in order that you may talk. In the case of a single party line, no one but yourself and the one to whom you are talking can interfere with the conversation ensuing between yourself and the party whom you have called, due to the fact that the operator has made certain definite electrical connections, excluding all outside interference.

Similarly, in radio, we follow the same procedure. The proper method of "tuning" or literally calling upon a specified broadcasting station is to consult the directory or call book wherein the numbers of the stations are listed. Now these numbers, instead of referring to a series of electrical connections as in telephony, refer instead to a certain wavelength—a wave motion of a definite length.

The principle of this wave motion is analogous with a girl skipping rope. The rope is turned by two other girls which corresponds in radio to the transmitter of the broadcasting station. They represent the source of power. The girl skipping or jumping the revolving rope is synonymous with your receiver in this analogy, and in order that she may not "miss," she must keep her jumps in exact time or "tune" with the revolutions

*"Radio Operator 29,744"
Gives a Few Easy Analogies
to Show Tuning Isn't As
Hard As It Seems to Some*

of the rope. If she jumps faster, or slower than the rope in revolving, she stops its progress. In radio, the action of this wave motion is practically the same. Your receiver must literally skip or jump in tune or resonance with the transmitted wave, or nothing will be heard. In plain words, you "miss" the program.

EVERY receiver has within its circuit some means of effecting this "tuned" state. It may be a variable coil of wire, or it may be a combination of a variable metal surface to another and a fixed coil. In radio we call the coil an inductance, and the two variable metal surfaces a condenser or capacity. When an inductance and a capacity are connected, the combination of the two will by virtue of certain electrical laws have the property of responding to a specified wave of a definite length. Increasing the size of the coil, or the area of the plates of the metal surfaces increases the length of the wave to which the circuit will respond. In other words, when you turn the dial of a condenser or of a variometer, you vary the ELECTRICAL length of a circuit, and adjust it in tune or resonance with a series of waves that are propagated into space by a generating apparatus at a definite series of intervals of time.

The speed at which these waves travel is the fundamental rate at which electricity travels; viz., 300,000,000 meters or 186,000 miles per second. This speed does not materially affect the distance between the maximum current points between each wave; but the distance between the points of maximum current of each of these impulses or oscillations (which are traveling at the 300,000,000 meter rate) does account for the phenomena of tuning. Hence, when you tune your radio, you are adjusting it to a series of impulses, traveling at the tremendous speed just mentioned, the impulses being a specified number of "meters" apart.

Station WMBB—Mecca of the



The studio of WMBB, at the Trianon, better known over the air as the World's Most Beautiful Ballroom. This station is a popular Chicago station, well known for its variety of program, comprised of both individual selections by artists and dance music by the Trianon Orchestra. From left to right in the photo we have Clyde Hager, announcer and program director, J. Dodewalt Lampe, director and Lindsay McPhail, musical director.



Ernest Torrence, well known Paramount Star recently made an appearance over WMBB during the recent Movie Ball held at the Trianon Ballroom. Personal talks were made by movie stars from WMBB in connection with this event.



Mme. Violetta Bornesti, prima donna, a protegee of Countess Viancini, is a staff artist of WMBB. No wonder the fans all like to listen to this station—who wouldn't like to hear this Italian beauty render her charming selections?



Photo by Joloff, Chicago
Here we have J. B. Lampe, director of WMBB, the man responsible for all this unusual array of stars and stunts over the Trianon Station. Mr. Lampe is well known by all the radio stars of Chicago, and his voice is known to many many fans from the station he directs.

"World's Most Beautiful Ballroom"



Betty Bronson was also a drawing card in this Movie Ball event at the World's Most Beautiful Ballroom recently. Many radio fans attended this function having heard of its announcement by word of WMBB.

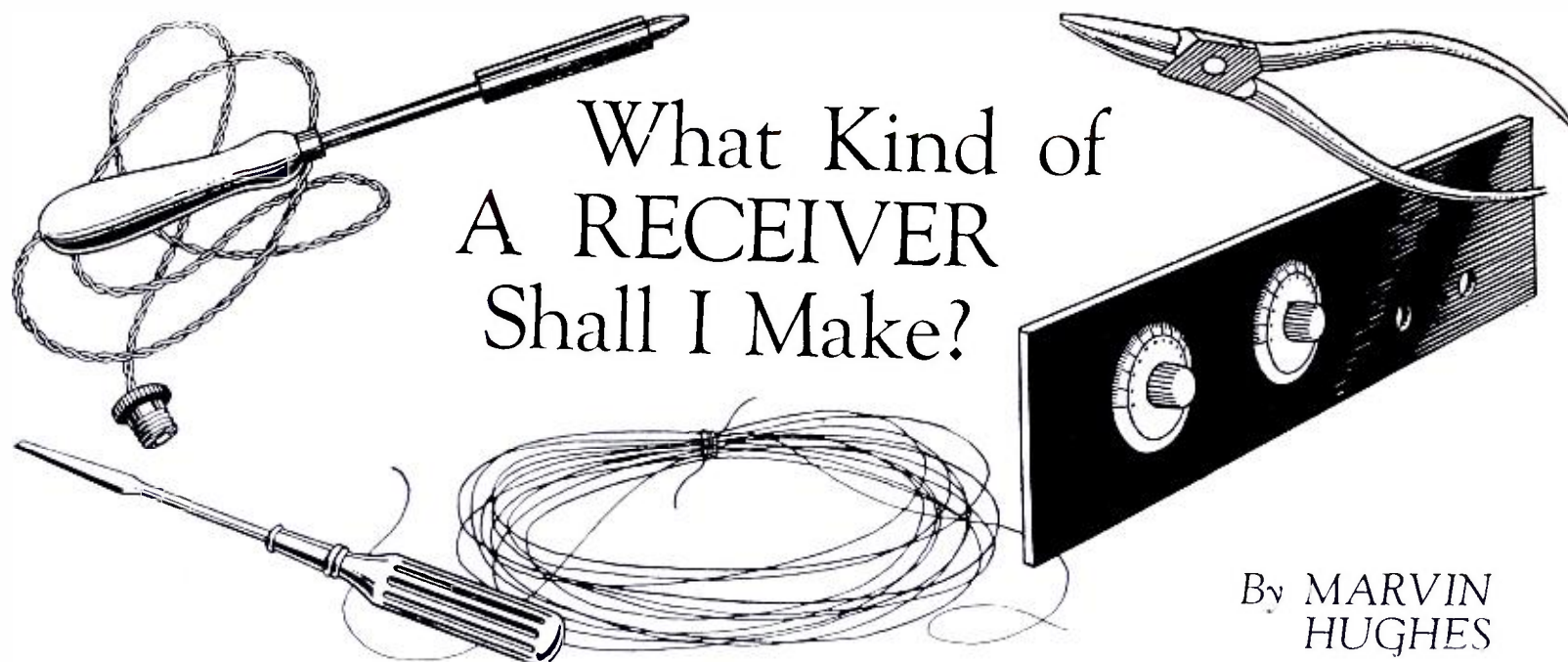
If you heard that this beautiful actress was to appear in person at the Trianon Ballroom would you be there? This is Greta Niscesn, the Paramount star who with the two other celebrities shown on this page made a personal appearance at WMBB and the Trianon.



Drake Photo, Chicago
Beatrice Teller has established for herself an enviable reputation as a radio artist from station WMBB at the Trianon studio in Chicago. Here selections have been heard by thousands of listeners of the south side station.



LOLA SCOFIELD. Who hasn't heard of Lola Scofield, the dramatic soprano of station WMBB? She featured especially on the opening program of the station, and has since appeared numerous times upon special request of the listeners who heard her that night.



By MARVIN
HUGHES

What to Consider Before Deciding on the Type of Circuit to Incorporate in your Home-Built Set

ONE of the greatest problems confronting the new radio enthusiast, whether of the entertainment-seeking type or of the technical dabbler, is the proper choice of a circuit for the most effective results. If the receiving set is to be homemade, it is no small matter to decide which kind of a radio is to be constructed, since the market offers so many sure fire long distance circuits for consideration.

When considering circuits, it is best to rate them on the following basis, respective to their all around merits. First, range; 2, selectivity; 3, volume; 4, cost, and fifth, the quality of the music received—a better term probably would be reproduction. The quality of the received programs is largely dependent upon the proper choice of instruments, and does not except in multi-bulb receivers, enter into the argument as to the nature of the electrical connections.

Radio Has Styles

RADIO has its "styles," and in the past three years, we have witnessed and fooled with an unceasing flow of dynes, supers, plexes, gons and gens. In spite of all this rush of freak and trick circuits, we have a good, old reliable stand-by that has stood its ground, and except for a few modern twists, remains inherently the same as when it was first originated.

The standard three circuit regenerative set, its origination and popularity dating back to pre-broadcasting days, has withstood for years the onslaught of newer and "better" circuits: for years it has been used as the basis of comparison, and today, it sits back and challenges all of them to give equal all around results tube for tube.

Properly constructed, a three circuit regenerative receiver has few equals. It is simple to assemble, easy to adjust, and is very selective. This circuit gives more volume per tube than probably any other circuit when generally considered, and the cost places it within the reach of nearly everyone. Its operation and selectivity is often questioned, some people contending it

"finicky." Others contend that it is hard to operate, and is objectionable due to the fact that regeneration is employed to bring in the distant stations. This is not true, for when placed in the hands of a person who is willing to acquaint himself with its traits, it is as effective as a super-heterodyne receiver with eight or ten tubes. With a good location, it will accomplish results just as pleasing. As to selectivity, it is the only receiver of three tubes that will really tune through locals and get long distance, since the advantages in selectivity obtained by employing the "zero" beat method of reception can be resorted to.

In experiments, I have used this circuit, and tune in stations over 2,500 miles away, while three local stations operating on powers ranging from 1,000 to 500 watts, with wavelengths not more than 30 meters apart from the wave of the stations being received, and when it is considered that the three locals were not more than five miles distant, it speaks very well for the set. These results were accomplished with standard apparatus, on an antenna located in average surroundings.

Circuit Provides Expansion

A RADIO set using this circuit can be constructed first with one tube at a small initial, and tubes and improvements can be added from time to time, until loudspeaker reception and three tubes have been connected up. Only when this stage is reached is the room for improvement entirely exhausted—but when this is realized, the builder has a receiver that is just as up to date as any radio ever was, and he has a set that will give greater results per dollar than any other.

With a receiver of the three circuit type, a little time devoted to tuning will reap receptions from many long distance stations. In fact, I have seen lists of receptions made with a radio of this circuit so long and effective that they would strike the owner of a ten tube super-heterodyne green with envy.

An OLD RELIABLE Returns

The CELERADYNE Set
employs a time-tested
principle of Stabilization

By HARRY J. MARX

RADIO fans have been consistently demanding an economical and efficient hook-up that can boast of volume and selectivity even in cities where numerous broadcasting stations create serious interference problems. In a well designed tuning unit, close coupling produces volume, by making adjustments for loosening this coupling selectivity can be increased without unnecessary sacrifice of volume. This coupling adjustment is most easily controlled by means of taps in the primary winding. The fewer the turns used the greater the selectivity, while increasing the number of turns builds up the volume slightly. The condenser tuning of the secondary is but slightly affected by changes in the taps.

Tube Oscillation

While neutrodyne circuits have their advantages, the average fan is well acquainted with the pleasures of trying to neutralize the interstage coupling. In addition many arguments have been advanced, doubting the advisability of completely eliminating the feed-back in tubes. Be that as it may, a proper grid potential control on the first or Radio frequency amplifier tube has been found extremely satisfactory. This grid control consists of a potentiometer of about 400 ohms resistance.

Here it is important to call the attention of the fans to a vital factor in the type of instrument to use. A wire-

wound potentiometer has a specific inductance value. Adjustment of the potentiometer affects the wavelength of the secondary circuit, making it impossible to log the dial settings. There is available, however, a non-inductive potentiometer, known as the Centralab, which has no wire wound resistor. Contact is made upon a resistor consisting of a graphite strip, by a patented rolling circular disc. This insures noiseless operation of the set and eliminates all trouble from loose turns of fine wire. It also permits adjustment of resistance, without steps as in wire-wound type, and gives the finest setting desired.

Using this type allows full grid potential control without affecting the adjustment of the secondary tuning condenser.

Circuit Details

TWO stages of audio frequency amplification guarantee ample volume loud speaker operation on long distance reception. Rarely is more than one stage

required for local stations. The condenser tuned secondary of the tuning unit, the tapped primary selectivity control, the potentiometer adjustment of the first tube and the condenser tuned secondary of the one stage R. F. transformer, all combine to offer the maximum degree of selectivity desired for even the most adverse conditions.

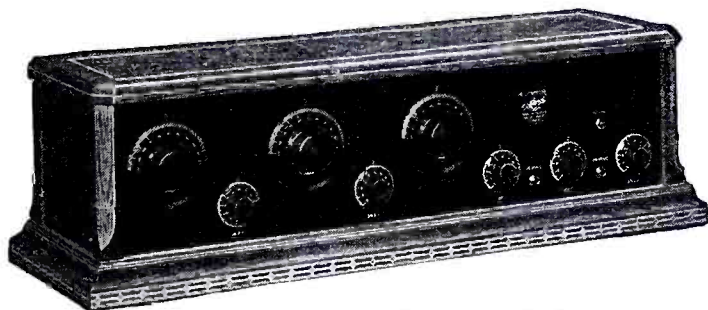
Dry cell tubes of the '99 type can be used throughout, but in most cases fans will prefer the popular "A" type of tube. The writer found that a soft detector tube gave slightly better results in both volume and clarity. For improvement of quality a variable grid leak was used. This gives smooth unbroken adjustment and uniform variation from 1-4 to 8 megohms. It makes possible quick and ready adjustment of the grid potential to the exact value that provides the greatest signal strength and the clearest tone value.

Tuning Unit Details

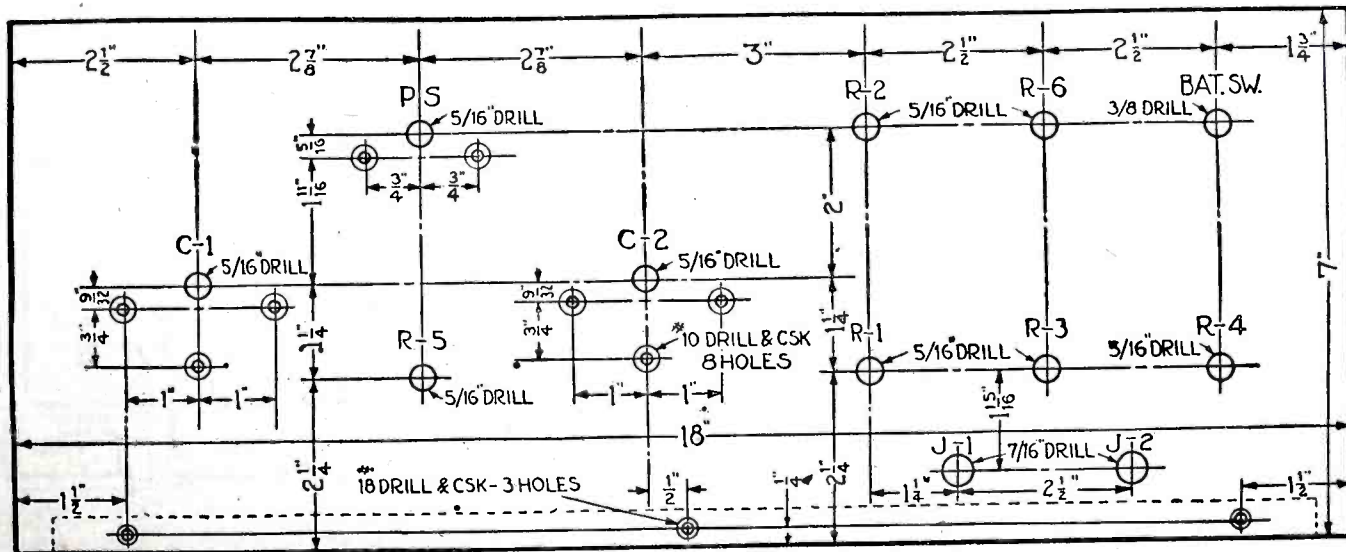
The tuning unit consists of two separate windings, which can be of the popular spiderweb form or any of the self supporting type such as those wound on pegs which are removed after the coil has been given a coat of some compound which holds the turns in position.

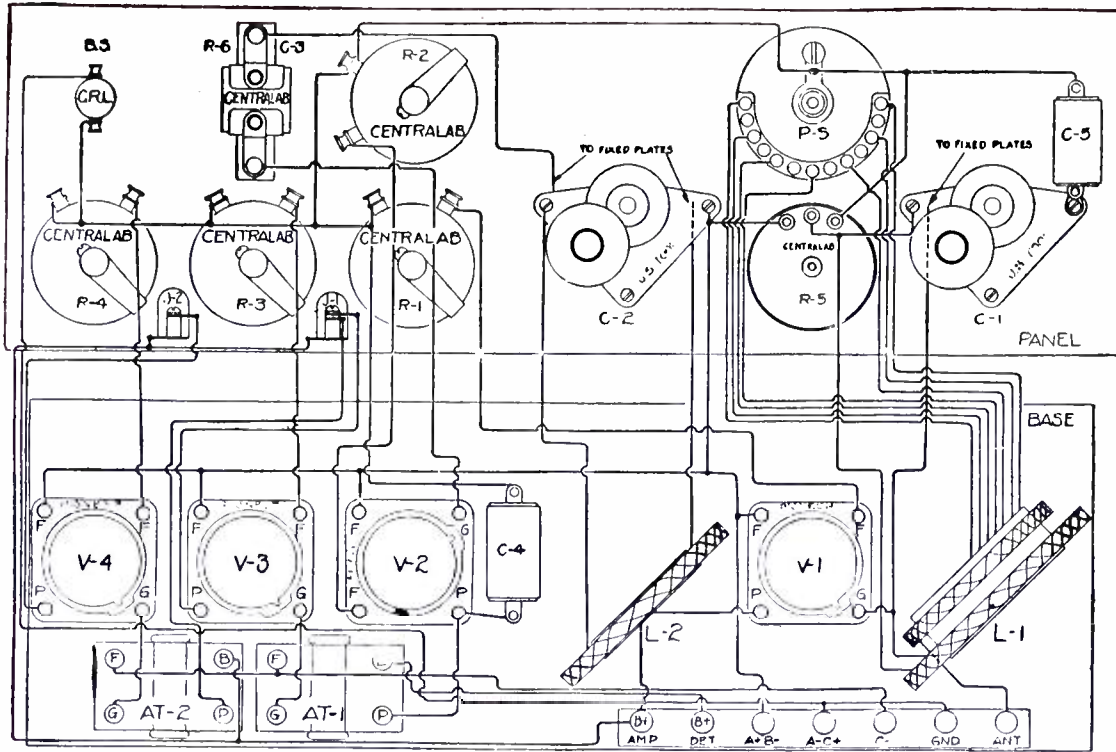
The winding details are as follows:

- Primary—32 turns
- 6 taps, every 4 turns
- Outer end—Antenna terminal



If the panel templet below is followed carefully to scale, the beautiful set shown in the photograph is the result.





A schematic wiring diagram showing the connections of the various units on both baseboard and panel. The coils are set at the angle that gives the smallest amount of interaction, and are fixed in that position. No definite angle is accurate, each set varying according to its inherent characteristics.

Panel Layout

THE layout of the panel is shown on page 35. The three countersunk holes along the lower edge are for fastening the baseboard to the panel by means of three flat head wood screws about 3/4 inch long. The important tuning controls are kept to the left side of the panel, while the rheostats, battery switch and grid leak are on the right. The two jacks are kept out of the way by locating them in the lower right side.

The layout of the baseboard is clearly indicated on this page. No dimensions are necessary. The position of the terminals for the parts should be as indicated in order to keep the leads as short as possible.

In assembly, first mount all apparatus on the panel and wire as much as possible. Then mount all the parts on the baseboard and wire these as far as possible. After this has been done, fasten the base assembly to the panel assembly and complete the wiring. This method simplifies the work of wiring and soldering inaccessible places.

Secondary—45 turns

Outer end—Grid terminal

Both windings are made with No. 22 double cotton covered wire. The inside diameter of both windings should be 2 1-2 inches. In mounting the primary and secondary, they should be spaced about 3-8 inch apart.

Air-Core Transformer

THE air-core transformer is wound like the tuning unit with the exception that the both windings are in one, the secondary being wound over the primary.

Primary—7 turns

Outer End—Plate Terminal

Inner End—B+ Terminal

Secondary—44 turns

Outer End—Grid Terminal

Inner End—A+ Terminal

No. 22 gauge double cotton covered wire is used for both primary and secondary. The same inside diameter of 2 1-2 inches should be used.

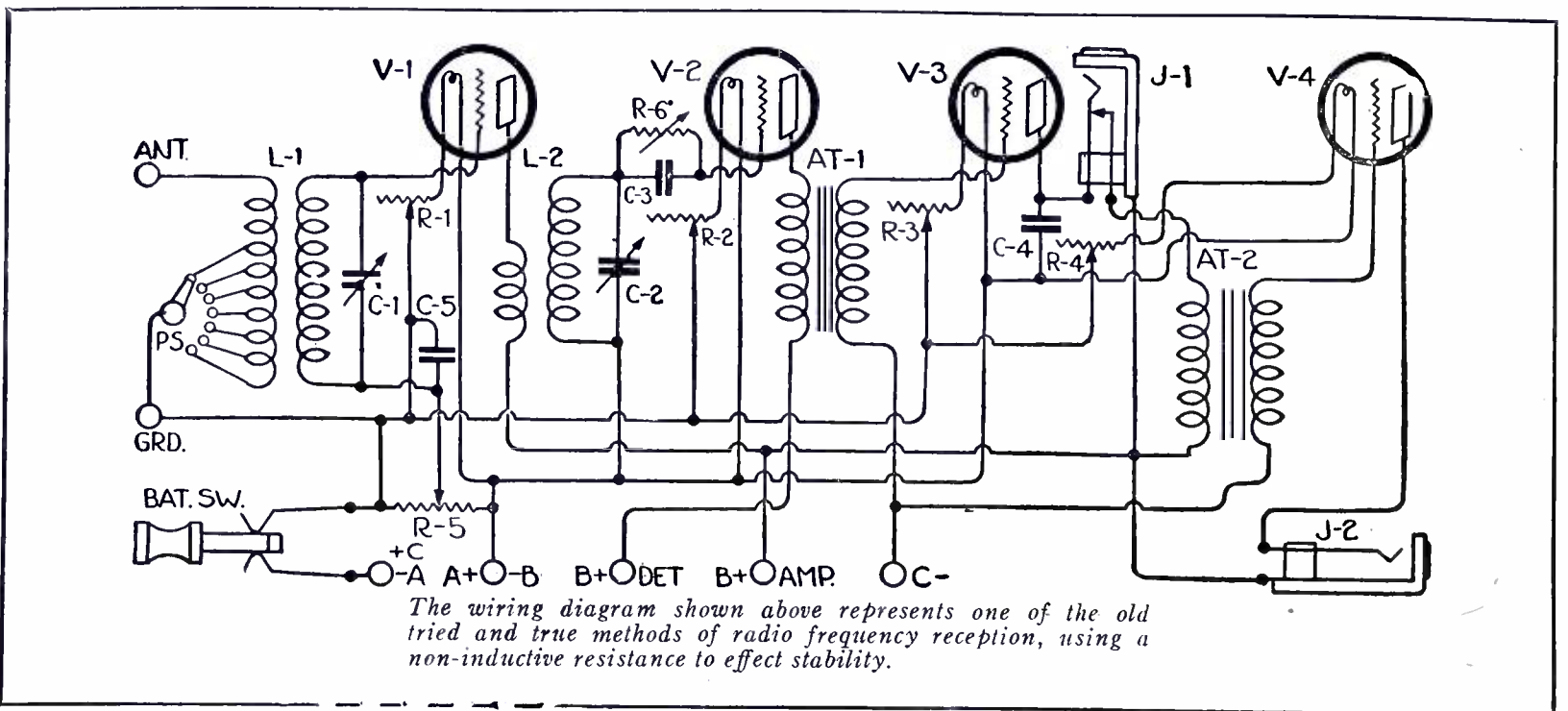
Parts Required

The parts required for building the

set are as follows:

- 1 Panel 7x18x3/16
- 1 Baseboard 8x17x1/2
- 1 L-1 Tuning Unit
- 1 L-2 R. F. Transformer
- 1 PS Inductance Switch
- 2 C-1, 2 Variable Condensers .0005 mfd.
- 4 Sockets
- 2 AT-1, 2 Audio Transformers
- 1 R-5 Centralab Potentiometer 400 ohms
- 1 R-6 Variable Grid Leak and Con-
- 1 C-3 denser
- 3 R-1, 3, 4 Rheostats 30 ohms
- 1 R-2 Rheostat 7 ohms
- 1 BS Battery Switch
- 1 C-4 Fixed Condenser .005
- 1 C-5 Fixed Condenser .002
- 1 J-1 Three Spring Jack
- 1 J-2 Open Circuit Jack
- 7 Binding Posts
- 1 Binding Post Strip 1x9x3/16

In addition to the usual assortment of terminals, screws, wire, etc., are required.



The wiring diagram shown above represents one of the old tried and true methods of radio frequency reception, using a non-inductive resistance to effect stability.

A TINY CRYSTAL

with a

Mighty Task

No More Shifting
Wavelengths and
Whistling Noises

By MALCOM BUDLONG

THE PIEZO CRYSTAL truly has a mighty task—that of acting as the governor of the frequency of the gigantic tubes now in use.

INTERFERENCE caused by a station being off its assigned wavelength, now the principal source of radio interference, is doomed.

A device that automatically holds a station constantly to a certain fixed frequency or wavelength, much the same as the balance wheel dictates the speed of a watch, or a governor regulates the speed of a steam engine, has been put in use by Westinghouse Station KDKA.

This device consists of a piezo crystal, ground to a certain size and general form, and placed in a specially designed transmitting circuit. The size and shape of the crystal governs the frequency or wavelength of the transmitter and holds it constant, and the only way to change it is to replace the crystal, or grind it to another size.

A Boon to Short Waves

SUCH crystals have been in experimental use for months on the KDKA short wave set, a type of set on which constant frequencies are difficult to maintain. After tests demonstrated that the crystal would control the wavelength, and that normal power could be used with it, H. P. Davis, vice president of the Westinghouse Company, announced that the KDKA regular 309 meter set, as well as the other Westinghouse stations, WBZ, Springfield; KYW, Chicago, and KFKX, Hastings, Neb., will be equipped with the crystal. Tests of the crystal control already have been run by WBZ and the KDKA 309 meter transmitting set. The crystals can be ground for use on any wavelength assigned to any station.

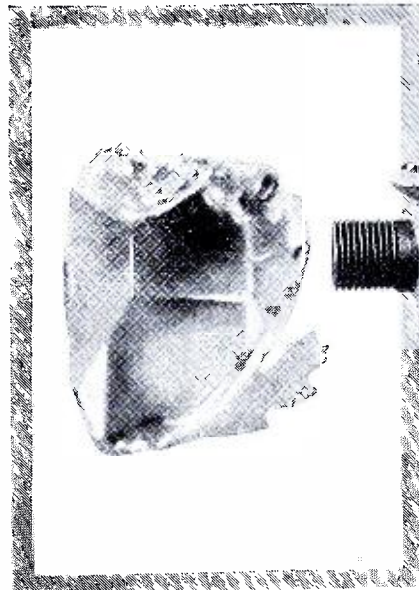
Although with the simple, broadly tuned receiving sets a shift in the wavelength is scarcely noticeable, with the sharply tuned sets now being sold the greatest source of interference is the station that is off its assigned frequency. Since the station wavelengths are separated by only ten kilocycles, it is a serious matter when a transmitter changes its wavelength even as little as two kilocycles, which in the case of a station operating on 309 meters, would be but .2 of one per

cent. If a shift greater than two kilocycles occurs, there is a whistling sound beat note, or other distortion heard in the receiving set, and the signals from two stations are jumbled together so that neither can be heard clearly.

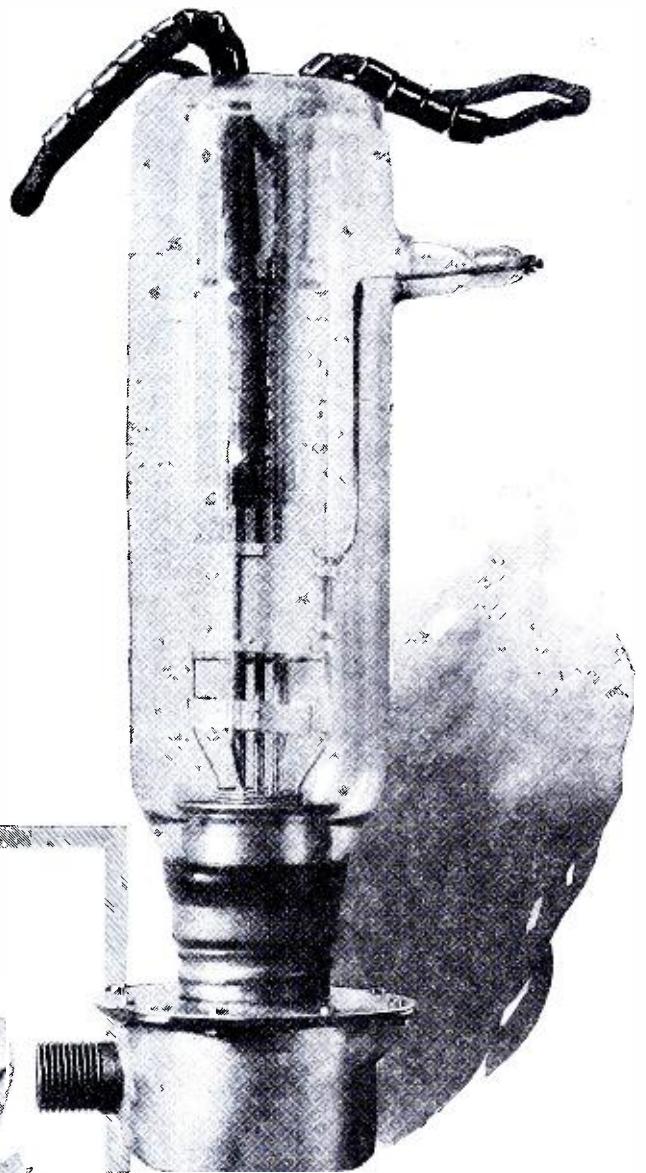
This shifting of wavelength has been difficult to prevent, as it may be caused by such seemingly trivial things as a sagging of the antenna and a variation of the amount of current used in the transmitter. Frequent checks with a wave meter, the only possible way hitherto of determining whether the station was near its assigned frequency, were unsatisfactory, and radio engineers have been looking for some way to automatically regulate the wavelength.

"Vibrating" Crystals

KDKA has found this regulator. It has been known to scientists that certain crystals have the power of vibrating at frequencies in the radio range. These crystals are called piezo crystals. The KDKA engineers learned that the frequency at which the crystal vibrated was governed by its size and shape. They also learned that by using the crystal in a specially constructed circuit, and building the oscillation on up through the high power transmitting set, the wavelength emitted is exactly the same as that of the crystal.



Though the tiny crystal shown at the left is no bigger than a half dollar, it has the important function of controlling the steadiness of the signals generated by this mighty ten kilowatt water-cooled tube.





Claiborne Foster—herself—at the right, in a mood that makes married radio fans repent, and single ones hope and sigh.

How the Girl With the Radio Voice Was "Discovered"

WHEN PRETTY CLAIBORNE FOSTER began her career as an actress not so many months ago, it was conceded generally that her cute actions, cute figure and saucy countenance were in a large measure responsible for her phenomenal success.

But the dopesters forgot one thing. They neglected to take account of little Claiborne's voice, and the unlimited possibilities its charm held for her future.

Such was the condition of the Foster Reputation when she landed in Chicago for the opening of her engagement as the feminine star of "Applesauce." Within a few weeks some directors of KYW, the Westinghouse super-station, attended the show and were bewitched by Claiborne's performances, as well as her actions *and* voice. They closed their eyes and still her performance was alluring.

That was the acid test. If she could "click" over the foot-

lights, then surely she would "go over" by radio. Within a few days Miss Foster was on the air at KYW, reciting one-act plays with her stage vis-à-vis, Allan Dinehart, and telling jokes and reciting poems in her own inimitable, captivating way.

The fans of the Middle West went into mourning—figuratively, of course, when Claiborne's play, "Applesauce," finished its engagement in Chicago. But their sorrow was short-lived, for the coquettish little star, hailed by critics as the dramatic "find" of the season, is back again behind the footlights—this time in a new play—"Patsy," written specially for her talents by the same Allan Dinehart.

And what is more important, she's on the air again from KYW, making the married fans wish they were single and the single ones wish they were married—to Claiborne of the unbobbed hair!

HIGH-FREQUENCY HARRY'S PAGE



STATION BLAH, now broadshoot-
ing, from the Gorgonzola Room
of the Hotel De Grubb, nine stories
above a vacant lot. Joe Sklotch will
now perform on a zither, made by the
Zoom Brothers Zither Foundry. Joe
plays with an artificial hand, made by
the Natural Lunch Hook Company.
He will be accompanied by Percival
Blubb, on a Smith and Wesson piano.
They appear by courtesy of the Stayup
Garter Company. Stand by for one
moment, while the announcer smokes a
Turkish Tombstone cigarette, and hunts
up something else to advertise.

Kilocycle Kate is so dumb that she
thinks a push-pull transformer is for
accordion music, only.

The Seven Wonders of the Radio World

1. I WONDER what station that was.
2. I WONDER if I turned the tubes off.
3. I WONDER if he really got all those stations.
4. I WONDER who told that guy he could sing.
5. I WONDER what's wrong with it, now.
6. I WONDER who invented static.
7. I WONDER why I ever took up radio.

The real reason some fans howl for a "silent night," is so that they can have one night's quiet snooze, without worrying about missing something good from the locals.

Yeah, he's so dumb, he thinks a kilocycle has wheels and pedals.

New York woman sued for divorce last week. Said hubby talked about Ann Tenna in his sleep.

Uh-huh, he's so dumb, he thinks a broadcaster is a guy who throws girls around.

You can buy all the parts, and build yourself a radio set, but you can't get a flivver that way. You have to buy a whole one, and drive it around the block, before you get the parts.

In less than 10 years, say the scientific ginks, we will be able to receive broadcast motion pictures.

Then Gloria Swanson, who is already the Marquise de la Falaise, et de la Couderey, can also be the Marquise de la Kilocycle et de la Variometer.

Wonder how they're going to get Walter Hiers through a 199 tube?

But a peanut tube will work all right for Mabel Normand.

The radio station directors are all buying puttees, and announcing through megaphones.

Will Hays, the movie czar, will have to keep one ear on the broadcasting stations. Will can do it all right, because he has generous ears.

Some fans are going to get their dials mixed. Think of watching Mary Pickford walk across a violin solo!

Or a close-up of Barbara La Marr, with the weather report all over her face.

All this is gonna happen about 10 years from now. Just in time to broadcast the movies of the Dempsey-Willsfight.

Once upon a time there was a radio dealer who didn't have a tin loudspeaker sticking out of the front of his store. Now you tell one.

This is a Flivver Story

Two crazy guys escaped from an asylum and made their getaway in a radio-equipped flivver, which was standing outside. They picked up a Chinese laundryman, who said he could operate the set.

Then they stopped on a railroad crossing, and tuned in on WTAS. The Twentieth Century roared around the

curve, in the middle of the first announcement, and knocked them for a stack of cross-eyed grid leaks.

Bystanders rushed to the scene, but all they could find, when the train had passed, were two Nuts and a Washer.

Station BLAH now signing off, so that the announcer can go home and listen in on his radio.

HIGH-FREQUENCY HARRY.

There has been a marked tendency in Canada during recent months for the radio business to become a substantial part of the music trades. This movement has been noted in the successive announcements by many leading music houses of the opening of special radio departments in their large stores and there has also been noticed a strong development of active radio interest on the part of important manufacturers and distributors of the allied musical industries of the Dominion.

An instance of the mutual attraction between the music and radio equipment businesses is very noticeable in Ottawa, the Canadian capital. Some months ago nearly everybody was selling wireless parts and sets. Radio goods were to be seen in the windows of garages, tobacconists, drug stores, hardware stores, electric shops and stationers. At the same time, the large music stores seemed to be standing aloof—perhaps wondering what radio concerts might do to the already defined piano, phonograph and instruments trades.

In recent weeks, there has been a distinct change. All but one large music store in Ottawa are now featuring radio goods as a substantial part of its stock in trade. That one music shop deals exclusively in pianos and it did not take phonographs when the "talking machine came in"—and it is continuing exclusively with pianos. But all the other piano and phonograph establishments of the city are now "hot for radio." One prominent local music company even went so far as to buy out the only local exclusive radio retail enterprise in Ottawa and the proprietor of the radio store is now in charge of the radio department of the music house.



"There goes old Henpeck. He can't open his mouth without permission from his wife!"

"Ah! one of these remotely controlled broadcasting stations, Eh?"

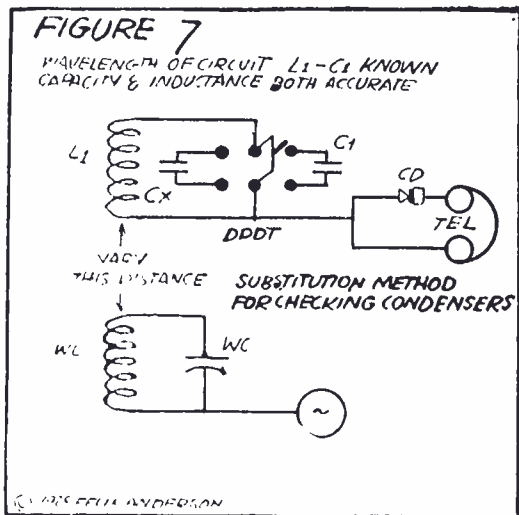


Figure 7. This is another permutation of the wavemeter further expressing its usefulness. The cut shows how it may be used to test .00025 and .0005 MFD fixed condensers for accuracy.

(Continued from pg. 18) a piece of flexible wire. This connection should be made carefully. If the connection to the buzzer is made incorrectly, the unit will not work as a driver. The contact must be made either to the adjustment screw proper (the screw that varies the pitch of the buzzer) or else to some part of the frame supporting the screw and which is connected to it. A wire (flexible) should be attached to one of the buzzer terminals, and run over to the switchpoint. One switchpoint is left open for the purpose of providing an off contact. The circuit is completed by running a wire from the switch lever down to the battery, and from the battery back to the other terminal of the buzzer. If you have any trouble in following the description, refer to the wiring diagram, which clearly illustrates the hookup.

The last two mentioned operations are important, especially the matter of getting the right connection to the buzzer and rotary plates of the condenser. I find in the tests that any other connection works poorly indeed. Make sure that the one end of the wire goes to the adjustment part of the buzzer, or some metal connected in direct contact with it. The object is to get the little spark across the buzzer contacts to charge the coil and condenser, and in that way act as a miniature transmitter.

After making sure that the buzzer circuit is properly connected, screw the panel down on the cabinet, and connect the batteries if you haven't already

done so. Test the buzzer circuit by putting the switch on the "on" position, and adjust it to give a clear steady note.

Winding the Coil

THE coil winding is not difficult for those who have already made inductances. Begin by preparing the cardboard tube which is to be used as the winding form. Apply a light coating of shellac, or spar varnish or better yet, a very thin coating of a solution of celluloid dissolved in acetone. If the tube is not dry, it should be thoroughly dried in a warm oven before the moisture impregnating dope is applied.

When the card board tube is still slightly sticky (not wet) two holes should be punched about 1/8 of an inch from the edge. Thread the No. 22 DSG wire into these holes, and begin winding the coil in a clockwise direction.

If you use a Bremer-Tully condenser,

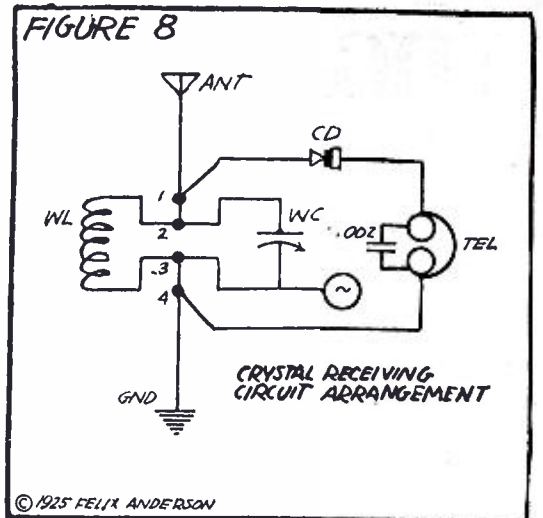


Figure 8. You needn't worry about missing out on any local program if you have a wavemeter handy. This illustrates how it may be hooked up as a crystal set of remarkable efficiency.

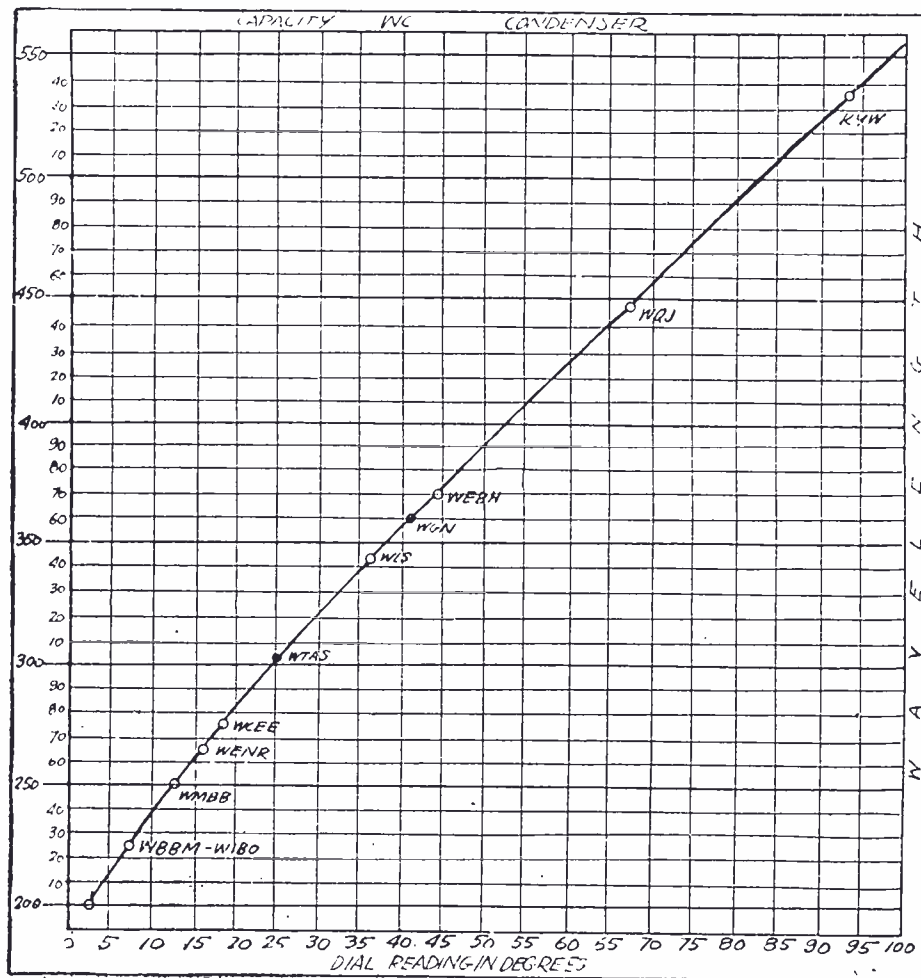


Figure 9. The above calibration chart is a sample chart showing how the readings are charted so that a general wavelength line may be drawn. The line is then transferred to the direct reading scale shown in Figure 6. This chart will NOT fit your wavemeter.

wind 59 turns on the four inch tube, tightly and neatly. If the varnish you have applied is not too dry you should have no trouble with slipping turns. Fasten the finish end, allowing a short piece for connection to the brass leg.

Now drill two holes in the pieces of strip brass large enough to accommodate an 8-32 bolt. The exact location of the holes is not important; one half inch from either end is quite satisfactory. The one end of the strip is then bent at right angles to form a foot, which is

screwed securely to the cardboard tubing of the coil. If the cardboard is of the thin variety, it may be necessary to back the bolts up with washers to keep them from pulling through.

The two coil ends are then soldered to these brass strips, which in turn are screwed down on the binding posts. The strips also keep the inductance clear and free, and at a good distance from the hand of the operator. (See illustration page 17.)

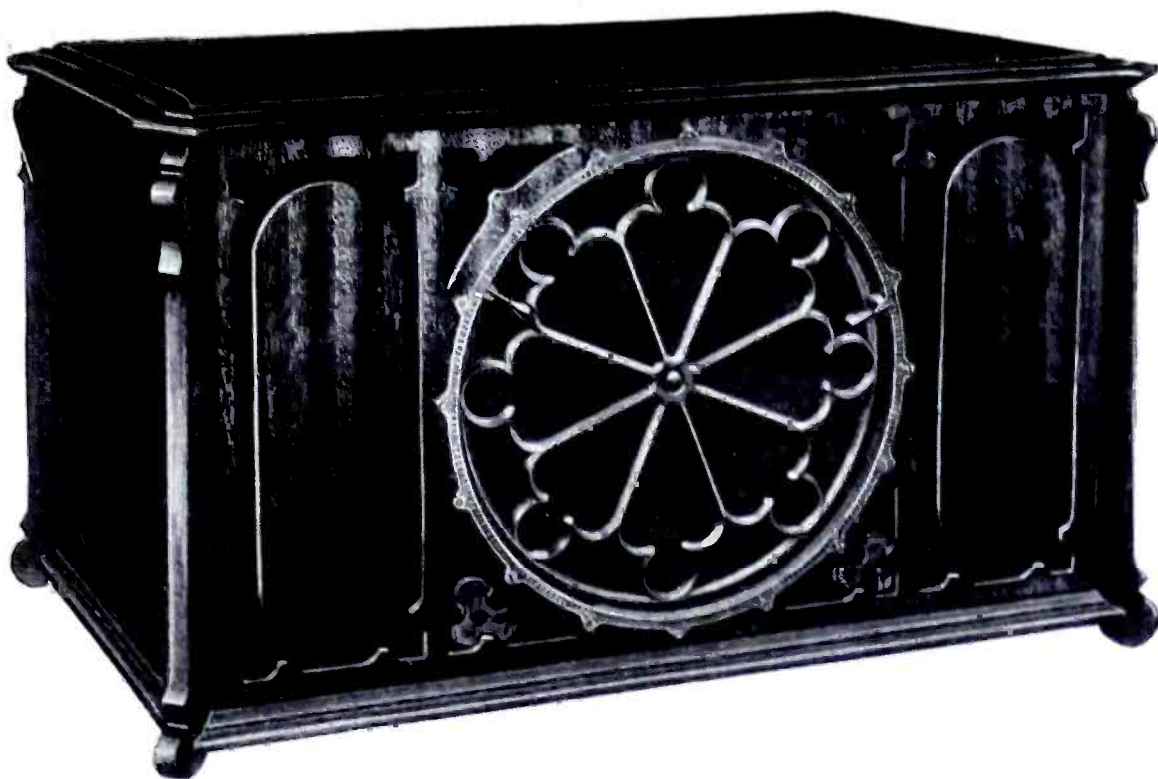
Calibration

CALIBRATION in our case means that we must find out what wavelength the oscillatory circuit composed by the condenser and coil responds to with various settings of the condenser dial, and further it means that we are enabled to read the condenser in terms of wavelength instead of degrees.

The first step in this procedure is to rule out a sheet of graph paper as illustrated in Figure 9. This is what is called a calibration graph, and will give us a wavelength curve for the coil and condenser combination we are using.

Make this graph sheet by drawing a rectangle 10 inches high and 7 inches wide. Divide both width and length into sections as illustrated and connect the divisions with cross rulings. When you have finished, you will have a rectangle composed of 20 squares for its base and 37 for its height. Number the lines along the base starting with zero and adding five. These numbers will correspond with the dial settings of the condenser. The vertical left

(Continued on page 58)



*Charm and Simplicity Combined
in the*

NEW ULTRADYNE

By M. L. MUHLEMAN

MR. ROBERT E. LACAULT, Chief Engineer of the Phenix Radio Corporation has shown a considerable amount of foresight in the design of the new Ultradyne receiver. He has met the requirements of a radio public who of late have become rather particular as to what is handed them in the way of sets.

The new Ultradyne has all the charm of a fine piece of furniture and is the very acme of simplicity. The accompanying photograph can do little better than give you an idea as to the attractiveness of the set. It is particularly conspicuous for its absence of unsightly controls. All that really greets the eye is a rich brown cabinet of five ply mahogany veneer, centered by a grilling with a statuary bronze finish and backed by a dull gold meshing. The monotony of the space on either side of the grill is relieved by two tone line cuttings.

The conservative design of the set makes it applicable to any room scheme and one would not have to worry as to its clashing with the furniture. This is rather an important factor since some rooms are arranged with great care and the furniture selected with a view towards artistic blending that quite often the addition of a radio set will spoil the whole effect.

Control System Simple

The simplicity of the control system employed in the new Ultradyne is

Art and Beauty at Last Find a Place in Receiver Design

another salient feature. Two levers, which are behind the grilling, terminate in convenient bronze grasping handles. These handles move along the periphery of the grill on which is stamped two scales. All that it is necessary to do to operate the set is to move these handles up or down until you hear the desired station. One is not bothered by critical adjustments as is the case in so many sets where it is necessary to turn knobs a hair's breadth one way or another in order to get the best reception.

These two station selectors are the only controls though there is a small knob to the right of the grill and below it employed for adjusting the volume. When the knob is turned full to the left the filaments of the vacuum tubes are turned off. No setting of rheostats is required since the filament control is entirely automatic.

A jack with a bronze face plate is mounted on the other side of the grill from the volume adjuster and is there should you care to use head phones. Of course, the loud speaker is directly

behind the grill, right where you can hear it best when selecting stations.

Technical Specifications

THE new Ultradyne employs six tubes of the storage battery type, three of them functioning as radio frequency amplifiers, the fourth as detector and the last two as the audio frequency amplifiers.

Two of the radio frequency stages are variable while the third is fixed or better said permanently tuned. By a special system utilized in the second and third stages, oscillation or "spilling over" at resonance points is eliminated without any loss of efficiency as in the usual case, and at the same time the selectivity greatly increased. This is accomplished by a combination of resistances in the input circuits together with the special transformers, which tend to equalize the grid-filament impedance of the tubes.

The ease with which it is possible to tune the set and the absence of "side-band interference" is due principally to the "straight-line wavelength curve" characteristic of the variable condensers employed. What these condensers actually do is to evenly distribute the wavelengths over the entire scaling, that is to say they prevent the "bunching" of the short waves in a comparatively small area. This system insures ample "scale space" between stations of different wavelength and consequently eliminates
(Turn to page 60)

What Makes a LOUDSPEAKER Good?

Former Government
Expert Designs
New Cone-Speaker

By R. E. McCORMICK

THE R. E. Thompson Manufacturing Company has developed and placed on the market a cabinet type Speaker. The new Speaker is called the Thompson-Fuller Speaker having been designed by Dr. Leonard F. Fuller, of the Thompson Company. Because of the fact that it is licensed to manufacture the cone type Speaker under the Lektophone patents, the Thompson Company is actually engaged in the manufacture of all three types of Speakers, the cone type however, being utilized as an enclosed Speaker in The Minuet, a new Thompson receiver model. At the present time, no cone type Speaker is being manufactured by this outfit for the general market.

The Speaker is enclosed in a beautiful mahogany cabinet with most attractive screened grill. Although unusual in appearance nothing has been sacrificed in efficiency to make it handsome, the cabinet being designed to harmonize with accepted styles of furniture for the home. The dimensions are length, 22½ inches; height, 9¼ inches; depth, 9½ inches. The length of the concealed horn is 22¼ inches.

Dr. Leonard F. Fuller, designer of the speaker is a scientist, engineer and executive whose experience covers many years in the industry. His designs are to be found in many of the most important stations throughout the world, including a majority of the giant high-powered stations of the American Navy. Dr. Fuller was actively engaged in the design of the largest single transmitter in the world—the great 1,000,000 watt station of the French Government at Bordeaux, France. This was the station that served as the principal source of communication between the American Armies in France and this country, during the War. Dr. Fuller's experience with large radio companies has been wide and varied. He was with the Federal Telegraph Company as chief engineer and it was while with this company that he was engaged in building radio stations. Later he came east to become Application Engineer for the General Electric Company. Before being with these two firms Dr. Fuller was with the old National Electric Signalling Company in Brooklyn. He is exceptionally well prepared to design quality radio apparatus of every description.

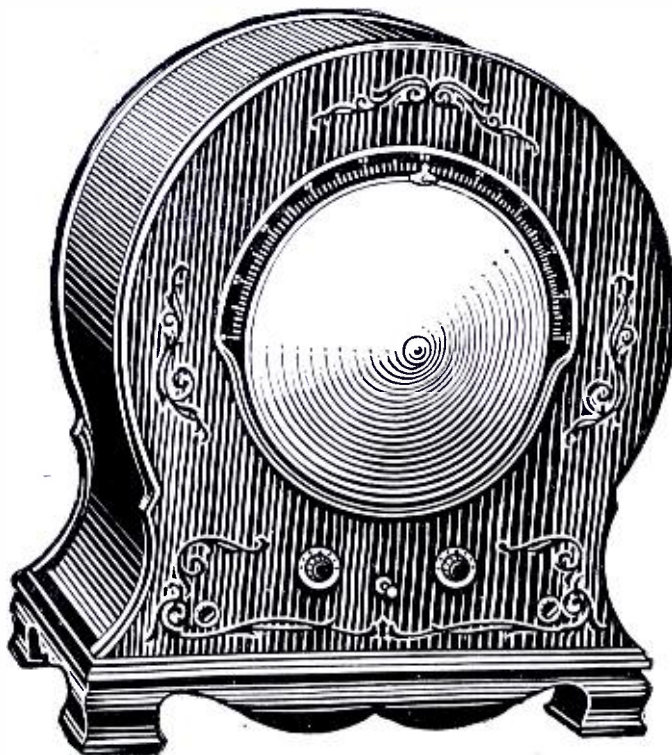
The designing of the speakers should incorporate a very definite

plan that takes into consideration certain predetermined standards by which efficient results can be judged.

A radio speaker, in order to satisfy



Dr. Leonard F. Fuller, well known radio expert with the Thompson Radio Company has just completed the design of the speaker shown below. It incorporates several unusual features in its design. Dr. Fuller served with distinction in the radio service department of the A.E.F. in France during the war.



the demands of the trade, and, consequently, meet the highest requirements of the radio public, must stand the following "test":

Be adjustable to any type of vacuum tube receiver, regardless of the number of tubes, whether one, eight or more.

Give "auditorium" volume without distortion.

Reproduce musical tones in such a way as to make listeners-in feel the actual presence of the broadcasting artist or artists.

Perform efficiently when the radio receiver is turned on "full force." This usually causes most Speakers to blast.

Be free from squeals, squawks, blurs and blasts under all operating conditions.

Be available to the public at a reasonable price.

With these definite Speaker ideals in view the laboratory and engineering staff set to work. Long and patient research with countless experiments resulted in adopting three constructional features affecting magnet, diaphragm and horn.

The magnet is made of special Tungsten alloy steel. This is essential to distant reception. Only by special construction can a magnet of over size be used in the Speaker. The conical bakelite diaphragm has a 50% greater effective area than a flat diaphragm of the same diameter would have. In addition, the entire cone moves, while the flat diaphragm moves mostly at its centre. The sound

created for a given movement of the conical diaphragm is, therefore, approximately 100% greater than for an equal movement in a flat diaphragm. The net result is better tonal quality as well as greater volume. The non-resonant bell horn amplifies without setting up tones of its own. Summing up mechanical features, a speaker should have the following: (1) Permanent magnet; (2) Actuating coils; (3) laminated pole pieces; (4) driving armature; (5) conical diaphragm; (6) volume regulator.

The foregoing is the first of a series of articles to be published in ON THE AIR concerning the development of America's radio industry and the figures and inventions that helped to give American Radio the high place in world science that it occupies today. Correspondence of readers regarding the subjects of future topics is urgently invited.



On the Airials

At the conclusion of the radio program on Wednesday evening, August 5, from Radio Station WOC, Davenport, Iowa, Stanley W. Barnett, better known as "BWS," one of the most popular radio announcers in the country, bade farewell to his audience and, with a short ceremony, the position was turned over to L. Emery Wass, his successor.

Following the farewell remarks by Mr. Barnett, Dr. Elliott introduced the new studio director, Edgar H. Twamley.

Mr. and Mrs. Barnett and family left Davenport the day following for the east. Early in the fall Mr. Barnett will be heard from a new station at Baltimore, Maryland, having recently accepted the position of announcer and studio director.

Regarding the use of initials indicating the identity of the announcer presiding over a broadcast program as a relic of the very early days of broadcasting, Station WOC, Davenport, has instructed its radio announcers to discontinue giving their own initials when signing off at the conclusion of a program. Some of the larger stations have already discontinued the practice, considering it as obsolete. Furthermore, radio listeners who have favorite announcers are so familiar with their voices as to make initial-giving unnecessary and superfluous.

Charles H. Gabriel, Jr., formerly musical director of WGN, the Chicago Tribune station, and studio manager of WCEE and WTAS, Elgin, Ill., and Chicago, has been appointed director and chief announcer of KLX, the Oakland Tribune station, Oakland, California.

"Gabe," as the radio fans call him, who is also a pianist and organist, and composer of music, obtained a particular corner in the affections of listeners in last winter, when, as WGN director, he gave a series of Sunday "Evening with the Great Composers." By virtue of much research he was able to present the human side of the great masters of music, describing them not so much from the technical and biographical side as from the "portrait" angle, telling of their physical appearance, their habits, their qualities as men and mind so that the famed names of musical history became living persons, friends of the radio fans instead of forbidding "names" only.

WOAW's weekly radio review, conducted by Neal Jones, managing editor of the Omaha Daily News, has proved extremely popular with radio listeners. Scores of letters are received daily by Mr. Jones, telling of the great interest and educational value of these lectures.

Radio announcers rarely receive praise from listeners for their "night after night" work before the microphone. The plaudits of the vast radio audience are always for the artists and yet a great deal of the success of the broadcast depends on the announcer who introduces the artists, gives the titles of the selections and the composers' names in a clear voice, and places the entertainers at the proper distance from the microphone so that the program will be best received. Occasionally, a feature broadcast of a very descriptive nature, dependent entirely upon the announcer, elicits praise from the listeners, but the regular duties of the broadcasting studio, arduous as they may be, seldom evoke praise in any form. One enthusiast, however, pays a tribute to "EFA," announcer at the Boston studio of WBZ, in a letter received recently at the broadcasting station. "Doubtless many send words of appreciation to the artists who take part in the broadcasting program, but I would like to express my gratitude to your announcer, 'EFA,' who maintains his cheeriness and courtesy into the late hours of the night," writes this correspondent.

The popular Peony Park orchestra, under direction of Ed Myers, will broadcast bi-monthly dinner programs over WOAW every other Tuesday. This orchestra comprises some of Omaha's best musicians and is largely responsible for the popularity of Peony park dance pavilion, which is crowded to capacity every night.

Next to markets and weather forecasts, reports covering crop estimates and the quality and condition of yields are meeting with great favor among farmers, according to letters to KOA from the grain states and Rocky Mountain territory.

The Jack Sprat Concert Trio, violin, cello and piano, has been added to the staff of WIBO, Chicago. This versatile

group of young musicians play operatic selections, musical comedy selections, semi-classical, popular ballad and all forms of high class music each night on the dinner program from 6 p. m. to 8 p. m.

Eve Darlon, French soprano, now in this country, made her radio debut station WBZ, July 29. Miss Darlon is an exponent of the French style of singing, which lays greater stress upon beauty and quality of tone than upon volume, and her voice is admirably adapted to that type of sing, because of its beautiful quality and clear tones.

June Lee, the frivolous jazz vocalist of Westinghouse station KYW, who sang her way into the hearts of thousands of radio fans, has left for her home on the West Coast, to be gone for the balance of the summer. Those who seek to hear her jolly songs will have to tune in the Coast stations, as she expects to make frequent visits to those studios.

The response to the first and second Thursday night Amateur Nights at Station WRNY was phenomenal. A four-weeks' supply of amateurs has already been booked, and the feature is now, frankly, the biggest of the station.

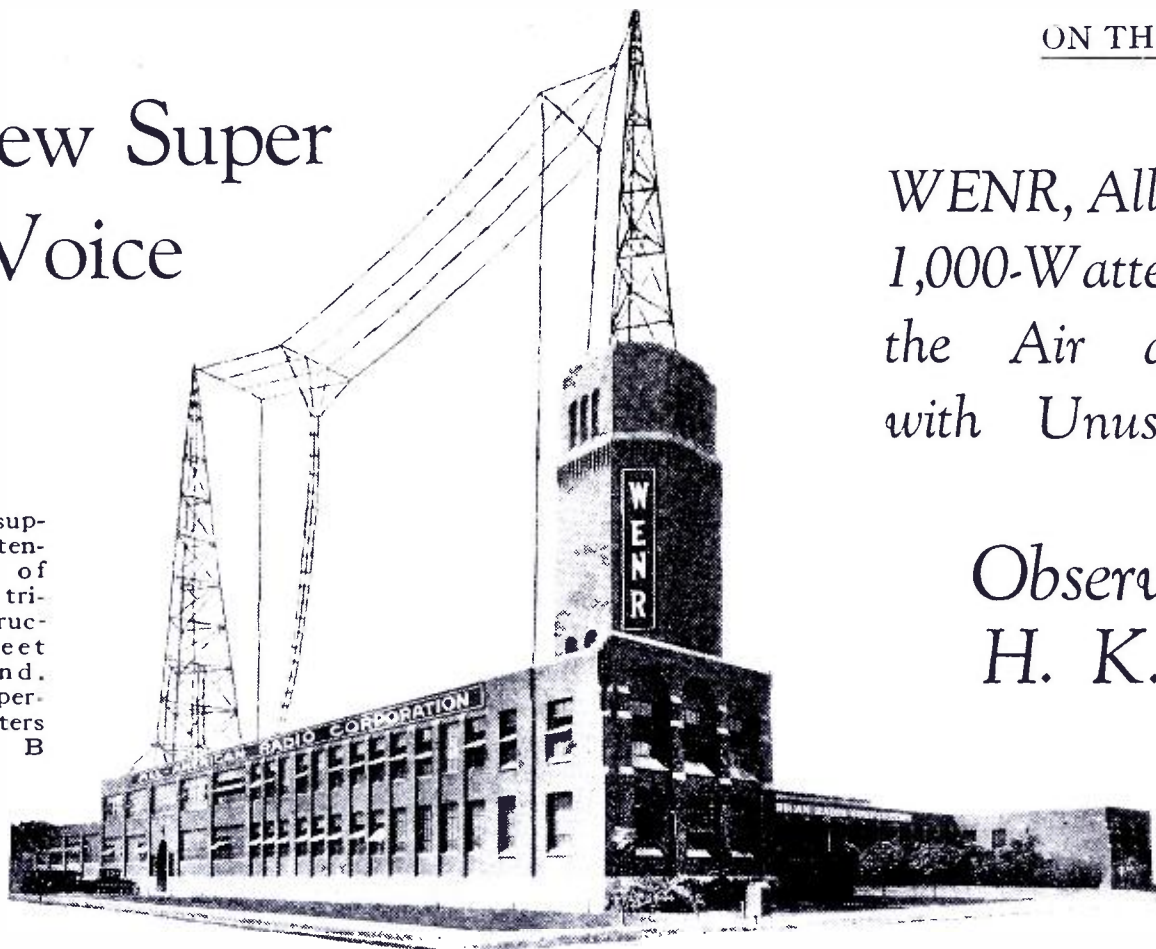
In order to appear during Amateur Night, it is necessary that you be an amateur; that is, one who has never before broadcast at any radio station. Those who think they have ability as musicians, singers, declaimers, elocutionists, high jinxers, or any other novelty that can be broadcast, are eligible. Prizes are awarded.

E. F. W. Alexanderson, consulting engineer of the General Electric Company whose invention of the Alexanderson high frequency alternator as made trans-oceanic radio communication possible, has been decorated by King Gustav V of Sweden with the Order of the North Star, the highest decoration within the power of the King to scientific or distinguished persons.

The decoration was part of the ceremony in connection with the official opening of Sweden's new high powered radio station at Varberg. Two of the Alexanderson alternators are installed in this station.

A New Super Voice

The towers supporting the antenna system of WENR are of triangular construction, 165 feet above ground. The station operates on 266 meters with a Class B license.



*WENR, All-American's
1,000-Watter, Now on
the Air at Chicago
with Unusual Talent*

*Observations by
H. K. Randall*

ON SATURDAY, August 29th, a new voice was heard on the air—the 1000 watt “Class B” broadcasting station of the All-American Radio Corporation at Chicago. While WENR is yet a new station, indications are that it is going to be one which is well worth listening to.

One of the features of the opening program was a short address by E. N. Rauland, President of the company owning this station, in which he outlined some of the plans he hopes to carry out in the new broadcaster. Mr. Rauland emphasized the fact that while a broadcast station, like a newspaper, strives to reach as large an audience as possible, yet it can do this to best advantage by developing a real personality.

By this is meant not a policy of restricting the programs to any particular class of entertainment, but rather the development of methods of presenting all of the best things available, in such a manner that they will reach those listeners who like them, at the time at which they want to hear them. This is becoming more and more an important feature in broadcasting, according to the owner of WENR—an appreciation of the fact that when a listener sits down and tunes in a certain station at a certain time he ought to have a pretty definite idea of what kind of selections that station is going to give him.

Frost Is a Speaker

OTH^{ER} features of the opening program were also of an interesting nature. There was a short talk from Major Herbert H. Frost, President of the Radio Manufacturers' Association, who took occasion to assure the owners of radio sets that they will never be called upon in the United States to pay any tax or fee for the support of broadcasting. The manufacturers of radio apparatus stand ready to provide broadcasting in abundance. There are, in fact, few, if any, places in the United States which are not now being served by broadcasting stations operated directly by radio manufacturers, whose own financial interests would not allow any slackening in the supply of good broadcast entertainment. The fact is, however, that at the present time even more of the broadcasting is being done by other parties not engaged in radio manufacturing, so that the manufacturers have plenty of able assistance.

Senator Wm. B. McKinley, who has consistently fought in Congress the proposal to place a high tax on radio apparatus, also spoke briefly, declaring that the commanding lead which the United States has taken in the development and general use has been due largely to the fact that there has been no legislative interference.

The equipment at WENR consists of a 1000 watt transmitter

using the master oscillator system, with a five kilowatt power amplifier using water cooled tubes. It is a duplicate of the new transmitter at WSMB in New Orleans, which has distinguished itself all Summer for breaking through static. WENR itself has already received reports from listeners in New York City, Long Island, Montreal, and New Orleans, as well as from Amarillo, Tex., and Saskatoon, Canada—all during the preliminary tests on hot August nights. With this as a starter it seems fair to predict that WENR will be easily heard, in more favorable weather, in nearly all parts of the United States.

The technical side of the station is in direct charge of John Allen Goodrich, Chief Operating Engineer, working under the supervision of President Rauland, who is himself a radio engineer.

Westphal Is In Charge

AS TO the artists who will be heard over WENR, the station has been provided with so large and competent a staff that programs of a high order are assured, even on occasions when no outside talent whatever is at hand. Frank Westphal, the studio manager and program director, is well known as an orchestra leader and song composer, and has been identified with a number of Chicago stations. Mr. Westphal is an all-round musician as well as a capable executive. He will have the assistance of Miss Marie Tulley, who is the possessor of a contralto voice of a texture which seems to carry splendidly through the air, and who will in addition act as the regular accompanist of the station.

Two instrumental organizations will be available constantly at WENR. The Rauland-Lyric Trio will furnish high-grade dinner music between the hours of six and seven, every evening except Sunday, and on Sunday afternoon. Popular music will be taken care of by the All-American Pioneers, an organization under Mr. Westphal's personal direction. Among the artists of these organizations are Charles McNeil, head of the McNeil School for Tenor Banjo and formerly with Isham Jones orchestras, Eric Saegerquist, concert violinist, and Ralph Shipman, well-known baritone and saxophonist. The popular selections from the All-American Pioneers will be heard chiefly between 8 and 10 p. m., every night except Sunday and Monday. On Wednesday, Friday and Saturday of each week, there will be a midnight program from twelve to two a. m., and for these hours many interesting stunts are being planned.

Among the features of the opening of WENR was the breaking of the Chicago “marathon record.” The previous record was held by KYW.



The Technical Editor to the Broadcast Listener



J. J. B., Eagle River, Wis.

I am constructing the Technical Editor's set according to your specifications in the September issue of ON THE AIR, but regret to say that I do not entirely understand the mechanism of the shafts and bearings for the movable primary and tickler coils of the tuning unit.

I understand that the threaded brass rod forms a sort of a pillar for the shaft bearing, and that the panel forms the other bearing, but I do not see what keeps the dial from continually scraping the panel and the coil jiggling back and forth. Incidentally, I would like to have you explain how the space wound coils are fastened to the shafts.

Answer: I realize that the instructions incidental to this part of the set were not as clear as they should have been, but due to space limitations, the description of its construction was necessarily limited. In an effort to make things a little more clear, I am showing several sketches illustrating the process of assembling the two (primary and tickler) bearings. The two pieces of $2 \times \frac{1}{2} \times \frac{5}{32}$ inch brass or hard copper are bent around the shaft rods as illustrated in Figure 1. Make a good job of the bending so that the shaft will run smoothly. Then with a twist drill, make a hole through the two overlaps and file off the rough edges as in Figure 2.

The next job is to solder this bearing to the threaded brass rod squarely and firmly so that it will not bind the shaft when it is rotated. (Figure 3.)

The threaded brass rod is mounted on the baseboard as illustrated in Figure 4. This illustration also shows the washer which is soldered to the shaft which keeps the entire assembly from shifting outwardly. The movement the opposite way (toward the back of the set) is stopped by the dial itself, which

TECHNICAL INFORMATION SERVICE

ON THE AIR is inaugurating this special technical service department for the convenience of its readers in helping them to solve technical and general difficulties common to radio broadcast listening.

There is no charge for this service which is maintained by a corps of technical men, and readers who wish to avail themselves of the service need only to observe a few efficiency rules.

1. Do not ask for comparisons between products advertised in this or other journals. In justice to our advertisers, we cannot convict one product and recommend another.
2. Don't ask too many questions. Boil your letter down to just what you really need.
3. Don't ask questions that require too much research work or reference. Give the other fellow a chance.
4. A letter of inquiry written in the following form always gets a quick reply. If you would expect speed, make your inquiry conform to the requirements.
 - A. Enclose a standard business size stamped addressed envelope. No envelope, no answer. Foreign countries need no stamps.
 - B. Write, don't scrawl. Use typewriter if possible. One side of paper only.
 - C. Diagrams and drawings on separate sheets. Fasten all correspondence together.
 - D. Number your questions or paragraphs, and keep the subject matter of the paragraph unified. When we answer, we'll refer to the number of the paragraph. Keep a copy of your letter for reference.
 - E. Put name and address on each sheet.
5. Address your questions to ON THE AIR, Technical Editor, 1304 Kimball Hall Bldg., Chicago, Ill.
6. And have patience, brother, patience.

and solid. The coils are then tied to this bakelite strip with pieces of thread and the thread is securely knotted. To insure permanent attachment, I coated the thread and knots with a light dab of collodion.

W. A. P., Detroit, Mich.

Question: How may I make moisture-proof some wood that I intend to use for the supports on the ends of a loose-coupler that I am building?

Answer: You may drive out all moisture by placing the wood in a bath of melted paraffine, which is kept at a temperature above 100 degrees centigrade. Keep the wood in the paraffine until all bubbling ceases; at that point all the moisture will have been boiled out of it. Then hang the pieces of wood up to dry in a cool place. When they are cooled off sufficiently they will be ready to use without fear of leakage due to moisture. It is not good practice to use paraffine on coils, however.

W. R. B., Odenton, Md.

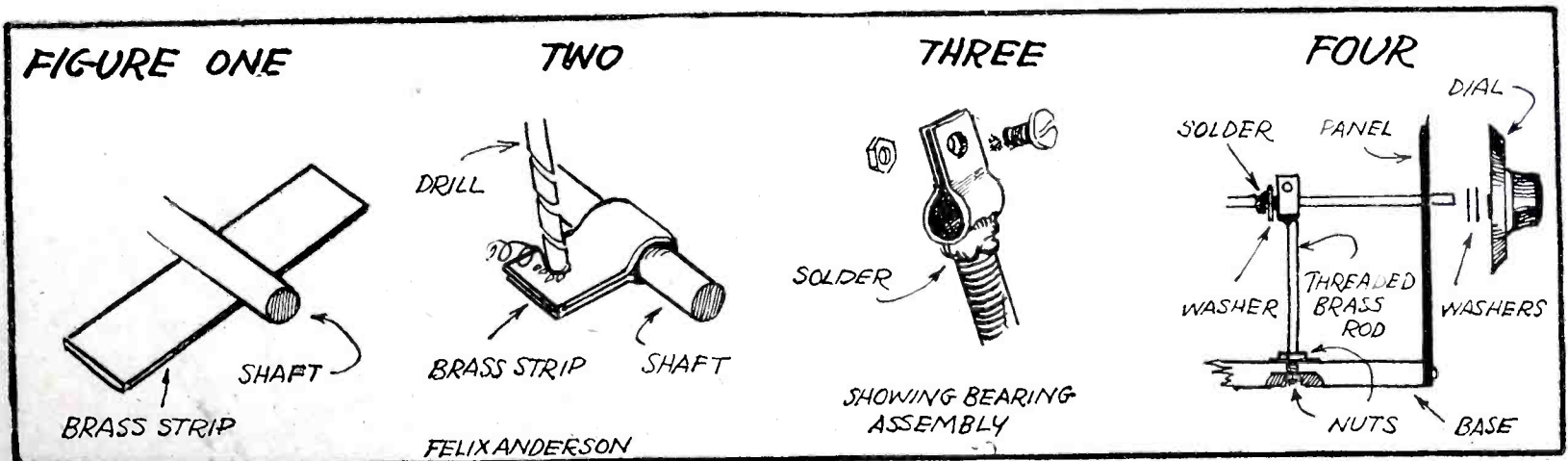
Question: I recently purchased a wireless specialty receiver from the Navy Department but it has proven unsatisfactory and so I want to change the hook-up. The apparatus is connected as enclosed drawing shows. Provision is made for both crystal and tube detector. What changes will be necessary to make this set efficient?

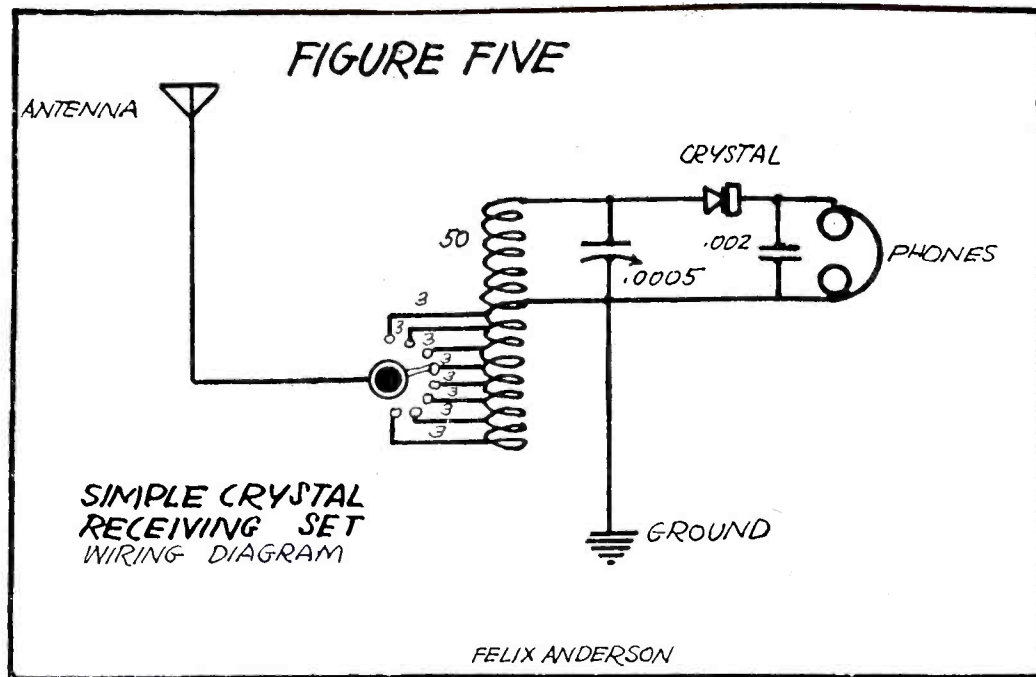
Answer: Inspection of your diagram shows that you will have to make several changes in the coils and condensers. No doubt the receiver was designed for 400, 600 and 800 meter ship traffic, and of course you will not be able to tune the low wave broadcasters.

The remedy is to remove turns from the Coil L_B of the circuit I am enclosing, decreasing the present number to about 45. The tickler coil need not have more than 50 turns at the most. Reduce the

is in turn kept from scraping the panel by the simple expedient of several small brass washers which keep it sufficiently far from the panel to prevent grating.

The coils are fastened to the shafts in the following manner. First drill a hole in the small pieces of bakelite intended for the purpose of shaft attachment, just about two-thirds of the way through. The hole should be a tight fit for the shaft—sufficiently so to make it necessary to wedge the brass shaft into the hole thus made. A little glue will make the entire unit permanent





number of turns on the antenna coil L_A to 20 and substitute a .0005 MFD straight line wavelength condenser for the 43 plate your diagram shows.

There are a few other minor changes I am showing you on your circuit sketch I would advise your executing. I am printing this question to illustrate the problem of not being able to tune in low wave radio stations. Any of my readers who are having similar trouble will find the remedy in reducing the coil turns and condenser capacity to the proper ratio.

H. L. C., Joliet, Ill.

Question: I would like to ask a question concerning my receiver on which I am having trouble with an alternating current hum. My antenna is close to a power line and three big transformers. Would another wire alongside of my present antenna grounded at both ends reduce the hum? What would you suggest?

Answer: The grounded wire you speak of would only detract from the effectiveness of your receiver, and lower the efficiency of your antenna as a whole. If you can't run your antenna at right angles to the source of the interference, would advise that you erect a pole of as high an altitude as you can, and run the aerial up and down (vertically) in the air. The effectiveness of your set would increase materially, and it would also be at right angles to all the wires which run parallel to the earth.

R. T. C., Chicago, Ill.

Question: I have a single circuit receiver, which am told oscillates and sends out carrier waves into the air which spoil my neighbors' reception. I am told that it does this only when the set is in the oscillating stage, and when it is doing so, I am not getting maximum efficiency out of it. Is there any instrument that I could put in the circuit that would tell me when the set is transmitting energy? How can I stop it?

Answer: It is pretty hard for the average fan to tell when his set is in the oscillating condition except by noting the noises which the set emits while tuning. When you tune across the wave of a

broadcasting station, and the set gives a whistle which varies as you move any of the knobs, it is an infallible sign that the set is oscillating and transmitting energy.

One test is to touch the set in any part of the grid circuit or antenna circuit. If you have taps in the antenna circuit you can try lifting the switch lever. If the set is oscillating, a pronounced "thud" or "thuop" will be heard in the phones. If not, a light click or scratch will be heard.

Another sign of an oscillating receiver is a slight whistle or whine with the signal when reception is carried on. You can put a millimeter of about 0 to 25 milliamps maximum in the plate or tickler circuit and watch the meter pointer as it travels across the face of the scale. As the set bursts into oscillation, the meter usually gives a decided swing toward maximum, indicating resonance. This is nearly always a sign that the set is oscillating.

The best results are obtained when one tunes just below the regenerating point, where the signal will come in without the customary squeals and whistles. To accomplish this, reduce the filament cur-

rent, and the tickler coupling, and if it is still difficult to control, adjust your grid leak until it does so. It is often necessary to use a smaller grid condenser to accomplish this purpose.

However, under no circumstances should you let your set radiate strongly. W. B. M., Chicago, Ill.

Question: I would like to construct a simple but efficient crystal receiving set for use in listening to Chicago stations and would appreciate your printing a diagram of a receiver suited to that purpose. Kindly give me a list of the necessary parts with all the detail—a list that I can give to a dealer to supply me without going into all the technicalities involved in purchasing such materials on my own judgment. Inasmuch as I cannot read circuit diagrams, I would appreciate your making the sketch of the picture variety.

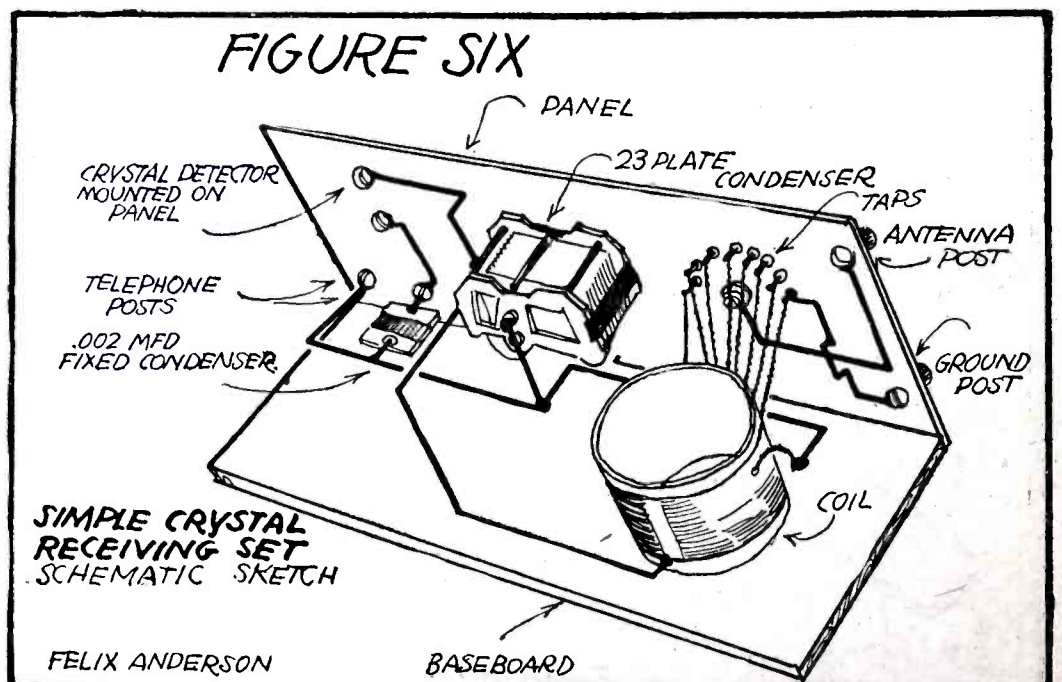
Answer: We always aim to please our readers and comply with their requests whenever we can—so on this page (Figures 5 and 6) I am showing the construction of your crystal set. You will need the following materials:

- 1 panel Formica 7x12x½ inch
- 1 Cabinet to suit your furniture
- 1 Switch lever King
- 8. Switchpoints King
- 1 SLW Variable Condenser Bremer-Tully, Continental or Silver-Marshall
- 1 Three inch Na-ald dial
- 4 Eby Binding Posts
- 1 Muter or Dubilier .002 fixed Condenser
- 1 half pound spool No. 20 DCC wire
- 1 3 inch cardboard tube 4 inches long
- 1 Grenwol Crystal detector

ACCESSORIES

- 100 feet No. 14 antenna wire
 - 50 feet No. 18 lead in wire
 - 2 Pyrex insulators
 - 1 ground clamp
 - 1 pair headphones Tower
- About the only thing not explained in the diagram is the construction of the coil. The winding of this unit is quite simple.

Wind fifty turns on the three inch tube, one turn right after the other. When
(Turn to page 48)





KICKING OFF---

for twelve RADIO touchdowns!



**ONE DOWN
ALREADY!**
Get into the
Scrimmage

This issue represents the embarkment on a magazine policy that has required many years in its origination. The policy necessitates the best broadcast features obtainable, more interesting and instructive technical material, bigger and better departments—in all, it will mean a more desirable magazine than has ever before been printed.

We have entered upon a field as active and as intense as any football field. Each month, figuratively speaking, we are going to make an editorial touchdown—a scoop. Our opponents are mighty and powerful, but our team is a good one—a combination hard to beat.

You will want to follow us as we make these touchdowns—For a dollar and one-half you can witness the greatest game of 'editorial football' that ever was played on the magazine publishing field.

Don't Miss a Touchdown

ON THE AIR

A Magazine of Radio

SUITE 1322, KIMBALL HALL

306 S. Wabash Ave.

CHICAGO

COUPON

*On The Air,
Suite 1322,
306 S. Wabash Ave.*

Gentlemen:

Please enter my subscription to **ON THE AIR** for **ONE YEAR**, twelve issues, my subscription to start with the.....issue.

I am enclosing **ONE DOLLAR FIFTY (\$1.50)**.

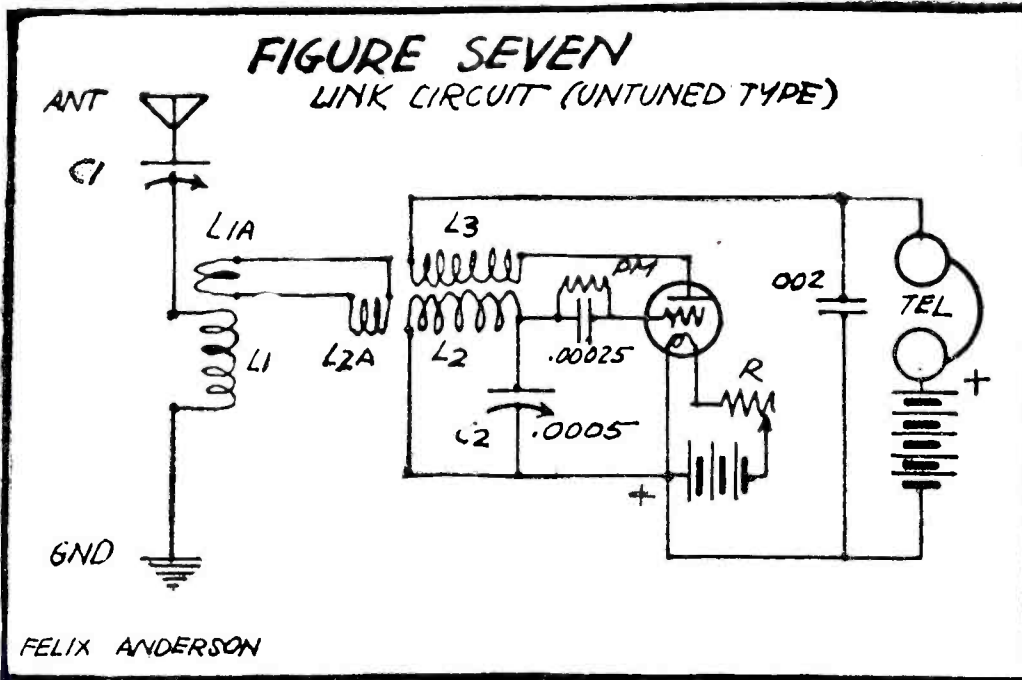
Name.....

Address.....

City..... State.....

10-26

Tell them you saw it advertised in On the Air.



(Continued from page 46)

the fiftieth turn has been wound, instead of cutting the wire, make a twist—say six inches long, and then proceed to make three more turns. Make another twist the same length, and then wind three more turns. Continue the three turns, twist and three turns process until 8 taps—24 turns have been wound in this fashion. When the 74th turn of the entire coil (the 24th turn counting from the 50th tap) has been wound, cut the wire from the spool, and fasten the end. This end counts as the eighth tap. The taps are all soldered to the switchpoints progressively.

Instructions for the erection of a good antenna can be found in the June, 1925, issue of ON THE AIR. I sincerely hope your radio set will be everything you wish it to be.

A. C. A., Dubuque, Ia.

Question: The filament of my detector tube burns all right, but I hear nothing on the phones; when I place a good tube in the socket, the set works O. K. Is it paralyzed or is there a loose connection inside of the tube? This trouble has exasperated me, as I have tried new "B" batteries and have experimented for weeks, trying to find out what was wrong. Can you advise me what it is?

Answer: Any one of the following faults could be the matter with your tube or circuit:

- 1—The prongs on the bottom of the

tube may be short in length, so that proper connection is not made with the contacts of the socket;

- 2—The prongs may be dirty, causing the same trouble;

- 3—There may be a loose connection in the base of the tube;

- 4—The filament may be leaning against the grid of the tube;

- 5—You may be using too high a plate voltage on the tube.

It is likely that you will find that one of the above points covers your trouble. If it is any one of them (except the fourth) you can remedy it yourself, but if it is the fourth, the tube is defective and you had better send it back to the manufacturer.

F. J. F., New Orleans, La.

Question: I am thinking of making up the receiver you show on Page 5 of the September issue, and would like to know if I can successfully add a stage of RF amplification before the detector tube. The set looks like a mighty good one to me, but I believe it would reach out more consistently if it had RF in front of the detector bulb.

Answer: The feasibility of adding radio frequency amplification to the receiver you mention is not especially great for several reasons. First of all, the set was primarily developed as a regenerative receiver by the writer, and the express purpose was to build a set that would give the most that can be gotten out of three tubes. Many months

were spent in experimenting with the set, and the results for three tubes equal in many cases those of four and five tube sets.

Instead of planning to add radio frequency to a set of this type, why don't you direct your attention to the four tube Browning-Drake receiver in the same issue. This set does just exactly what you ask—four tubes, radio frequency and regeneration combined, and all in a specially worked out circuit. The reason we printed this story was first because it was a good description of a four tube set, and secondly, because it takes care of all those bugs who naturally want to improve on a smaller receiver. Stick to the receivers as they are designed, and you'll have little or no trouble. An engineer works pretty hard to perfect his sets and tries to attain as near perfect performance as he can.

R. J. McC., Denver, Colo.

Question: Where can I get a wireless directory that gives all the calls of wireless stations, amateur, Government and commercial, which do transmitting in the United States?

Answer: Send 15 cents to the Government Printing Office and ask for a copy of the yearly "Amateur Radio Stations of the U. S."

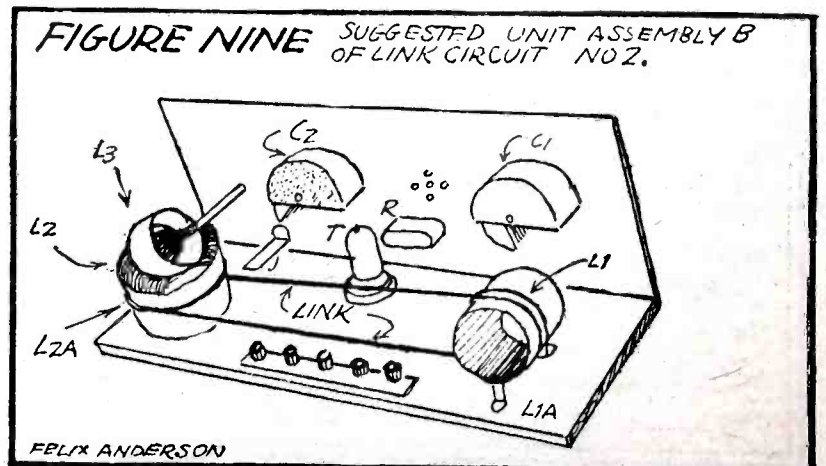
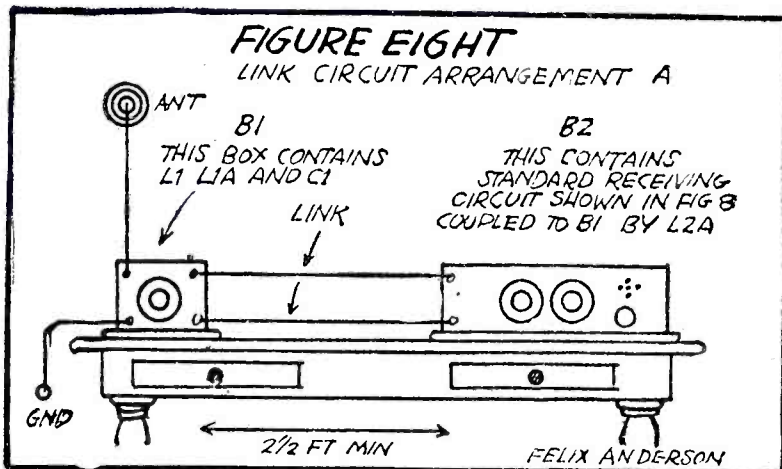
Our circulation department is also offering as a premium a very well compiled call book which contains a list of all the broadcasting calls, a log sheet and many other desirable features. Write the circulation department, ON THE AIR Magazine, 1322 Kimball Hall, Chicago, Illinois, for further particulars, or see the advertisement in this magazine.

H. J. M., Barberton, Ohio.

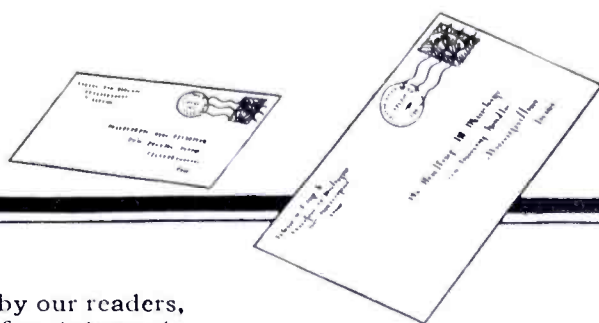
Question: I have heard a great many stations announce that they were broadcasting by "remote" control. Would you mind explaining to me what this term means?

Answer: Don't mind at all, H. J. M. We're always glad to help our readers out in any way we can. Remote control broadcasting means that the studio of the station is located apart from the actual transmitting apparatus. This separation may be many miles. The selections rendered by the artists impinge on the microphone, which is connected to a telephone line instead of to the input of the actual transmitter.

(Continued on page 52)



Feedbacks



This department is composed of contributions by our readers, and ON THE AIR assumes no responsibility for statements made by such contributors. It is a department where readers may discuss and submit ideas, achievements, kinks and experiences for the mutual benefit of all enthusiasts.

LAST January, ON THE AIR conducted a prize contest for the purpose of determining just what radio fans wanted in the way of a radio magazine. Announcements of this contest were broadcast from the official station of ON THE AIR, the Villa Olivia Station WTAS and the sister station, WCEE.

The contest has long since been closed, the letters graded and prizes awarded, and to all outside appearances, the matter has been dropped as far as actual competition is concerned; the contest has long been forgotten by our readers.

We have been keeping the cream of these letters on file, and in the course of determining the policy of ON THE AIR, constant reference has been made to this file. That such a procedure is profitable has been abundantly demonstrated in the growth of the circulation and size of this magazine. The editorial, the technical and the circulation staffs have in the past months endeavored to put into actual practice the suggestions contained in those contest letters, and the result is truly gratifying.

With this issue ON THE AIR increases to sixty-four pages, doubling its size, adding new and better features and technical matter, and incidentally has increased its circulation to an extent heretofore unheard of in the magazine publishing game.

NEARLY every one of the letters we received in that contest suggested that we incorporate a readers' department—a section where broadcast listeners might meet on common ground with the various departments and branches of the industry. The writers of those letters felt that a department devoted to the redress of the broadcast listener, the broadcaster, and the technical world of radio in general would give them a real tangible interest in the magazine—that it would make them a vital part of the publication, and that it would give voice to their opinions, their discoveries, and their achievements.

Until this issue, we have been unable to devote sufficient space to such a department—we felt that we would do wiser in waiting until we

had sufficient room in the magazine to do this thing justice. And now we devote these pages to this forum—YOUR section of the magazine—YOUR voice in the radio world. We expect you to use it.

Since this is to be an open department we are adverse to setting down specified rules as to how you may use it. The actual spirit of the department will be determined by the character and the quality of the contributions submitted. It is not our intention to impose any restrictions on you—we have sufficient faith in the radio public to know that they will employ opportunities appropriately and unselfishly.

Our ideas on the subject might be valuable to you in advising how to effect the greatest good out of these pages. So, constructively, we suggest

Did you ever visualize a broadcasting station in full blast during the late hours of the night? Here's what it looks like—the clock on the wall says it's just eight minutes after midnight at Station WIP, Philadelphia. Charles Goudy (HG) is announcing with his note paper before the mike, Charles Wier (CW) is phoning the generator room to get ready to shut off, and Samuel Kale (SK) is all ready to shut off the power to the amplifiers and control panels.



that you bear the following things in mind.

First, we agree not to discriminate between subscribers and non-subscribers. We know we have a great many loyal newsstand readers, and in justice to them, we feel that no preference should be made.

We would welcome contributions from the manufacturer that are real honest suggestions and items of interest. We reserve the right to exclude from these pages flamboyant and mercenary advertising. If the object is to gain advertising, we shall be glad to direct such intentions to our advertising representative who can more effectively explain the advantage of advertising space in ON THE AIR. But we will heartily welcome reports, tests, and suggestions made in an impersonal, unbiased way for publication in this department.

Contributions from the technical department of the radio profession all the way down from the chief engineer of the biggest radio corporation to the 12 year old embryo engineer are welcome. Send them along.

Lists of stations heard—achievements worthy of note in operating; unusual receptions, freak condition reports—anything of interest will find a place in this FEEDBACKS department.

Anecdotes, stunts, radio party suggestions, novel uses of radio as an entertainment, technical kinks, circuits of unusual performance and design—here's the place where you can pass the information on to more than a hundred thousand fellow radio bugs.

Now that we've explained the purpose of the department, we feel that it might be a wise thing to explain the name we chose to head it.

Nearly every radio enthusiast understands what the word "FEEDBACK" implies in radio—. It is the crossword puzzle "hidword" for reaction—regeneration—oscillation.

When we dubbed this department FEEDBACKS, we had in mind just this: Our editorial pages represent the input—the secondary circuit of the whole scheme of things. The reader is the detector, the rectifier of this material; he selects the impulses he prefers and his brain (the

plate circuit) gives the impulses to the phones—his convictions.

Now it occurs to us that it might be profitable to do as Armstrong did—it might be wise and effective to feedback some of this "reaction" to the input circuits, and get a greater and stronger impression with the readers. If it works with a radio set, it ought to work with a magazine—all you've got to do is to "oscillate" and react sufficiently to write us your impressions and activities—and in the long run we'll have a much more satisfactory output—we'll have a more interesting magazine, and it will be so much more acceptable to you.

So let's see you oscillate—react—we want to see this experiment work out in practice as well as on paper. Our diagram looks OK in theory—it's up to you to make it percolate.

MARVIN HUGHES,
Department Editor.

JUST to show you how this FEED-BACK theory works out with us, we're going to print a few letters to substantiate what we base our theories on. Random choice from the files gives us this one:

53 South Hawk St.,
Albany, N. Y.

On the Air
Chicago, Ill.
Gentlemen:

Relative to the universal invitation outlined on page 23 of the January issue of your magazine, I am enclosing a few suggestions that I believe will help you in your efforts to be of greater assistance and interest to the radio fans throughout the country.

Educational Department

As the advance of radio today has been brought about by the younger class of radio fans, I think that a magazine devoted more or less to them would be in order. This should not be drawn up so that it will be necessary to have a college education to understand its language, but with just enough tact to it to explain in detail just what and why certain results are arrived at when certain rules of electricity are not violated or are violated.

If your magazine held a series of studies with each and all kinds of hook-ups, their advantages and disadvantages, also the proper manner to shoot trouble on these circuits, this would be very instructive to the average youngster who is interested in radio.

As I read every radio magazine that I can purchase, I find that your magazine alone is published where it can be of exceptional use to the radio worker. I think it would be a wonderful asset to your magazine to use the WTAS station at least one hour per week or if possible one-half hour each night. Of course this may look like an expensive proposition to you but after it is known



While "Uncle Bob" is teaching the gang "the curb is the limit" he isn't practicing what he preaches.



Did you ever know that Richard Dix, the Paramount movie star, is a confirmed radio enthusiast? Well, he is, and he writes us that he always takes a radio set along with him on location.

that you will answer questions pertaining to radio from this station, you can rest assured that the radio fan will be very much interested in your magazine if it is necessary to send in a coupon, cut out of your book with each set of questions.

To bring about a closer relationship between your magazine and its purchasers in towns and cities, if you were to have a small button furnished to each subscriber and request him to wear it, you will find that your monthly circulation will greatly increase when the younger bug learns what assistance On the Air wishes to be to him.

Another thing that will more than pay you will be to publish your magazine every two weeks, and on each occasion publish a complete and current list of all stations broadcasting, their wave length,

location and call letters. In this way your magazine would be fifteen days ahead of all other publications in monthly magazine form and be more than assistance to the subscriber.

To stimulate sale of this book, it would be quite an attraction to the purchaser to be supplied with a good clear radio map which can be kept up to the minute with the assistance of your semi-monthly publication.

Commercial Departments

Another thing that would be of great assistance to the average radio bug would be to know that if he read in your book that he could purchase equipment and when he received it, it would be just as it is represented in your book and not something of an inferior nature. This

condition could be brought about very readily by you, by subscriptions from manufacturers of the upper class with a reputation behind them. Under this caption would come, sets and equipment of all standard makes. In this way, a closer relationship will spring up between the younger radio fan, the older fans and the broadcaster.

Your magazine could place itself in a position whereby all listeners-in could procure applause cards at a reasonable price, perhaps put up by you at your plant.

Pictures

Pictures of different artists also the heads of the different stations and their equipment would be quite a drawing card, for I know that as a burner of midnight oil (Electricity), I would like to know just what each and every plant looks like. I have pictures of some of the plants but if it was possible to have a picture of each and every station, it would be a pleasing feature to be able to compare same from time to time.

Departments of Kinks

Another thing that you should try and educate the fan who from time to time finds some little trick that helped him get a better reception or tune out some undesirable station, is to submit them to you (and in that way help his fellow fan out of trouble) by having you put them in your magazine.

If at any time I can be of any assistance to you in bringing about a closer relationship between radio fans and your magazine, kindly feel at liberty to call on—

Yours For Better Radio,
V. S. COLEMAN

Mr. Coleman's letter was one of those submitted in the prize contest, and we print it to illustrate just how we have followed out a great many of his suggestions.

First, we have considered the necessity of printing understandable technical material. McMurdo Silver's stories, Felix Anderson, Harry J. Marx, Radio Operator 29744—all of them are good examples of clear cut technical ma-



Walter C. Evans, the chief engineer at KYW, has a novel way of cooling off his feet on hot days. He meanders to the roof of the Congress Hotel and hangs his feet over the edge as the picture shows. If he falls off, KYW will need a new chief engineer—the roof is only twenty-two stories above the ground.

terial, written entertainingly and instructively.

The problem of answering questions via WTAS is too restricted to use with ON THE AIR—its service would be of value only to readers in the immediate vicinity of WTAS—. The circulation of ON THE AIR is nation-wide every month—WTAS is restricted frequently by weather conditions and unfavorable reception phenomena. We are convinced that we can render greater service to this end by maintaining a GOOD information service department—look and see for yourself.

At present, Frank O. Balch is at work on a new call book which he promises to present our readers this issue. I believe he has an announcement of this somewhere on our back pages.

We are inaugurating a laboratory testing service to be conducted by members of our technical staff to pass judgment on the various devices that appear on the radio market, and in connection with the technical information service department, this section will assure readers that no "junk" advertising gets into ON THE AIR's columns.

The applause card idea is also being pursued by Mr. Balch, our circulation manager, who intends to put this necessity out on a premium and cash basis for readers of ON THE AIR.

Pictures—well; look through this issue. We believe we've got a few, and we hope Mr. Coleman is pleased with their nature.

And a kink department—, right here Mr. Coleman—FEEDBACK'S the place for readers to pass on information of interest to their fellow enthusiasts.

As far as getting out ON THE AIR more than once a month—it can't be done and done well. It takes every bit of thirty days and lots of hard work to get a magazine as good as ON THE AIR together just once a month.

Write us, Mr. Coleman, and tell us if we've made a good job of generally

complying with your ideas of what a good radio magazine should constitute.

Back in January, Mr. D. H. Goon of Monroe and Auburn Streets, Toledo, Ohio, wrote us:

On the Air
Chicago, Ill.
Gentlemen:

In response to your appeal for suggestions relative to material that would interest most radio fans and keep them interested, I shall offer a few thoughts

Villa Olivia Station WTAS,
Kimball Hall Bldg.,
Chicago, Illinois.

Dear Mr. Erbstein:

Just a letter of appreciation for your lovely programs. I have listened to the lovable songs and selections from your station again and again and I never tire of anything you render because each time it seems so different—so sincere and original.

God bless you and all your family. Many, many thanks for hours and hours of pleasure. I hope you will have all the joy and sweetness that this old world contains. If you get just one-half of the happiness you give you will only get a tiny particle of that which you deserve.

Again I thank you for your wonderful programs.

Mrs. R. A.

Ridgefield, Illinois.

The Editor of this department prints this with a two-fold purpose. First as a tribute to Charles E. Erbstein because he deserves everything Mrs. R. A. wishes him, and secondly because it is an excellent sample of what we'd like to have from broadcasters for this department.

The essence of this department is human interest and what illustrates this factor more completely than a letter of gratitude like the above?

that come to me, prompted by many queries from hosts of radio enthusiasts.

Most radio fans when looking for magazines, new or old, usually first express themselves by saying, "Well what's new in radio Mr. ——. I like my set first rate, but it is not quite as selective as it should be, and I am looking for a better hookup." These and similar queries as to what will improve their reception of programs, seem to be foremost in every radio fan's mind.

Then comes the fellow who wants to know more about radio and wants a magazine that will tell him something of the whys and wherefores of the various parts that go to make up a radio, and how and why they function. He wants to build a set, but would like to read up a little first. First and last, this man who builds his own set first, always ends by becoming the best radio fan, and who is so enthusiastic that he gets everybody around him in the same spirit, and thus keeps radio topics at the boiling point, which means more business.

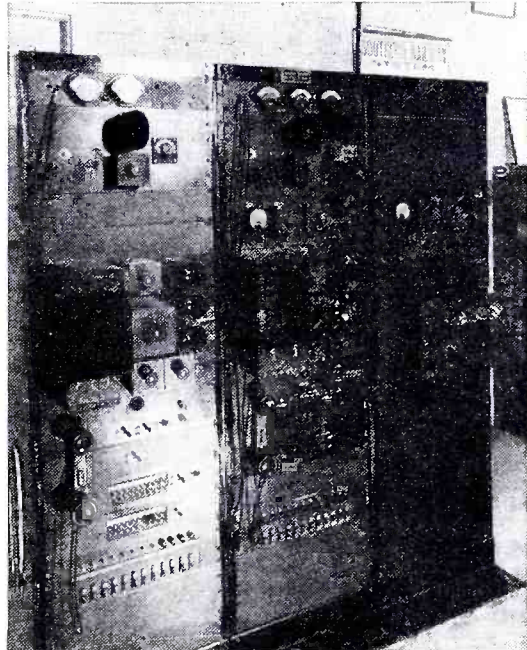
As to a strictly technical magazine, my experience back of the counter convinces me that few fans are sufficiently versed to appreciate the effort. However, one well written article on the technique of some particular hookup usually is worth the effort. McMurdo Silvers' writeup of the portable Super is a good example, for it surely created a lot of inquiries.

Broadcasters and their radio audience can best meet through mutual exchange of expression. Without expression there is no interest, and interest is what keeps the ball rolling.

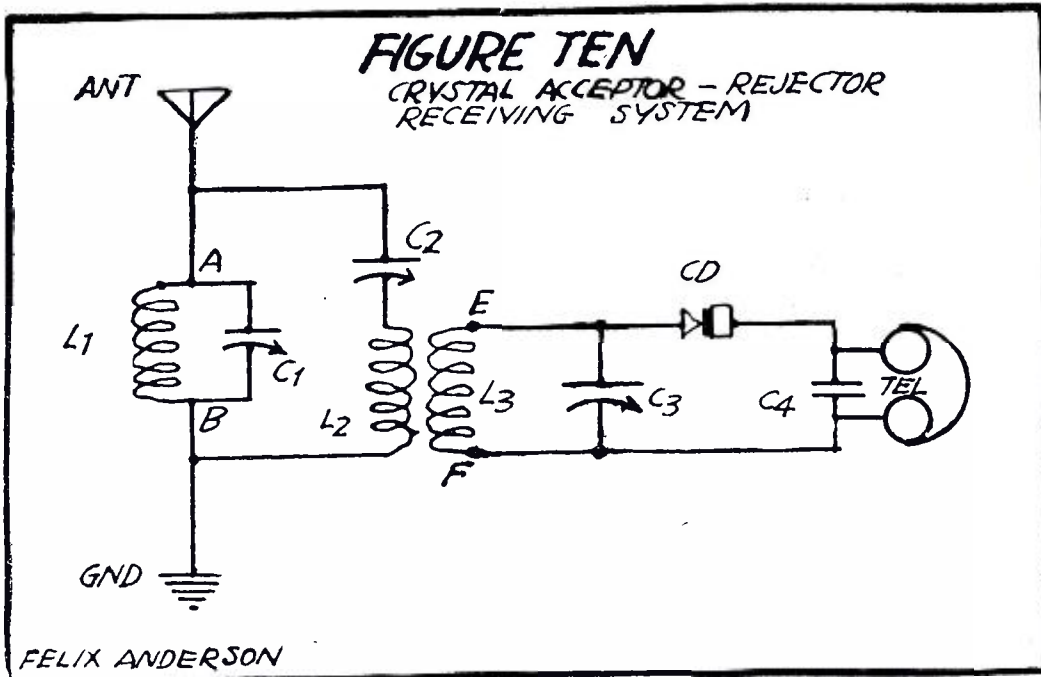
Radio fans like to see the artists they hear, and express much pleasure in seeing their favorites in print. "King of the Ivories" a very good example.

Regular departments should comprise an authentic advance radio program.

(Turn to page 62)



Many of our readers have been wondering what "remote" control means. Remote control means that the studio is separate from the transmitter by several miles, necessitating telephone wire to carry the programs from the studio to the station. This photo shows the "booster" or speech amplifier that steps up the signals after they come in over the telephone wires at the transmitting apparatus. This particular one is part of WSAI's system of remote control. Wouldn't you like to push all the buttons on it just to see what happens?



(Continued from page 48)

These telephone lines connect the studio with the transmitter, and carry the selections just as though one were singing over the telephone. When the impulses reach the broadcasting set, they are immediately amplified—made louder by a so-called speech amplifier. The original signal thus amplified is passed on to the oscillator tubes, the power amplifier and then to the antenna from where the journey via the ether commences. I hope I have made things clear and that this answers your question.

J. L. C., Chicago, Ill.

Question: I am a constant reader and a well satisfied subscriber of ON THE AIR, and I want to take this opportunity to tell the members of your staff how much I appreciate your excellent magazine. Since your magazine is responsible for my becoming a radio "nut," I'm also going to bring my troubles to you. My trouble is the old well known one—I can't find a set outside of a super-het that will give me enough selectivity to enjoy the program from one station without also getting a share of two or three others. I want to know if there isn't a set that will absolutely tune out one station, and get another exclusively—without a background of interference from the others. Can you help me out?

Answer: Being a resident of Chicago I can well appreciate your set of circumstances—I know what the interference amounts to, and I am abundantly aware of the fact that a very selective set is necessary to get the most out of the programs. First however, I want to say that I am not aware of a set yet, that will actually tune through the small holes in the broadcasting allotment for this city without getting mush from the others. There are a few places on the dials of my present "Technical Editors Set" that I find are free—or reasonably so—of harmonics and mush, provided I tune the stations far away using zero beat reception. On the lower waves where conditions are chronic, I will frankly admit that I very often have to wait until the interfering station signs off. At present I am ex-

perimenting with several types of super-selective receivers of the simpler variety—something that will not go over three tubes, and I have high hopes of turning to something of value. One of these is the Marconi "Link" Circuit, illustrated in Figure 7? The specifications of the standard "link" circuit are as follows: Antenna coil L1 50 turns No. 22 DCC wound low loss. The secondary coil is a duplicate of L1—the same specifications. The tickler is a 45 turn coil wound with No. 24 or 26 DCC on a 2 1-2 inch tube. L1 and L2 are three inches in diameter. The "link" consists of a piece of heavy wire or stranded cable wound around L1 and L2 once. This "link" is also the connecting medium between the two circuits—antenna and secondary. The coils should be at least 15 inches apart and at right angles if mounted on the same panel. A good arrangement is shown in Figure 9.

Probably the most successful application of this link system is the construction of the circuits in two separate units—separated by two or three feet as shown in Figure 3.

Another interesting experiment along this line is the impedance and acceptor

idea—the wave trap and series filter. This idea is illustrated in Figure 10, applied to a crystal receiver; a very interesting experiment in the phenomena of tuning. The theory consists of an impedance circuit in series with the antenna and ground (circuit AB) which acts as an impedance to the desired signal, passing all others to the ground without resistance. The signal to which it is tuned practically stops at the wave trap circuit AB. Shunted across this AB wave trap circuit we have another acceptor circuit CD which is also tuned to the wave we desire to hear. This circuit has the property of passing only the frequencies to which it is tuned. It is well separated from the circuit AB—preferably at right angles and at least 20 inches from circuit AB. It is variably coupled to circuit EF, the secondary—preferably very loosely in the case of a tube set to keep antenna characteristics out of the argument.

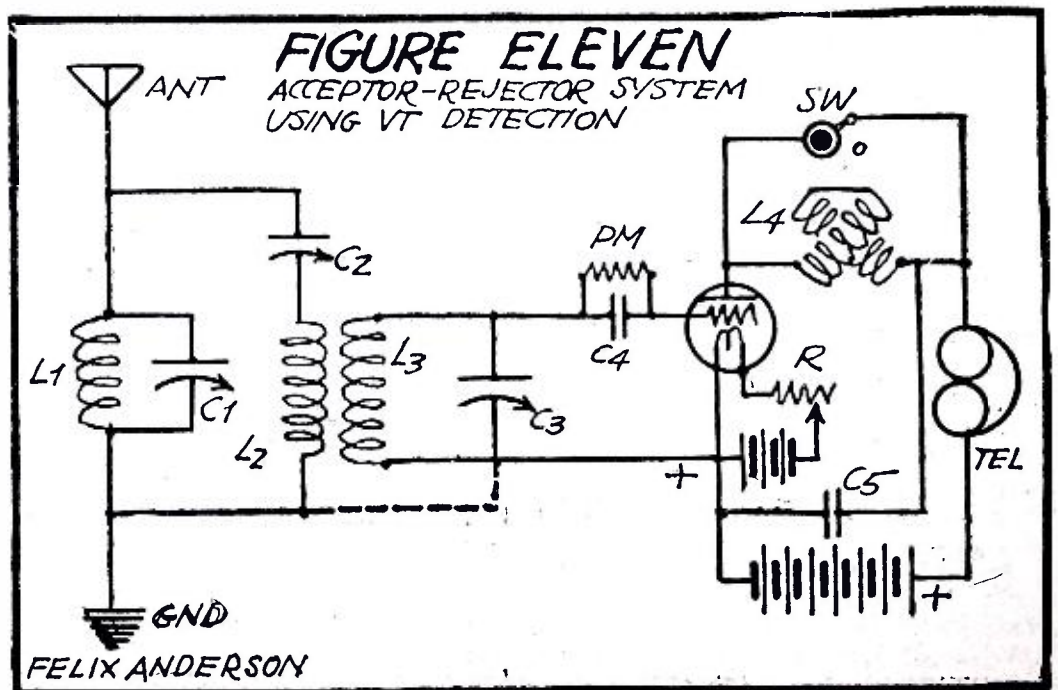
The operation consists of tuning circuit AB to the desired wave, rejecting it, and passing all other signals to the ground. The series circuit or the acceptor offers high impedance to the unwanted frequencies but practically none to the desired signal. Thus it accepts the frequency rejected by AB and induces it into the circuit EF with a minimum of foreign frequencies.

- L1—50 turns No. 22 DCC 3 in. tube
- C1—.0005 MFD condenser
- L2—50 turns No. 22 DCC 3 in. tube
- C2—.001 MFD condenser
- L3—50 turns No. 22 DCC 3 in. tube
- C3—.0005 MFD condenser.

You might also try the following:

- L1—20 turns No. 18 3 in. tube
- C1—.001 MFD condenser
- L2—15 turns No. 18 DCC 3 in. tube
- L3—50 turns No. 20 DCC 3 in. tube
- C2—.001 MFD condenser
- C3—.0005 MFD condenser

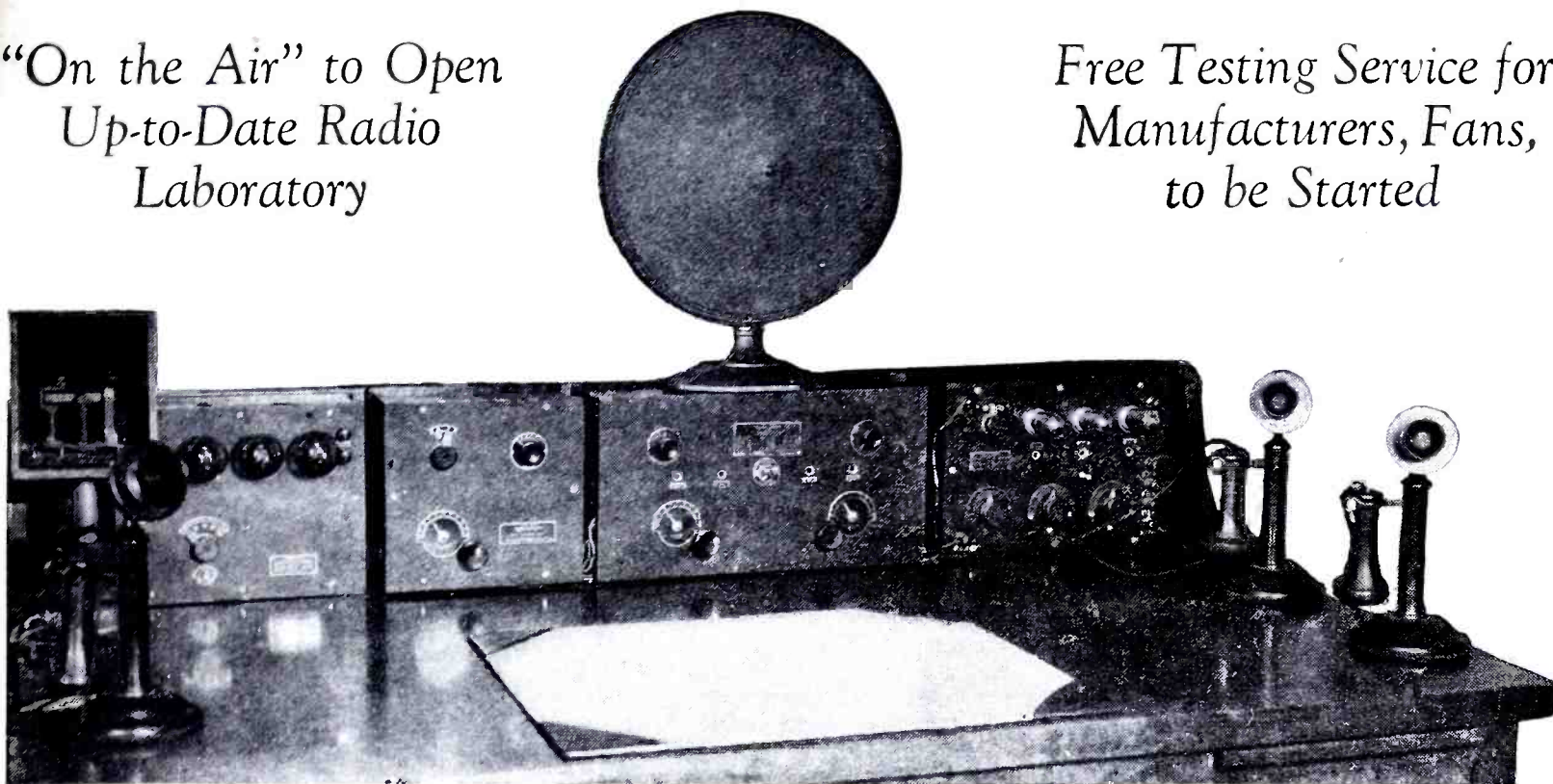
In the circuit diagram using tube rectification, I am indicating a variometer with a shorting switch since the combination is often a little unsteady when regeneration is used. This enables you to try the circuit out both as regenerative and non-regenerative. (Figure 11)



An Announcement of Vital Importance

*"On the Air" to Open
Up-to-Date Radio
Laboratory*

*Free Testing Service for
Manufacturers, Fans,
to be Started*



AN ANNOUNCEMENT that will be of interest to every radio enthusiast who is interested in the development of radio is contained in the decision of "On the Air" to establish its own testing and experimental laboratory—a laboratory that will be second to none of its type in the United States.

Since its inception, "On the Air" has been besieged with requests for technical information of such a nature that it could be obtained only by actual experiment. Also, readers and manufacturers have sent us their sets and parts, as well as their circuits, with the request that they be passed upon according to their respective merits, or rejected altogether, with the reasons for such action.

Naturally, such requests had to be handled by outside engineers at great expense. And even then the results obtained could not bear the official stamp of approval of "On the Air" for the reason they were obtained in laboratories and with equipment out of reach of this magazine.

Therefore, it was only a logical step that it was decided to equip one of our offices in the Kimball Building, Chicago, with a laboratory that would contain all the equipment necessary for any kind of a test that might be demanded. Also, such equipment must be available for such experimental work as the editors of "On the Air" might deem advisable for the development of the radio science in general.

It is with great pleasure, then, that the editors of "On the Air" make this announcement to their readers and advertisers. This up-to-date laboratory will be installed immediately and put in charge of expert engineers whose activities will be devoted to the development of the "On the Air" laboratory.

Apparatus sent in will be given stringent tests and the impartial results sent to the owners or manufacturers. Those manufacturers whose apparatus passes

The new "On the Air" Laboratory will be ready for use within a short time after this issue is in the hands of readers. It will incorporate the latest features in radio laboratories, and will be at the disposal of all manufacturers, engineers, fans, etc., desiring authoritative testing of such apparatus as they may submit. Results of these tests will be published monthly on the Laboratory page of "On the Air." Watch for it!

the tests will be awarded a certificate signed by the engineers, as ample proof that their apparatus is satisfactory and has met the exacting tests imposed by "On the Air."

This testing service will be available at no charge to both manufacturers and readers, advertisers and non-advertisers. In the next issue of "On the Air" the results of tests with the first apparatus sent to this magazine for approval

will be announced on the Laboratory Page.

The apparatus submitted should be carefully wrapped to make sure that it sustains no damage during transit. The tests will include precision measurements and check on the apparatus in an endeavor to determine just whether the apparatus is worthy of the certificate of approval or not.

Manufacturers and advertisers as well as readers should bear in mind that not infrequently submitted apparatus is dis-assembled in the tests, and often destroyed in the process of testing. In this connection, ON THE AIR assumes no responsibility for apparatus demolished during tests. In cases where it is possible, every effort will be made to return the tested device to the manufacturer, undamaged.

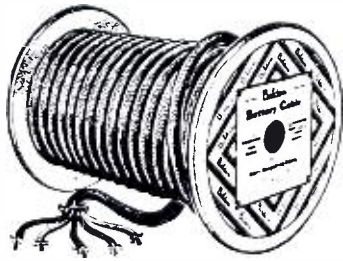
It is not important that the devices submitted be large sets or bulky accessories. This service is maintained for the benefit of the manufacturer of superheterodynes as well as the producers of crystals—don't hesitate to send your product in for test, even though it may be small and seemingly insignificant.

IF IT'S TESTED BY
"ON THE AIR"
YOU CAN BE SURE IT'S RIGHT!

News of the Radio World

Radio Battery Cable

The Belden Manufacturing Company, 2300 South Western Avenue, Chicago, Illinois, has recently placed a battery



cable on the market that is very similar to the well known and universally used Belden Radio Battery Cord. It is supplied in 100 foot lengths on spools, or 200-foot lengths in coils, and can thus be cut to any special length that the occasion requires.

The cable consists of 2 No. 16 B. & S. stranded and 3 No. 20 B. & S. stranded copper conductors, each rubber covered and insulated with individually colored cotton braid, coded in accordance with the standard of the A. M. E. S. The entire unit is then encased in a heavy, black, glazed cotton braid cover.

The cable is used when it is desirable or necessary to isolate the batteries from the set, by placing them in the basement or in a similarly remote location. The difficulty usually encountered in tracing a maze of tangled, unsightly wires from battery to set is thus eliminated. The colored tracers simplify the checking of connections and insure absolute accuracy in the hook-up. Blownout tubes, crossed wires, short circuits and wrong connections are entirely disposed of by the use of this cable.

Globe Loud Speaker

The Globe Phone Mfg. Company, Reading, Mass., for nearly 20 years makers of supersensitive acoustical devices including earphones for the deaf, the Vactuphone, a vacuum tube device for the hard of hearing, auditorium phones, and earth stethoscopes, now announce the development of a new Globe Loud Speaker.

Built on an entirely new principle the Globe Loud Speaker has a Silicon steel diaphragm, extra large drop-forged magnet with carefully balanced coils mounted on a sound bridge with a special tone pocket beneath. This gives a surprising smoothness of tone and faithfully reproduces music or the spoken word in full, deep, mellow tones throughout the entire acoustical range.

A vibrationless horn is used and it is claimed that all unpleasant overtones are eliminated and that the speaker is unexcelled for distant reception.

Careful, accurate and expert factory adjustment assures maximum volume regardless of the type of receiving set used.

The solid base is oblong in shape, very neat in design and in balance with the size of horn used.

Music Master Appoints

Music Master Corporation has announced the appointment of Frank Dorian as assistant to president, Walter L. Eckhardt.

Mr. Dorian joined the Music Master Corporation January 1, 1923, and was sent to the Pittsburgh headquarters of the Corporation from which office he has been transferred to Philadelphia.

He brought to Music Master a valuable experience gained in more than thirty years of activity in the talking machine industry. For several years he served in an executive capacity with the Columbia Phonograph Company, where he came in close contact with President Eckhardt during the latter's long association with talking machine interests, and because thoroughly familiar with the Eckhardt policies which have brought the Music Master Corporation to its present place of leadership in the radio field.

A real veteran of the industry, Mr. Dorian has been prominent both at home and abroad in the development of the talking machine from its earliest days. He started his work with the Columbia organization in the commercial phonograph division, when this company was devoting most of its energies to the development of the commercial gramophone, intended for the use of court reporters, official stenographers, etc.—a machine which was later succeeded by the Dictaphone of the present day—and rose rapidly with that company through positions of increasing responsibility and importance.

The first European branch of the Columbia Phonograph Company was established in Paris by Mr. Dorian, and later he also opened a branch in Berlin. In 1900, when the European headquarters of the company were transferred to London, Mr. Dorian was appointed European General Manager, with direct supervision of branches in many other European capitals.

Mr. Dorian returned to the United States in 1909 to build up the Dictaphone organization, and the phenomenal success which that company has since enjoyed stamps him as one of the foremost executives in the industry today.

New WSBC Uses Storage Batteries

Making its maiden bow and bid for popular favor is the 1000 Watt Radio Broadcast Transmitter sponsored by the World Battery Company of Chicago, operating under Station Call Letters WSBC on 210 meters, and constructed by the Engineers of that concern.



Frank Dorian

The World Battery Company Transmitter, as the new outfit is officially designated, is novel in many respects and unique in that the power for the operation is supplied entirely by storage batteries, made up of identically the same materials as are used in the standard, stock batteries supplied to radio users for the operation of receiving sets. For instance, the "B" or tube plate supply of 2400 volts is furnished by the equivalent of over 400 ordinary receiving 6-Volt "A" batteries made up of the same parts that are used in the unit familiar to all radio fans. By an ingenious switch arrangement these can be connected in straight series to operate the set or in series parallel for charging.

The "C" or biasing batteries as well as those used for the microphone circuits are made up of the parts used in the standard 24 volt units such as are used for the "B" supply in receiving sets.

Although the battery installation is a good deal more expensive than is the equivalent motor generator set, it is felt that the additional expense is more than compensated for by the clarity of transmission, it being well known that the smooth steady flow of power from storage batteries insures a clearness that can only be approximated by the generator system. Other exclusive features are incorporated in the design and construction of the transmitter proper.

All-American Brings Out New Tuning Units

The All-American Radio Corporation of Chicago, widely known for the popular audio frequency transformers which it has manufactured for years, has just announced new radio frequency coils and variable condensers, which are both of advanced types.



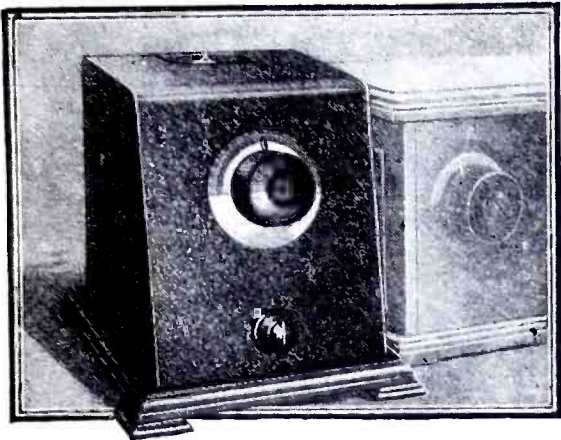
The inductance units are of the toroid or endless-field form, which has been familiar to engineers for several years but which has always been considered a difficult manufacturing proposition.

"In bringing out these toroid coils," says E. N. Rauland, president of the All-American concern, "we believe we are providing what is by far the best and most efficient type of inductance unit and are producing it by machine methods with the same precision workmanship which has given us our conspicuous success in the transformer field.

"The well-known advantages of the toroid coil are, of course, due chiefly to its magnetic field being circular and endless."



New Radio Devices



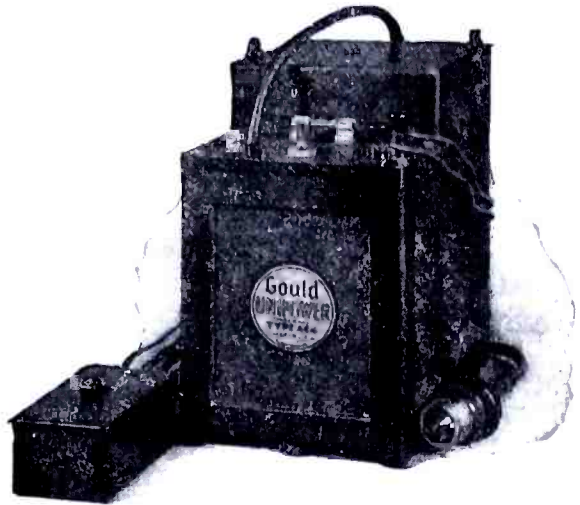
THE WALBERT PENETROLA

An auxiliary unit that is connected to the regular receiver in order to increase range, selectivity and volume. It also stops radiating and tends to stabilize the input circuit of the receiver it is used with. Manufactured by the Walbert Manufacturing Company of 933 Wrightwood Ave., Chicago, Ill.

THE MUSSELMAN CERTIFIED TUBE

While there is nothing especially radical in the construction of this tube, it is exceptionally good, since it is furnished with a characteristic curve reading that necessitates its being high grade.

Manufactured by the Van Horne Tube Company, and distributed by A. J. Musselman, 549 Washington Boulevard, Chicago.



THE GOULD UNIPOWER UNIT

A device that rectifies the ordinary sixty cycle house current for use in the filament circuits of the receiver. Made in two types—one for storage battery tubes and for dry cell thorium coated filament valves.

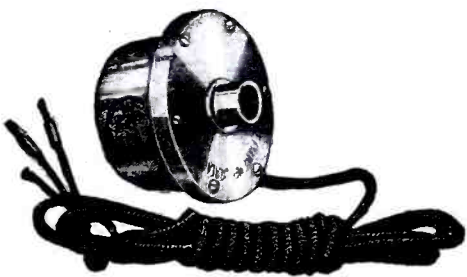
A product of the Gould Storage Battery Company, Inc., 250 Park Ave., New York.



WADE SLW CONDENSER

A tuning condenser made by the Wade Manufacturing Co., 1819 Broadway, New York, that incorporates several unusual features in design.

The frame is so constructed that it allows adding and removing standard stamped brass plates effecting any capacity desired.

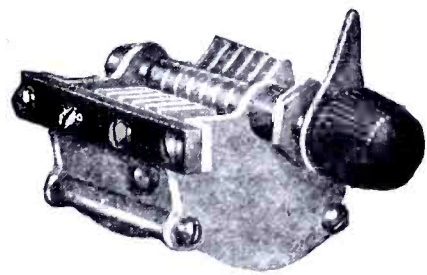
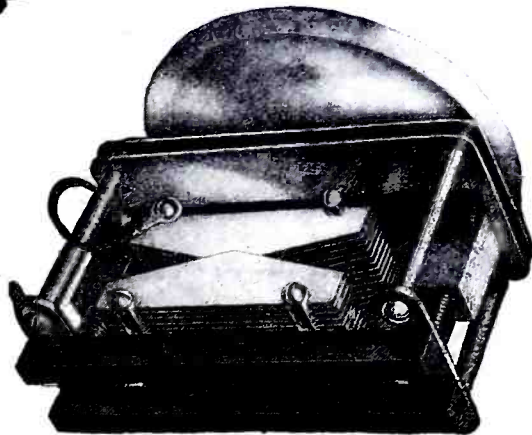


PHONOGRAPH ATTACHMENT UNIT

The Globe Phone Mfg. Company, Reading, Mass., announce a new Phonograph Attachment Loud Speaker Unit made to accept any standard connector.

A new principle is used, the carefully balanced coils being mounted upon a sound bridge with a special tone pocket beneath.

A surprising smoothness of tone is obtained and this unit is claimed to be free from all distortion.



CONTINENTAL LOW LOSS JUNIOR

Continental Junior is a miniature low loss condenser of advanced design and good workmanship. It shunts across the standard condenser and makes a vernier, with none of the faults of friction attachments or geared dials.

Can be obtained from the firm of Gardiner & Hepburn, Inc., 611 Widener Bldg., Philadelphia, Pa.

Features You'll Find in No Other Magazine!

in "On the Air" Every Month!

AFTER you've read them all, you'll realize that **ON THE AIR** is the only radio magazine the average listener can enjoy. It is written in plain language; and even its technical articles are comprehensible to the layman. It caters to no one group of radio listeners—but *all*. It realizes the interest in technical radio is great, and meets the demand with authoritative, up-to-date technical articles; and because it goes into the home to be read by every member of the family, it is brimful of human interest stories and pictures of the broadcast favorites you hear over the air every night.

ON THE AIR is different, amusing and instructive. It is edited to be attractive and interesting. It is the radio magazine of today *and tomorrow*.

Coming, in Our November Issue!

AN unusual gathering of features is being prepared for **ON THE AIR'S** 100,000 readers in the November issue, on the stands October 15. Among the surprises in store for you are—

How To Transform Your 1924 Set into a 1926 Model.

America's "Most Eccentric" Station.

From a Dime to Ten Thousand a Year—One of The "Stunts" Radio Caused.

"Feedbacks"—Our Readers' Own Pages.

The Latest Sets and Hookups for 1925-26.

Pictures—Stories—Illustrations—Of Your Favorite Stars and Stations.

Where Will Radio Be a Year From Now?—A Peep into the Future.

**Five Dollars' Worth of Features
Every Issue for 15c!**

Only \$1.50 a Year

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See Page 47

Several Jacks in a Set Out of Date

THE general use of multi-tube receivers and superpower broadcasting station has done much to eliminate the old system of using several jacks in a radio set. The latest receivers are using only one jack at the most, to which the loud speaker can be connected. Many of them are eliminating all jacks and providing binding posts in the rear of the set for the loud speaker connections.

The elimination of plugs and jacks is ridding receivers of two very common sources of trouble.

Any receiver is better off without jacks, for that matter. Wiring is greatly simplified, capacity of the wiring is reduced, and the front panel is improved in appearance. The use of jacks where any audio transformer is used with high primary impedance, such as the high quality, low ratio audio transformers that are becoming more and more popular, is hazardous. The sudden surge of current caused by the opening or closing of a jack circuit is likely to burn out fine wire used in winding the transformer core.

A serious problem presents itself, however, when jacks are eliminated. The volume of the receiver must be controlled. If the rheostats are turned low, volume will be reduced, but at the expense of clarity. If turned too low, distortion results. Partially detuning the receiver, with the tubes operating at their most efficient setting of the rheostats is often done. In this day of congested broadcasting, however, such a procedure will result in interference between stations.

Engineers have been working to devise means of softening the tone without destroying quality. Resistances across the primary and secondary windings of transformers are sometimes used, as well as a bank of fixed resistances in series with the output of the last tube, proving entirely satisfactory except that poor regulation is secured.

Best tone quality is maintained with a fixed resistance across the secondary of the transformer, and volume controlled by using a variable center contact like a potentiometer, connecting this contact to the grid of the next tube. Approximately 500,000 ohms puts the proper load on the transformer for best results, while the variable arm must have perfectly smooth regulation from zero to the maximum resistance.

Such a resistance is the Centralab Modulator, made in Milwaukee. This is supplied with three terminals, precisely like a potentiometer except that the resistance is a graphite ring upon which a metal disc is pressed to make contact. All of the rubbing and wear comes between the metal disc and pressure arm which does not make the electrical contact and therefore cannot cause noise even after long service. The resistance strip remains unhurt by the pressure contact of the disc, whereas the usual variable resistance wears quickly from the direct friction of the contact arm on the resistance.

The Remo Corporation has announced two new types of speakers, on which deliveries have just started. They are the Remo Trumpet Concert Type and the Remola Concert Cabinet. The tone values of these loud speakers are very good, and are the result of long experimentation to produce the true high and low tones. The reproducing units are fixed and no adjustment is required.

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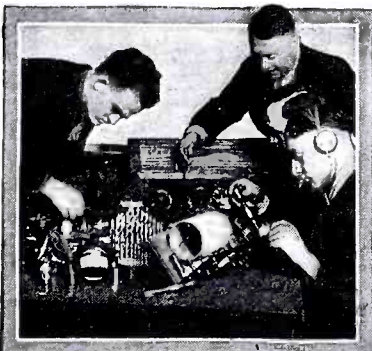
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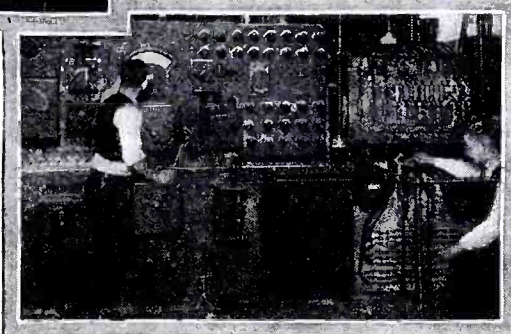
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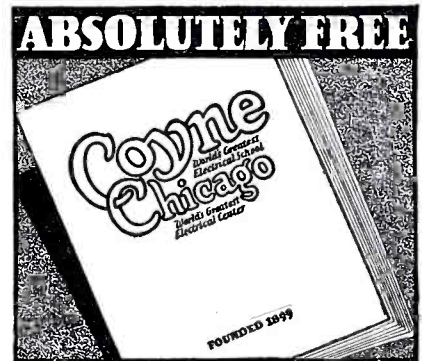
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Name

Address

You Need a Wavemeter

(Continued from page 40)

hand side is numbered off in tens starting at 200 and going up to 550. This corresponds to the wavelength range we seek to cover.

Now we want to get a series of standard readings on this graph so that we can plot a wavelength curve for the coil and condenser we are using. This is quite simple, and requires only a small receiving set—even the lowly crystal will do if it has four or five stations on its log sheet. You will need also an accurate broadcast list with a chart of the wavelengths of the various stations you can hear.

Tune your receiver—it makes little or no difference what kind of a receiver it is, to some station that is transmitting. Tune it in so that it is clear and steady, with a minimum of coupling so that the tuning is quite sharp. If you are using a neutrodyne or similar five tube RF set, get the reading as accurately as possible. Then leave it alone.

Now bring the completed wavemeter close to the broadcast receiver you are using. Wait until there is a lull in transmission—between numbers, and when this comes, close the switch of the buzzer circuit on the driver, and swing the condenser of the wavemeter back and forth until the buzzer can be heard in the phones or loudspeaker. Move the wavemeter further and further away from the set until you can get a hair line reading on the wavemeter dial—sometimes on superheterodyne sets this reading requires a six to ten foot separation. On crystal sets it amounts to only a few inches.

When you have this reading as sharp as you can get it, jot it down on a piece of paper and proceed to tune in another station on the receiver. Repeat the entire operation on about eight or ten stations or as many as you can cover, getting your readings as sharply as you can. These readings should cover the entire scale of broadcasting wavelengths if possible for the best results and most accurate curve. The more stations you check, the more accurate your curve will be.

I am giving a sample log of wavemeter dial readings to show how this should read. Assuming I am operating in the vicinity of Chicago it would look something like this:

WAVEMETER

WIBO	Dial reading.....	7.5
WBBM	Dial reading.....	7.5
WMBB	Dial reading.....	13.25
WENR	Dial reading.....	16.5
WCEE	Dial reading.....	19.
WTAS	Dial reading.....	25.5
WLS	Dial reading.....	36.75
WGN	Dial reading.....	41.5
WEBH	Dial reading.....	44.25
WQJ	Dial reading.....	67.
KYW	Dial reading.....	93.
WBBM		
WIBO	Wavelength.....	226

WMBB	Wavelength.....	250
WENR	Wavelength.....	266
WCEE	Wavelength.....	275
WTAS	Wavelength.....	303
WLS	Wavelength.....	344
WGN	Wavelength.....	360
WEBH	Wavelength.....	370
WQJ	Wavelength.....	448
KYW	Wavelength.....	536

Checking

THE next job is to plot your curve from these readings. Take a piece of square paper and lay it across the graph you have ruled up; this square paper will be used as a point finder. Now for the first reading let the right hand edge of the slide paper just touch the degree mark on the scale you have marked off on the bottom edge of the calibration graph. Then slide the paper vertically until the top edge reaches the point where the wavelength scale on the left hand edge indicates 266 meters. At the corner of the paper where (that is the slide paper on the graph) the degree edge and 266 meter edge coincide or meet, make a point. Now do this all along up the scale until you have recorded every reading you have made.

The rest is simple—merely connect up the points thus laid out with an even line—in this case it is practically straight because a SLW condenser has been used. By this slide paper, you can get any wavelength reading of the meter and a dial reading or vice versa that you want. To get a wavelength reading let the top of the slide paper touch the wavelength you want, let the corner just touch the wavelength curve line, and then follow your right hand slide paper edge down to the dial reading in degrees.

A simpler way to chart this for rapid measurements is to transfer this graph curve to a station finder or wavelength finder as illustrated in Figure 6. This chart gives ready readings in degrees for any desired wavelength wanted.

Using the Wavemeter-Driver

AS I SAID before, I recount the virtues of the device when I describe its application to radio use, and a light survey of the following uses and methods of employment are substantial argument in this connection. The first general all around handiness comes in using the wavemeter as a tuning aid. It cuts out the guesswork and fishing, systematizes your listening, and gets certain results.

As A Station Finder

To use the wavemeter-driver as a station finder, one merely sets the dial in degrees to correspond to the wave length wanted, and then turns on the driver or buzzer. Bring the wavemeter close to the tuning inductances of the receiver you are operating, and tune in the buzzer signal until it is sharpest and clearest. Then turn off the buzzer, and your set is adjusted to the wavelength you wish to listen to. As an illustration,

suppose you want to listen to Station KGO at Oakland, California, and you don't want to fish. KGO is on 361 meters. According to the sample chart I plotted for you, set the wavemeter dial at 41.75 degrees. Now turn on the buzzer. Tune the broadcast receiver you are operating to the buzzer signal until resonance is effected. Then turn off the buzzer and withdraw the wavemeter. If KGO is broadcasting, and if your wavemeter is properly checked, KGO will come in—often just a tiniest turn on the dial brings them in. More often, I have tuned with this device to find that they come in better than tuning with the set oscillating, because when I do get KGO this way, the tuning is accurate.

As a Coil Check

The device is invaluable in checking coils of unknown inductance for wavelength range. Wind your coil too large—by several turns, and then proceed to hook it up in the circuit shown in Figure 4 using the condenser it is to be operated with. Connect a crystal detector and a pair of phones as illustrated, and with the buzzer find the hot spot. To do this you will have to have both the wavemeter circuit and X or unknown circuit in resonance. Now set the X circuit condenser at minimum and don the phones. Start the buzzer on the driver, and swing the wavemeter condenser until the buzzer is heard in the phones. If you cannot hear it, increase the capacity of the X condenser until you do. Loosen the coupling between the two circuits until a sharp reading on the wavemeter dial is obtained. Then jot that down and look up the wave length. Now set the condenser of the X circuit at maximum—with all the plates in. Again look for the resonance point and jot it down. Then from this you can proceed to add or subtract turns on the X coil or vary the number of plates of Cx to get the right wave band. The best way is to try to get circuit X to read as nearly the same as the wavemeter dial if possible. Proportion it so that 536 meters will come in on 88 or 90 on the Cx condenser dial—which will allow ample room for all the lower wave stations.

By this method you can also determine how high and how low the coils of the receiver you are using will tune.

A Wave Trap

The unit can be used as a wave trap by the simple expedient of connecting the antenna to post 3 and the wire to the set to post 4. (See illustration No. 5.) Keep the wavemeter away from the set by at least two feet.

The operation is to set the wavemeter to the wavelength you want to trap out—to eliminate, and then proceed to tune the set just as you please.

It may also be shunted across the
(Turn to page 64)

How to Handle Problems of Interference

(Continued from page 22)

but every other stray electrical impulse in the ether as well. The result is poor reception insofar as quality is concerned.

The intensity of signals from broadcast stations located on the opposite coast is usually far below the intensity of the ether noise level, and if we expect to hear these signals we must expect to hear the noise as well.

It is for this reason that perhaps the best quality of reception can be obtained by the use of a crystal detector. The crystal is not highly sensitive and will pick up no signals below a certain intensity, usually well above the ordinary noise level. In listening to a station with a crystal detector with or without audio frequency amplification we hear the signals but not the noise.

Of course, by this it is not meant that we should throw away our tube sets and revert to the use of the crystal. Virtually the same effect can be obtained in a tube set by running the detector rheostat somewhat lower since this reduces the sensitivity of the receiver.

In speaking of the natural noise level in the ether caused by electrical devices, the question that no doubt comes to mind is, "Cannot this noise be eliminated or reduced by some manner or means?"

The answer is "Yes," if you are willing to give up all your modern electrical conveniences and all the advantages you now have through the facilities placed at your disposal by the electric light and power companies, the telephone company, and the electric railways which serve the community in which you live. Even this, however, would not eliminate interference from automobile ignition systems and static. No sane person would be willing to make this sacrifice.

We are thus forced to come to the conclusion that the question of interference is relative. What constitutes interference in any particular case depends not only upon the type of receiver used, the aerial, the distance from the transmitting station but also upon the psychological reaction of the individual listener. A true lover of music whose only interest in radio is in the quality of the music he hears over it is annoyed by interference which the dyed-in-the-wool experimenter would not even notice.

Another factor which has an important bearing upon interference in radio reception is the power used by the broadcast station. The present tendency towards the use of so-called superpower broadcast stations is one which should be discouraged, as such stations do not under present conditions attain the results they are after and only create a mess of it locally. The object of the superpower station is to radiate sufficient power to cover the country. As a matter of fact none of them do this. It is true they can be heard somewhat farther than the 500 watt station but under present conditions where almost every locality is construct-

ing superpower stations, this increased transmission is more than neutralized by the local interference created by these stations themselves.

The well adjusted 500 watt transmitter radiates sufficient energy to enable the D X fans to pick them up at distances anywhere from 500 to 2,000 miles and it causes very little confusion locally.

If for any reason on special occasions it is desired to cover the entire country, it can be done much more effectively by connecting a number of 500-watt stations together by wire or by a short wave radio channel than by the use of a single superpower station.

For the present those listeners who demand quality in reception will have to content themselves in listening to reasonable nearby stations. If the listener wants distance he can get it by using a modern super-sensitive receiver but he must understand that the music of the distant symphony orchestra will be accompanied by the noises of a boiler shop.

Long-distance records brought in by station WHAZ on a power input of 500 watts causes Prof. W. J. Williams to doubt the claims made for superpower.

"When we know that this 500-watt station has been heard consistently in cool weather across the continent and in Europe, we can hardly be criticized for taking the stand that a power level of approximately this value is sufficiently high to meet the demands of the radio audiences," says Williams.

"When it is necessary to lift the power level all over the country for a broadcast of national importance, it can be done satisfactorily by linking by wires several stations chosen on account of their location."

Giving the correct time, from any broadcasting station is an item requiring more consideration and attention, than it is at first thought of by the average listener-in.

When it is realized that post-masters, village bell-ringers, jewellers, watch-makers, factory managers, school teachers and a galaxy of others depending on radio for the correct Greenwich time, whether of the Eastern, Central or Mountain variety; a broadcasting station must be prepared to give this small, yet very important, part of its program, within the very second.

The relaying of Arlington time signals is a splendid opportunity; but, it happens only twice a day. In order to satisfy the "clients" of CKAC, Canada's pioneer station, J. N. Cartier, director-announcer has resorted to the famous Mappin & Webb self repeating watch, which beside being accurate, has the property of ringing the hours, quarters and minutes.



\$3.25 RADIO Storage "B" Battery

12 Cells 24 Volts Lasts Indefinitely—Pays for Itself

Economy and performance unheard of before. Recharged at a negligible cost. Approved and listed as Standard by leading Radio Authorities, including Pop. Radio Laboratories, Pop. Sci. Inst. Standards, Radio News Lab., Lo-fax, Inc., and other important institutions. Equipped with *Solid Rubber Case*, an insurance against acid and leakage. Extra heavy glass jars. Heavy, rugged plates. Order yours today!

SEND NO MONEY Just state number of batteries wanted and we will ship day order is received. Extra Offer: 4 batteries in series (36 volts), \$12.75. Pay expressman after examining batteries. 5 per cent discount for cash with order. Mail your order now!

WORLD BATTERY COMPANY
1219 So. Wabash Ave., Dept. 94, Chicago, Ill.
Makers of the famous World Radio "A" Storage Battery
Prices: 6-volt, 100 Amp. \$11.25; 20 Amp. \$18.25; 140 Amp. \$14.00
All equipped with *Solid Rubber Case*.

World STORAGE BATTERIES
Set your Radio Dials at 210 meters for the new 1000 watt World Storage Battery Station, WSBC, Chicago. Watch for announcements.
KDKA = WEAZ = WGN = WJS = KHJ = KGO = KFAP = WJY = KOP

Big 3 ft. Telescope

Has unusually powerful lenses — magnifying over 8 times. Makes people and objects miles away seem close. Brings new pleasures to home, farm, camp, sport. See moon and stars as never before. New Ferry "Wonder" telescope has 5 sections—opens out over 3 ft. long measures 12 inches closed. Big, Strong and powerful yet light, compact, easy to carry. Body and draws fully brass bound with knurled edges. Covered with black leatherette.

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YES ABSOLUTELY FREE! Handsome leatherette covered Carrying Case, light, strong, complete with strap. Case is 12 in. long, 2 1/2 in. in diameter. Handy for farmers, auto tourists and bikers.

Read These Letters
Thousands of Delighted Users
"I am delighted with the 'Wonder' telescope. Today I have been watching submarines 3 miles off the coast."
—Philip Brush.
"I can see across the Mississippi 3 miles and see people fishing."
—M. L. Thorn.
"I am nearly 80 years old and if I could not get another would not take \$10.00 for it."
—A. R. Walker.
"I can tell time on the church clock 5 miles away."
—Edward Foster.
"Could tell color of aeroplane 4 miles away."
—Mrs. L. M. Yarbrough.
"I saw a Light House 18 miles away."
—Clyde Serbner.

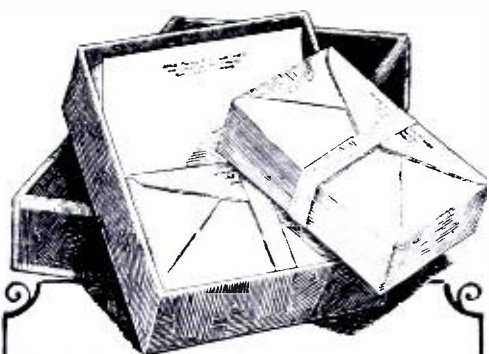
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Sign and mail coupon below and Ferry Wonder 3 ft. Telescope with free Carrying Case will come by return mail. Pay postman special price of \$1.85 plus few cents postage. Satisfaction guaranteed or money back. Send coupon today!

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Name _____
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Tell them you saw it advertised in On the Air.



200 Sheets 100 Envelopes

High grade, clear white bond paper — unusually smooth writing surface. Size 6x7 in. with envelope to match. Has that crisp, crackly "feel" that identifies it to everyone as superior quality stationery. This stationery, unprinted, would ordinarily cost you more than \$1.00; our large production at narrow margin makes this offer possible.

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on every sheet and envelope in rich dark blue, up to 4 lines. Type is Plate Gothic, designed especially for clearness and good taste. Makes a personal stationery you will be delighted to use. An ideal gift with your friend's name. Attractive 3 letter monogram if preferred.

Just send the coupon below with \$1.00 (west of Denver and outside U. S. \$1.10) and this generous supply of stationery will come by return mail, postage prepaid. Securely packed in a sturdy blue box. Please write or print clearly. Prompt service and satisfaction guaranteed. Money refunded if you are not pleased in every way. Send coupon today!

National Stationery Co.
2216 Lincoln Highway, Batavia, Illinois

Gentlemen—I enclose \$1.00 (\$1.10 for shipments west of Denver and outside U.S.) for which please send me, postage prepaid, 200 sheets and 100 envelopes of National Stationery printed as follows:

To avoid errors please Write or Print Clearly

THREE-GAMES-IN-ONE

Catch the Goose that Laid the Golden Egg
Pin Solitaire - Checkers

One Side—2 Pin Games
One Side—Checkers

Hardwood Inlaid

ALSO FULL INSTRUCTIONS ON HOW TO PLAY EACH GAME

Also Full Set of **FREE**
Pins and Checkers

These Boards are made of choice Hardwood inlaid. The games are easy to play—so simple a child can play them, yet so fascinating the older folks go wild about them. SEND NO MONEY—just a letter. When delivered, pay mailman 50 cents and a few cents delivery charges.

Game Board Co., Dept. 92, Wilmette, Ill.



ON THE AIR is the fastest growing publication in the Radio field. Tune in and grow with it.

"The Play's the Thing" at KGO

(Continued from page 24)

never at a loss to understand action that is invisible and must be suggested or described in words or by the use of accessories—preferably words. I believe the drama lies in words rather than in noise."

Much is yet to be accomplished by the coordination of music with words, according to Mrs. Church. As yet very little is really known about this phase of radio drama. Recent experiments at KGO with educational drama, during which a boy and a girl and "The Old Man of the Rivers" drifted down the Volga River and talked about what they saw and heard, show clearly that music can be made an important part of the drama over the air. In "The Volga River" presentation sounds of water rippling past the boat, and dripping of the paddles, were heard throughout the entire piece. Music, bells, sounds of feet on the streets and bridges, merchants yelling out their wares, were heard as the little party in the play passed through the city of Nijni Novgorod, through which the Volga River flows. These sounds not only created "atmosphere" for the drama, but at the same time much information about the Russian people was gained by listeners. Later during the trip, music was heard in one of the peasant's houses along the shore. "The Old Man of the Rivers" said it was the "measles song," always sung when Russian peasants have the measles. It developed here that Russian people sing songs about nearly everything they do. "But the big idea", said Mrs. Church, "is the listeners through the medium of music looked right inside the souls of the Russian peasants along the Volga, and understood them by the association of words which were heard with the music."

Drama by sound alone is yet in its infancy and only a good beginning has been made, according to Mrs. Church, who sees it carried into educational fields with revolutionary results to methods now employed. Several educational dramas have been planned at KGO as a result of the "Volga River" playlet.

The All-American coils are made in two types—an antenna coupler and a radio frequency transformer. They are priced at \$3.50 each, and the set of three is packed in a box at \$10.50 for the set. The frame of the coils is finished in glossy black and makes a wonderfully neat appearance, besides embodying the highest electrical efficiency. In the R. F. transformer the primary is wound inside the secondary and is a short coil entirely suspended in air, reducing the distributed capacity to an extremely low figure and eliminating all practical tendency to oscillate.

All-American variable condensers are of the straight-line-frequency type, so that there is no crowding whatever of the short wave stations on the dial. There is a movement of nearly 360

Charm and Simplicity in the Ultradyne

(Continued from page 41)

most forms of interference.

Matched Loud Speaker Employed

Mr. Lacault has answered the problem of distortion by matching the loud speaker unit with the audio frequency amplifier. The impedance of the unit is equal to the plate-filament impedance of the last audio frequency tube and the whole strikes an electrical balance of advantage to the flow and dissipation of the audio frequency currents. The arrangement provides for greater volume at the loud speaker as well.

Preliminary tests on the new Ultradyne have shown that it will operate extremely well on a small indoor aerial, such as a wire run around the moulding of a room. In fact the set has shown itself capable of doing about as much with a small collector as with an outdoor one of larger dimensions. Whether there is any great advantage in using a long span of wire out of doors is hard to say at the present time.

There is space provided inside the cabinet for the "B" batteries which are connected to binding posts on the side of the tube socket sub-base. It is the idea that the storage battery and charger will be put in some out of the way place where no harm could be done by a possible leakage of acid.

There are binding posts at the rear of the sub-base for the "A" battery, aerial and ground connections which are run to the posts through holes in the rear of the cabinet.

The cabinet itself is 24 inches long, 14 inches high and 14 inches deep which makes a very convenient size set for the home.

degrees from minimum capacity to maximum, and the minimum capacity is less than one-thirtieth of the maximum, even though these instruments are thoroughly protected from dust by heavy brass shells.

The condenser is furnished in two capacities—350 and 500 micromicrofarads. An important point is the small space required as compared with the common rotor types—about one-half the panel space, or one-third of the total cubic space is sufficient for the All-American condenser. The insulation is of the highest grade material, making these instruments particularly suitable for reception of the newer short wave stations where the strength of signals is so seriously weakened by any power losses in the tuning instruments.

The price of the .00035 mfd. size condenser is \$4.50 and that of the .0005 is \$5.00. First deliveries of these new type instruments will be made during August and September.

Tell them you saw it advertised in On the Air.

So Sen Kaney Became "Informal"

(Continued from page 27)

mediately seized upon this occurrence as human interest material. He told the world something to the effect that he thought everything was going to be all right, because the studio cat had just come in bringing with him several stars from a well known musical comedy then playing in Chicago. In the next few days there came to KYW a deluge of mail. The majority of listeners wanted to know the name of the announcer. Several fans sent Kaney stuffed cats. Overnight "Sen" had become a personality instead of just a voice.

Kaney's new position in the eyes of the radio fans brought, of course, added responsibilities. He had to realize that although the studio director would supply him with the facts in the case, it was his work to present those facts to the public in the most acceptable way. It meant, briefly, that he had to be versatile, for each day in a broadcasting studio presents new problems, most of them without precedent. Perhaps in one evening he would be called upon to announce a prominent speaker, the artists appearing on a classical program or popular stars appearing in a jazz revue. Each of the preceding programs called for a different style of announcing, and it was Kaney's job to develop that style.

Informal Announcing Not Easy

Informal announcing, as it is called, is much more difficult than formal radio presentation. In the latter case the announcer has only read what has been prepared for him, while in the former he must tell his own story and tell it right the first time. Formal announcing, of course, requires rehearsals, but the informal kind requires even more, for the announcer has no thing except his own glibness and sense of fitness to guide him. It is rather obvious that informality can be perfected only after the announcer has gone through a rigid training in formal announcing, although it is difficult to convince the "cub" announcer of this fact.

Each of KYW's announcers, and there are several of them, goes through a rather arduous training course. Diction, pronunciation and clarity, are drilled into the men, but no attempt is made to make them all talk alike. KYW's directors believe in each announcer developing his own "air" personality, but only after the fundamentals of good announcing have been mastered.

The Norwegian Radio Dealers and the Radio Association plan to hold a radio exhibition this fall, according to advices reaching Washington.

At Rangoon, India, the Burma Wireless Club, with a membership of 100 fans, is planning to import apparatus and has applied for a broadcasting license. Successful loud speaker demonstrations with a four tube set have increased local interest greatly.

Limitations of Radio Reception

(Continued from page 29)

sists of breaking up the atoms which constitute these atmospheric gases. When an atom is broken up into its constituents, the result is a positive charge of electricity and a number of negative charges or electrons.

How Ions Recombine

AS THE relative position between the earth and the sun changes, it is evident that the extent of ionisation will vary to a considerable extent. In other words, the ions recombine rapidly as soon as the force which caused this condition has ceased. This de-ionisation or recombining of the ions to form gas atoms will change the amount of electrical charge in the air. It is the change in amount of electrical charge, or change of potential gradient, which causes the electrical disturbance or noises in the radio receiving set which are commonly known among radio operators as "grinders." These grinders travel over great distances and are more noticeable at night just after sunset, because it is then that the process of de-ionisation is at its height. The potential gradient may also be varied by vertical air currents, which are caused by the sun's rays heating and expanding the upper layers of the atmosphere. During the summer months, when the sun is relatively close to the earth, the extreme heat will cause the air to shift vertically as already explained, thereby causing a maximum disturbance at that time.

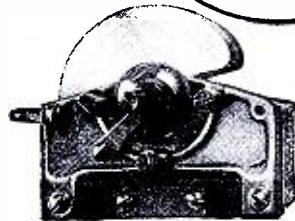
Lightning discharges also cause a great amount of noise in a receiving set, especially during the summer, when electric storms are frequent and most severe. It is surprising to many when they learn that these disturbances are not usually heard over distances greater than 100 miles. These disturbances cause sharp clicks of considerable intensity in the receiver.

Another condition which is often found to be very annoying is fading. Many theories have been advanced regarding the causes of fading, but the latest information upon the subject seems to indicate that it is largely a matter of interference between direct waves and waves that have been reflected from the Heaviside layer, which is a layer of ionised air in the upper strata of the earth's atmosphere. This ionised air has the peculiar property of reflecting radio waves in a manner which might be compared to a mirror reflecting a beam of light.

Sketch 3 illustrates how both the direct and reflected waves travel from the transmitter to the receiver. It is evident that the reflected wave travels much farther than the direct wave and is therefore subject to being out of phase with the latter wave. As the height of the Heaviside layer varies, the phase relation will change, thereby changing the extent to which the two waves aid or oppose each other.

Tell them you saw it advertised in On the Air.

SM
SUPER
PARTS



S-L-F!

Real S-L-F Condensers at last! Silver-Marshall have met the demand for an all-round straight-line-frequency condenser by producing an instrument that meets the requirements of lowest losses, small size, attractive appearance, and—most important—actual S-L-F tuning efficiency. All types supplied with pulley collars so that from one to five condensers may be controlled by a single knob, without separate verniers. The S-M Condensers are entirely silver-plated—a feature that reduces losses lower than laboratory standards.

No. 310 .0005.....\$6.00
No. 311 .00035..... 5.75
No. 312 .00025..... 5.50

S-M
Type
210
and
211
Trans-
formers



The famous S-M 210 and 211 Intermediate transformers, used in the receivers developed by McMurdo Silver and in several other well known designs, provide the highest amplification of any transformers on the market. Each transformer is laboratory-measured and supplied with individual curves—your guarantee of uniformity! The new bakelite case is especially attractive and efficient. Filter furnished with measured tuning condenser. Transformers supplied in sets of two 210's and one 211.

Each.....\$8.00
Send 4c in stamps for circulars describing the latest S-M developments, including the new cushioned sockets for UX and UV tubes and the interchangeable coils for all-wave receivers. Magazine reprints describing the super-auto-dune and the all-wave super are free!

Silver-Marshall, Inc.

111 S. Wabash Ave.

Chicago, Illinois

“Feedbacks”

(Continued from page 51)

Questions and answers, and how to care for your radio set.

Very truly yours,
D. H. GOON,
3380 Monroe St.,
Toledo, Ohio.

Mr. Goon's suggestions are especially valuable, since he speaks from a professional standpoint. Now that we have worked a good many of his suggestions into actuality, we hope he'll write us and tell us what he thinks of the result.

Before we turn the job of contributing over to you, we want to blow our horn just once more by saying that we believe we have applied everything, or nearly everything contained in the following letter:

261 Central Park West,
New York City.

“On the Air” Magazine,
Chicago, Ill.

Gentlemen:

A radio magazine should fulfill two purposes. First, it should give the readers what they want and second, it should prove instructive without appearing to be giving lessons. Its readers may be divided into certain classes, one of which will be taken up in each of the three following paragraphs:

There are vast numbers of people who buy their sets ready made. They are primarily interested in the programs which are being sent out over the air, particularly those of unusual merit which are to be broadcast in the near future. To a slightly lesser degree they are interested in past programs to which they have listened. Attention should be focused on the main events of the month, however, and programs which are usually commonplace should be eliminated from the discussion. Certain of these ready made fans like to hear about the station participating in these features. For their benefit interesting information about the stations and their personnel should be included. Periodical descriptions of the new models of factory made sets will serve to keep them posted on the latest developments. It will be seen that all of these articles may be illustrated with advantage.

Next are the men who build their own sets. These men are interested in the latest developments in set construction. They are never quite satisfied until they have obtained the impossible, namely, the radio set perfect in every way. Therefore not only should new circuits be described but also improvements on the old ones. These two types of articles should be carefully distinguished so that old circuits under new names will not raise false hopes in the home constructor. It has been my experience that the advertisements of parts are of great assistance to the man constructing his own set. At present the one difficulty in picking the proper apparatus is a lack of knowledge of the characteristics of these parts. Without this information, it is impossible to determine what

parts are best suited for specific uses. Therefore, articles describing the apparatus advertised along with charts of curves and like information, would be most welcome. However, to be of the greatest value the data given should be taken at the same wave length, voltage, frequency, or whatever the test may be, for each particular piece of apparatus. In this way the set constructor may make his own comparisons and determine for himself what is best suited for his own use. These men, in addition to the diagrams necessary, are interested in seeing pictures of the completed sets and the sets while in the process of construction.

The next class of radio fans are those who wish to go a little deeper into the technical end of the game. By these I do not mean the scientists, but rather, the men who are interested in experimenting on a small scale. The technical information should therefore be limited to a discussion of matter which may be of assistance to a person who wishes to use his own imagination in constructing his set. These articles because of their nature cannot be very readily illustrated by photographs. Diagrams are indispensable however.

The broadcasters receive the views of the listeners in the many letters which they receive. The listeners have no way of getting the broadcaster's point of view, except through articles appearing in a publication. However, these articles should be so written as to avoid a controversy between broadcaster and listener.

A question and answer department is of great assistance to set constructors who encounter difficulties which they cannot overcome. This department could be divided into two sections: the first, answering questions relating to sets which have been described in the magazine, and the second, answering general questions. The matter covered by these two sections could be divided into its various classes, thus keeping all the answers to questions regarding particular sets or apparatus in one place. By this means a reader will be able to find what he wants without wading through questions and answers which do not aid him in his particular difficulty.

It will be seen from this outline, that a typical number would be composed of the following articles:

1. Events to come or events past.
2. Some station on the air.
3. Description of the latest set.
4. New ideas about a recent set.
5. Semi-technical article.
6. Broadcaster's views.
7. The characteristics of apparatus.
8. Question and answer column.

It would seem as though the above list would cover the slogan:

“Information and entertainment for every broadcast listener so arranged that he can find it.”

Very truly yours,
GRAHAM C. THOMSON.

Mexico is probably the only country which has made use of radio broadcasting in war. During the recent revolution, bulletins from the front were put on the air at Mexico City.

S-L-W Versus S-L-F Condensers

(Continued from page 25)

between 200 and 300 meters there are 50 channels; 50 stations may operate at once, says the Department of Commerce. Between 300 and 550 meters there are, roughly, 50 more. Actually, the lower range has more than 50 stations in it; far more, since the Department of Commerce puts everybody that wants a license right down in this little playground, regardless of interference, while the upper range is kept clean for those who want to enjoy good programs; not to try to sort out heterodyne squeals.

We might state the S-L-F versus the S-L-W case as follows, and be quite near the truth: If you want numbers of stations, take an S-L-F condenser. If you want to enjoy the country's best broadcasting, use an S-L-W condenser, and you'll still get quite satisfying separation, for—here's a secret—Most of the so-called straight-line-wavelength condensers marketed up to this time are emphatically not; only a few are really S-L-W. And one other factor—a straight-line-frequency condenser cannot be manufactured for home-built sets, because the resultant curve will be distorted by any variations of coil or circuit capacity, and it is impossible for any manufacturer to predetermine the capacity of your particular coil or set wiring.

Fans on the Island of Teneriff, in the Canary group, have succeeded in picking up radio stations in France, and Spain, and now a demand for receivers has started, Consul Gibson reports. So far American sets are practically unknown and untried.

Fading, or the fluctuations in intensity of distant signals, is the heavy villain in the radio drama today, according to Dr. J. H. Dellinger of the Bureau of Standards. It does not bother fans much except when they are striving to tune to and hold stations over 50 miles distant, he points out. Although it is probably no worse today than it has been in the past, other enemies to good reception have been yielding to scientific development. Fading is yet unconquered, he adds, although he says we are rapidly learning about it, which aids materially in finding a remedy. The Bureau is now cooperating with a group of scientific institutions in an effort to learn how to control radio fading, especially at night when broadcasting stations are affected.

And now we have the radio physician. Once a week from WGY at Schenectady, Dr. C. W. Woodall is giving a short talk on first aid. He doesn't attempt to prescribe for individual cases, but he does give advice which may be of great value in an emergency and the response from listeners indicates that his efforts are meeting with success.

WURLITZER

REG. U.S. PAT. OFF.



Justin Huber
Jazz Band Leader
Huber's Orchestra



Alberto Salvi
Concert Harpist
Internationally Famous



Eugene Ysaeye
The Great
Master Violinist



Alexander Liberati
Cornet Virtuoso and
Leader, Liberati's Band



Carl C. Preble
Trombone Soloist
Sousa's Band



Walter J. Klinko
Concert Saxophonist
Victor Records



Homer Rodeheaver
Musical Director
for Billy Sunday

Masters in Every Sphere of Music Praise Wurlitzer Instruments

Great artists of the concert stage — prominent band and orchestra musicians — "kings of jazz" — all meet on common ground in their endorsement of Wurlitzer instruments.

They appreciate the rich, mellow tone, the ease of playing and the superior workmanship. And they value especially the artistic quality, the character, that they find in Wurlitzer instruments as in no others. It is the product of seven generations of music craftsmanship, more than 200 years experience in musical instrument building.

Try any Wurlitzer instrument. You will recognize this quality—Wurlitzer quality—that has made Wurlitzer instruments the preference of master musicians, professional and amateur alike.

Try Any Wurlitzer Instrument in Your Own Home

YOU may now have any Wurlitzer instrument for a week's free trial in your own home. Examine the instrument, show it to your friends, play it as much as you wish. No obligation to buy—no expense for the trial. We make this liberal offer because we want you to see for yourself the superior quality of Wurlitzer instruments, the result of 200 years' experience in musical instrument building.

You are always popular and sure of a good time if you can play a musical instrument. And there is no easier way to earn money in spare time. Choose your instrument now and let Wurlitzer help you buy it and learn to play.

Easy Payments

If you decide to buy after the week's free trial, payments are arranged in small monthly sums. A few cents a day will pay for your instrument. By buying direct you obtain genuine Wurlitzer instruments at moderate prices. Special offers on complete outfits—velvet lined cases, all accessories, self-instructor, etc.—everything you need at practically the cost of the instrument alone.

Send for New Catalog—FREE

The greatest musical catalog ever published! Over 3,000 articles—every known instrument described and illustrated; many shown in full colors.

Gives lowest prices direct to you and all details of Free Trial, Easy Payment plan—all sent FREE—no obligation.

Send This Coupon

THE RUDOLPH WURLITZER CO.,
329 S. Wabash Ave., Chicago 117 E. 4th St., Cincinnati
120 W. 42nd St., New York 250 Stockton St., San Francisco

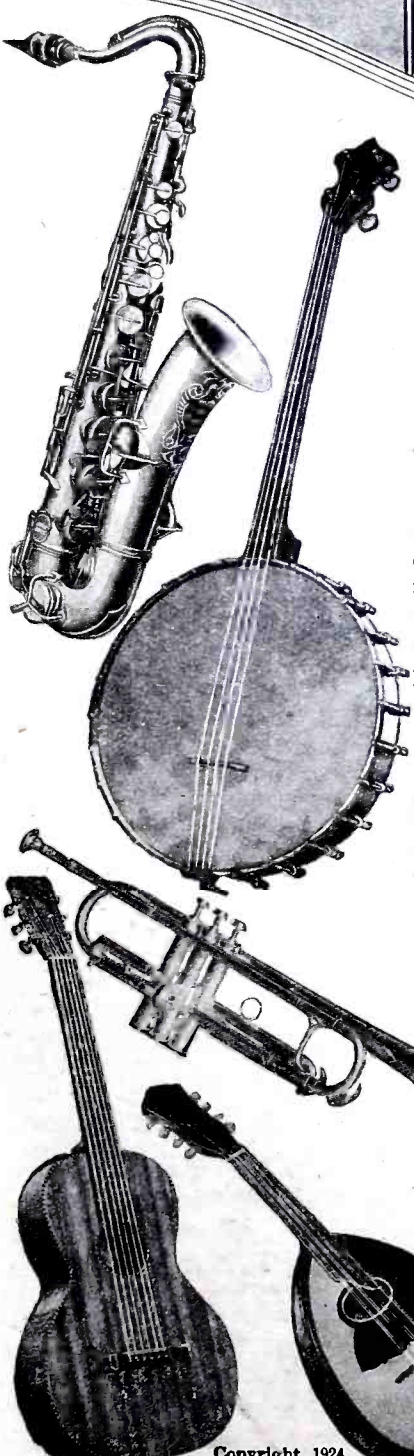
Send me absolutely free, your new illustrated catalog, with prices and description of every known musical instrument. Also tell me how I may try any instrument in my own home and pay for it in small monthly payments. No obligation.

Name.....

Address.....

City.....State.....

Instrument.....
(State instrument in which you are interested)



"I Like This Business of Broadcasting"

(Continued from page 10)

the "Follies" lyricist; Silvio Hein, composer; Marguerite Namara, opera star; the Duncan Sisters, entertainers par excellence; Brooke Johns, probably the most famous banjo artist; and others of equal note.

Then, the theater. The public has read much about the alleged controversy concerning radio and the theater. It was always radio versus the drama. Radio, a direful ogre, threatening the safety and position of the theater. Nothing is more idiotic. Radio, I have proved to my own satisfaction, has been a boon to the theater. Radio and the theater are two separate, distinct realms and radio will never keep people out of the theater.

We have been interested in the development of radio drama. There is, without doubt, a field for the writer with ideas, to create original things for dramatic production on the air. Radio plays are bound to be as specifically unique as motion picture scenarios; radio is a medium as different from the legitimate drama as are the films. At WGBS, the Provincetown Players, who developed Eugene O'Neill, made their radio debut, with many of O'Neill's plays—a most noticeable instance being the broadcasting of scenes from "The Emperor Jones" by the famous Negro actor, Paul Robeson. He has also won considerable of a reputation by singing Negro spirituals, and has sung quite a few times from WGBS. Nearly every week we have at least one play scheduled; sometimes we have as many as four or more. Just now we are about to announce a contest for the best original drama written expressly for the radio.

There is another point I would like to make. We are distinctly a non-commercial station. We do not sell time to advertisers who put on orchestras or artists to feature the name of some canned goods or merchandise. Gimbel Brothers derive as the sole benefit from the operation of WGBS the feeling that they are helping to further the cause of radio—to help develop it to a point where it will be treated eventually with the serious consideration commensurate with its merit.

Programs For Women

EDWARD J. CONTENT, our Chief Engineer, a man who was in France with the Signal Corps, knows his job well. He is ever experimenting with new methods of increasing the quality of our transmission.

Of course, remembering the thousands of women listeners, we have many programs arranged expressly for their benefit. These are usually in the morning and afternoon broadcast periods. Terese Rose Nagel, a capable newspaper woman, with many resources at her command, arranges these programs. Her afternoon interviews with celebrities from all walks of life, have evoked unusual interest.

You Need a Wavemeter

(Continued from page 58)

antenna and ground posts of the receiver as an acceptor, and tuned to the station that is wanted. Thus it passes all frequencies except that to which it is tuned, and forces the desired frequency to pass through input coil of the receiver. This direct coupling method does not allow one to make use of the wavemeter readings since the resistance, capacity and inductance of the antenna tend to change the dial readings of the wavemeter.

To use the device as a filter trap, merely wrap two or three turns of lamp cord around the wavemeter coil, and connect one end to the antenna and one to the set. Then you may use the readings of the wavemeter dial allowing for a few meters inaccuracy caused by the turns of lamp cord around the coil.

A Hot Spot Finder

The driver may be used to test crystals by bringing the device near the crystal set with the wavemeter condenser dial set at about 50, and then varying the condenser and catwhisker of the crystal set until both resonance and best detection is obtained. Another way is to run a wire from the binding post connected to the rotary plates to the ground wire of the crystal set. Start the buzzer, and find your hot spot. This is really the simplest way.

A Neutralizing Signal

To use it as a neutralizing signal for balancing RF and Neutrodyne sets, set the wavemeter dial at about 360 meters and tune the buzzer signal in on the neutrodyne being balanced. Then move the wavemeter driver away until the signal is moderately strong. Proceed with the neutralizing in the usual manner. You will find it a much more accurate way, since you can vary the intensity of your neutralizing signal by loosening the coupling between the driver and the receiver to a point where you can find the absolute neutral spot of the neutrodyne. To loosen coupling between the device and receiver, it is meant to increase the distance between them.

As A Troubleshooter

Many times we want to shoot trouble with our sets, and cannot do so because we have no signal to check with. Here is another instance where the wavemeter driver is handy—you can generate your own signals any time you want to search for trouble in your set.

As A Calibrator

To use the device as a calibrator, it is merely necessary to make readings of the dials of the receiver to be calibrated with the wavemeter set at various even divisions (preferably in tens) of the wavelength range of the set. Accuracy is not especially great in receivers that do not use fixed antenna coupling—but it is reasonably so for average purposes.

As A Temporary Crystal Set

To use it as a temporary crystal set of

excellent efficiency, merely connect a crystal detector and headset in series and shunt them across the binding posts 3 and 4. Connect the antenna to the post with the crystal connection on it and the ground to the phone post. Tune with the condenser dial. Illustration No. 8.

As a Capacity Check

It can also be used as a rough capacity check on small fixed condensers by wiring it as shown in Figure 7. Coil X is a coil of about 35 turns of No. 22 DSG on a 4 inch tube. Connect a condenser, the capacity of which you know is correct and accurate across the coil. Check with driver, phones and crystal. Note the wavelength reading. Now substitute the known fixed condenser with the unknown and repeat. If the capacity is correct, the wavelength reading should be the same. If the wavelength is higher, its capacity is higher and if lower, the capacity of the unknown is not up to what it is rated.

A PPLICATIONS for radio patents are being received at the Patent Office at the rate of about twenty-five a week. Many fans, at one time or another, believe they have thought of or devised something new. It may interest them, then, to know how to go about getting a patent, or at least properly presenting their claim.

The first advice of the Patent Office is to employ a competent patent attorney and to exercise great care in his selection. The necessity for this is explained by Karl Fenning, Assistant Commissioner of Patents, as follows:

"The preparation of an application is a highly complex proceeding, and generally cannot be conducted properly except by an attorney trained in this specialized practice. The inventor is advised to employ a competent patent attorney, as without skillful preparation of specifications and claims, a patent grant is of doubtful value. A register of attorneys is kept in the United States Patent Office at Washington. No attorney not registered in this office will be permitted to prosecute applications."

A radio patent, like every other patent grant, gives the inventor the right to exclude all others from making, using, or selling his invention for the term of 17 years, but it does not give the patentee the right to make, use, and sell his own invention if it is an improvement on some unexpired patent whose claims are infringed thereby. The Patent Office in its investigation preceding the issue of a patent does not consider whether the invention infringes prior patents.

A radio patent is granted only upon a regularly filed application, complete in all respects, upon payment of the \$20.00 fee, and only after a determination of utility and completeness of disclosure of the invention, and a search to determine its novelty.

Night-Hawk Super-4

\$69.80 From Factory to You
COMPLETE

Nothing More to Buy

Includes tubes, batteries, Loud speaker

NOW You can enjoy radio at the lowest possible cost.

Write us for the name of your local NIGHT-HAWK Representative.



The Set That Sells in All Localities

Pull in the Dollars With the NIGHT-HAWK

Hundreds of people in your community are waiting for you to place this "wonder set" in their homes. Right at this moment you undoubtedly can call to mind the names of a number of your acquaintances who would appreciate the opportunity to purchase this 4-tube Radio Set entirely complete—nothing more to buy—at the low cost of \$69.80.

Do not envy the good things in life. Just step out and get them. You cannot engage in a more profitable occupation than the sale of Radio Sets. And you cannot offer a more attractive and efficient set at a more attractive price than the NIGHT-HAWK SUPER-4. You have your chance now to get into the big money class. Do not let the other fellow beat you to it.

\$100 Per Week

Under our "tested and proven" plan of selling direct from our factory through local representatives only, you'll find it mighty easy to make \$100 weekly—and more.

Everyone is interested in radio—no need to hunt your prospects. Such a startling value as the NIGHT-HAWK will create a sensation in your community. Good news travels fast. Before you know it you'll have a BIG MONEY BUSINESS—all your own.

No home is complete without a radio. No other invention of the age has brought such keen enjoyment to millions. This fall and winter broadcasting stations will offer the best musical talent obtainable. The proud possessor of the NIGHT-HAWK can reach out hundreds of miles and bring in all that the broadcasting stations have to offer—music—lectures—market reports—weather reports, the latest news and sporting events of the day. "Cash in" on the tremendous interest which exists in radio.

Clip the Coupon

Every day coupons clipped from the advertisements in various magazines are changing the entire course of lives. Clip the coupon below. Investigate this opportunity. You'll find our "selling plan" easy and productive of big earnings for you. Don't hesitate. Don't delay. Act now—this moment—not tomorrow or next week. Action is what counts. Again we say "clip the coupon"—better still, write us all about yourself.

Some Radio Sets meeting with certain local conditions will not operate satisfactorily unless such conditions are removed or overcome by the substitution of a set stronger in reception volume.

The NIGHT-HAWK SUPER-4, with its super-power (furnishing 5 tube volume) will overcome unfavorable conditions to the greatest possible extent.

Never before in the history of Radio has such a remarkable instrument been presented at such a low price. Volume sales, direct from our factory, through our authorized representative, make it possible to offer this highly efficient Radio Receiver at a price within the reach of every pocketbook.

Coast to Coast Reception

You'll be delighted with distance reception on the NIGHT-HAWK—with a range of from 500 to 2,000 miles. Delightful music—lectures—the latest news events—all that the broadcasting stations have to offer—brought to your home in the most satisfying volume.

Marvelous Tone

The sweet, clear tone of this "wonder set," reproduces both high and low tones with a surprising mellowness, free from rasping, grinding noises.

Excellent Selectivity

Inability to bring in stations desired with clear-cut reception and without interference has long been the "bugaboo" of radio. Thanks to NIGHT-HAWK engineers, dependable selectivity is at last made possible with the NIGHT-HAWK SUPER-4. Stations only a few meters apart are separated with astounding ease.

Simplicity of Operation

With only two dials to adjust delicate tuning is surprisingly easy. The large Vernier Dial knobs fit the hand with a surprisingly "feel" of confidence. The "tone modulator" (center dial) makes it possible to accurately regulate the tone volume.

Beauty and Duty Combined

The handsome, mahogany-finished cabinet harmonizes admirably with the most beautiful of home furnishings. Of pleasing proportions with sloping crystal panel, you will indeed be justly proud of the NIGHT-HAWK SUPER-4.

All Batteries Encased

No unsightly batteries and dangling wires to mar the beauty of the home arrangement. They're compactly encased within the cabinet, permitting the NIGHT-HAWK to be attractively placed wherever desired.

Send No Money

Do not send any money. Simply clip and mail the coupon—NOW. Do not hesitate because of lack of radio or sales experience. We teach you.

We need 500 More Factory Representatives

The enormous demand for NIGHT-HAWK instruments requires 500 additional factory representatives throughout the United States at once. Sales or radio experience not necessary. We train you—we teach you—so that you may quickly place yourself in the \$10,000 per year class. You must act quickly to be enrolled as a NIGHT-HAWK Representative.

Millions of dollars have been made in the radio industry. It's the most profitable business of the age. Thousands of Radio Sets will be purchased in your territory this season. Thousands of dollars will be made by live-wire sales people. As our factory representative, you will be assured your share. Because you will be able to offer this remarkable 4-tube Receiving Set at a price far below the prices asked in your district.

A Demonstrating Set in Your Home Means Dollars in Your Pocket

Of course it does. Because you will be able to prove to your prospects the bell-like sweetness of tone—the distance range—the excellent selectivity, the ease of tuning, the ease of operation.

Act NOW

Night-Hawk Radio Co.

Designers, Manufacturers Engineers

6749-51 WENTWORTH AVENUE

CHICAGO

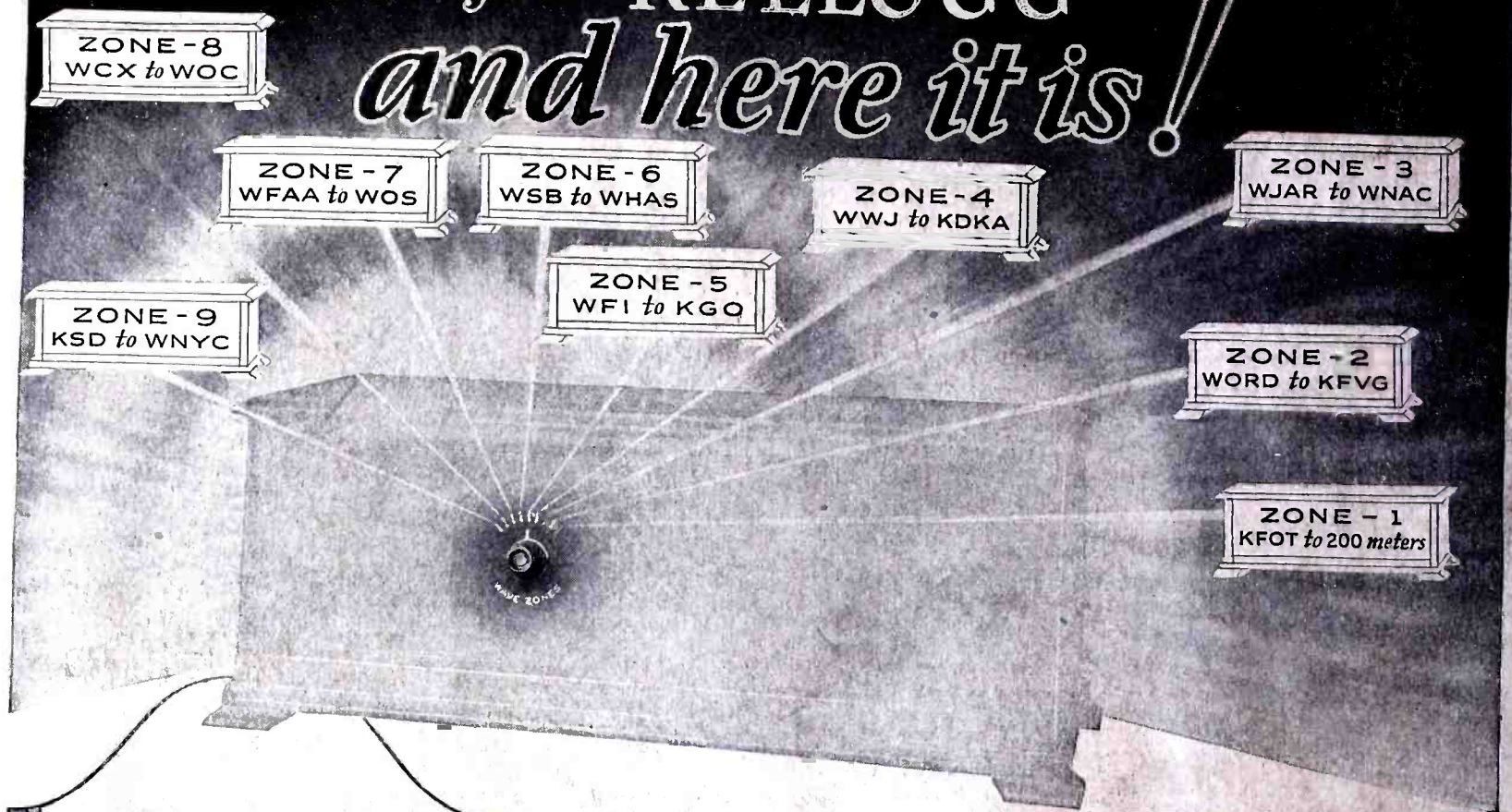
ILLINOIS

Make \$5,000 By Christmas
CLIP—SIGN—MAIL—NOW
Opportunity Coupon

NIGHT-HAWK RADIO CO., 6749-51 Wentworth Ave.,
 Chicago, Ill.
 I am interested in purchasing the NIGHT-HAWK SUPER-4 Radio complete at \$69.80.
 Please give me this name of my local NIGHT-HAWK representative:
 I am desirous of acting as your factory representative in the sale of the NIGHT-HAWK SUPER-4 Radio.

Name _____ Street _____ City _____ State _____

The World Expected a Supreme Radio Set from **KELLOGG** *and here it is!*



WAVE-MASTER
Standard Model
\$125.00



WAVE-MASTER
Brown Walnut Console
with inbuilt horn
\$275.00

A Separate Circuit for Each 40 Meter Wavelength Band!

Kellogg — for 28 years makers of precision telephone instruments and equipment — producers of quality parts since radio began — *Kellogg* has perfected a radio receiver worthy to bear the *Kellogg* name.

In the illustration we visualize this wonderful engineering achievement.

In the new **WAVE-MASTER** there are nine separate circuits—one for each 40 meter wavelength band. Each circuit gives that maximum efficiency heretofore found only in one short section of the dials of ordinary radio frequency sets. Each circuit brings within the range of the tuning dial a *different group of stations*.

How wonderfully simple tuning becomes! Merely set the pointer to the wave zone in which you are interested and bring in the desired station with the single Selector dial.

This remarkable tuning dial actu-

ally has a tuning range of 540 degrees—equal to 1½ times around a complete circle — over three times the station finding range of any other set.

All other radio frequency sets have variable capacity which must be tuned, usually with three different dials, to balance with their inductance coils.

The **WAVE-MASTER'S** inductance is not fixed but variable and is easily and quickly tuned, with the one Station Selector dial, to balance the fixed capacities.

Write for full description and complete technical explanation of the *Wave Master* circuit. Please mention your radio dealer's name.

Kellogg Switchboard & Supply Company
1042 W. Adams St., Dept. J — Chicago, Ill.

Radio Dealers and Jobbers

The **WAVE-MASTER** franchise, backed by *Kellogg* resources and our powerful advertising campaign, is most valuable. Open territory is being closed rapidly. Wire us, or get into Chicago, quick, and see us.

KELLOGG **WAVE MASTER** SWITCHBOARD & SUPPLY CO.