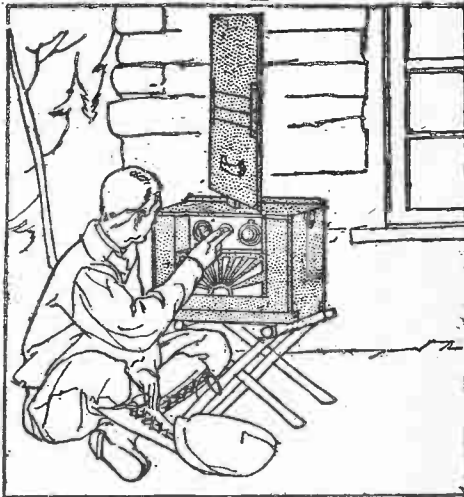
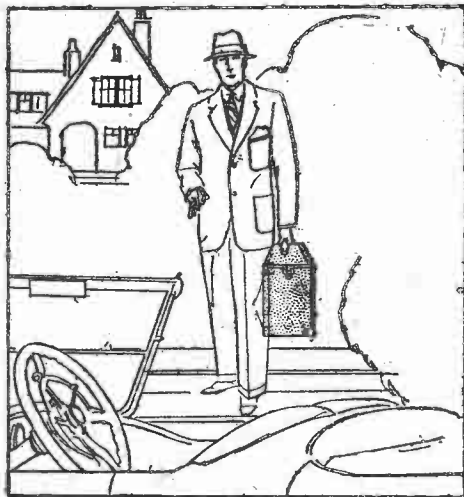
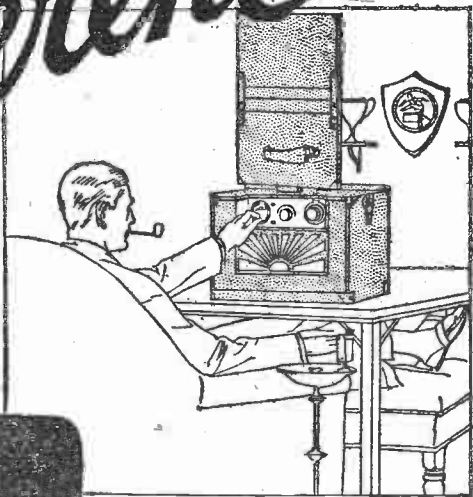
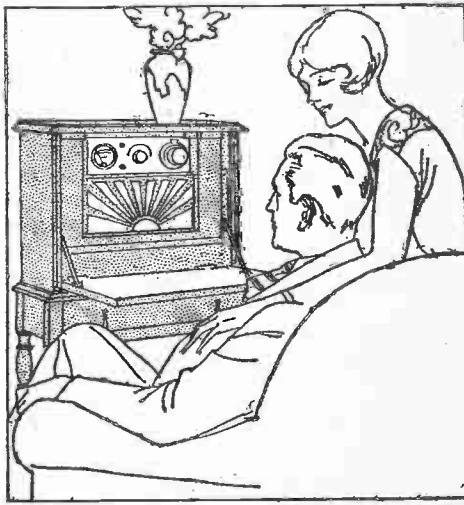
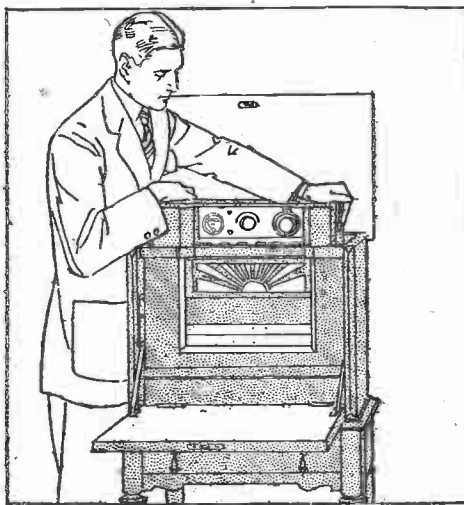
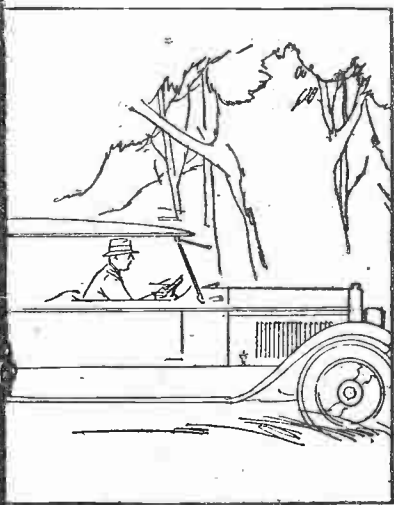


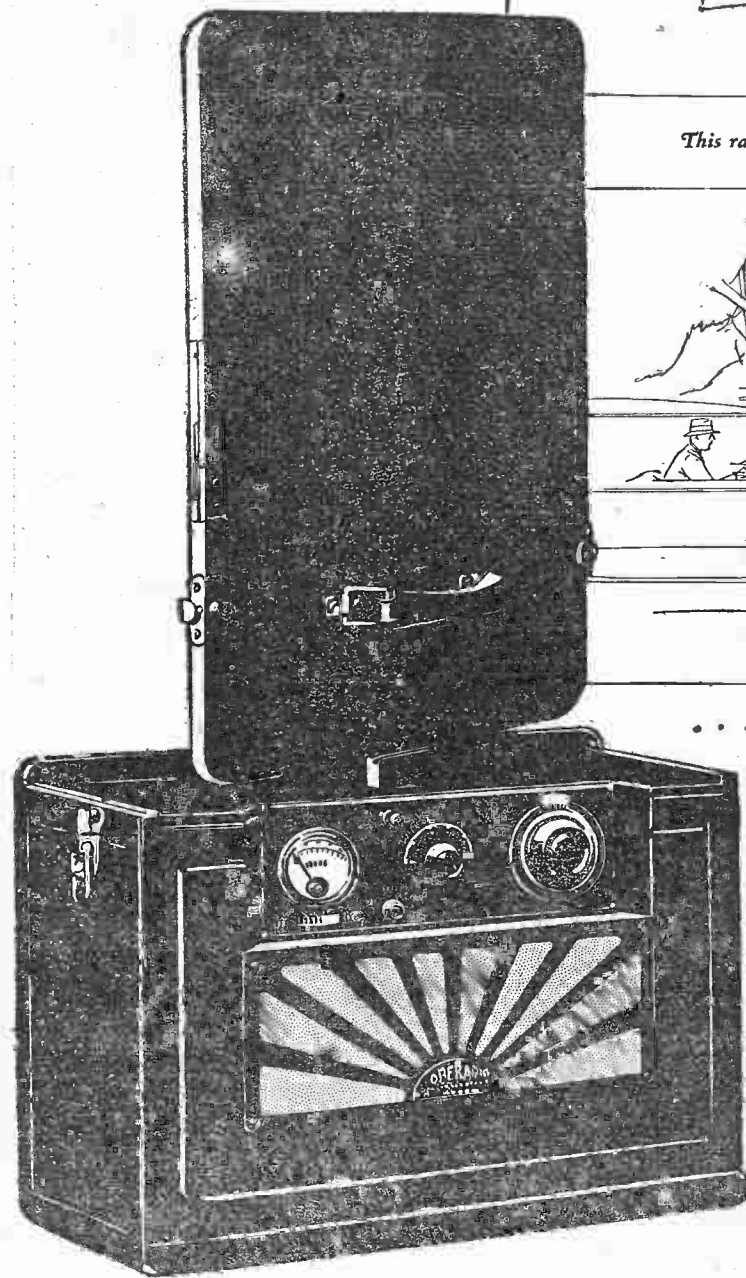
Different



This radio set may be closed . . . . . carried like a suit case . . . . . and used indoors or out . . . . .



. . . . . Wherever you go . . . . . or placed in this walnut cabinet . . . . . if you prefer a furniture model for your home



The Operadio shown above is a complete self-contained set with six tubes, loudspeaker, loop aerial, batteries and all parts fitted into a compact carrying case. Ready for use anywhere at a moment's notice. It may, if desired, be housed in the beautiful Tudor Cabinet. And for those who want a compact set for home use only, the Operadio is also available in a distinctive semi-portable mahogany case.

Prices without tubes or batteries, Portable \$160; Console \$180; Tudor Cabinet (for housing the portable) \$68.

The Operadio idea was conceived sixteen years ago when J. M. Stone built the first successful self-contained radio receiving set, using a kite to carry the aerial wire aloft. The accompanying sketch was made from a photograph taken in 1909.



## The Operadio Idea Makes Radio Completely Enjoyable

Only with the Operadio is the very finest quality radio reception possible whenever and wherever you want it.

Offering everything that any set can bring, and much that no other can duplicate, it is your logical choice of radio for your home.

The Operadio is entirely self-contained. It requires no outside wires, no separate loudspeaker, no bothersome wet batteries. For the past two years it has been the talk of the entire world. Today you will find it in thousands and thousands of American homes.

Close it up, carry it to any part of house, or take it with you anywhere.

Open it, and in a moment you can be listening in on stations hundreds and even thousands of miles distant. Perfect fidelity of tone—clear, distinct, undistorted! Amazingly simple tuning to bring in one station after another.

For those who desire it, a beautiful dark walnut cabinet is available for housing the set in the home—combining the attractiveness of a furniture model with the convenience of absolute portability.

Do not make the mistake of buying a radio set until you have seen and heard the Operadio. Ask your dealer to demonstrate it in your home in comparison with any other high-grade set.

THE OPERADIO CORPORATION  
8 So. Dearborn St. Chicago, Illinois

# OPERADIO

The Original Self-Contained Radio

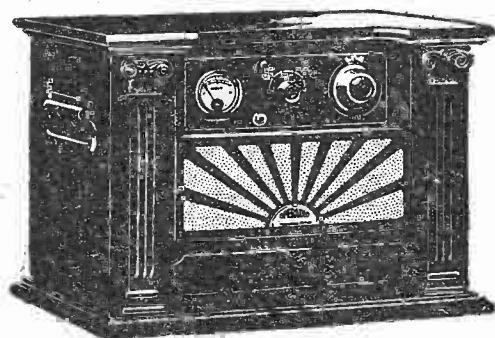
### The Beautiful New Console Makes its First Appearance at the Radio World's Fair Operadio Convenience in a Cabinet of Classic Beauty

Those who want Operadio advantages in a compact set for home and apartment use only, will welcome the beautiful new Console.

The exquisite mahogany case—like all Operadios—contains the complete instrument. It may be readily carried to any

room of the house—and is instantly available for use as no outside wires or connections of any sort are used.

The special loop supplied with the Console may be used either concealed within the cabinet or exposed, plugged into the eyelet in the top when extremely directional effects are desired.



DON'T FAIL TO VISIT THE OPERADIO DISPLAY AT THE RADIO WORLD'S FAIR

This is the first of a series of twenty-five similar advertisements that will appear this Fall in leading New York newspapers

SPECIAL RADIO SHOW NUMBER—28 PAGES

# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

COPYRIGHT, 1925, NEW YORK TRIBUNE INC.

SECTION SIX

SUNDAY, SEPTEMBER 13, 1925

28 PAGES

## The Brownlees Get Into a Radio Mix-Up

Husband and Wife and Two Friends Disagree on What They Want to Hear, but Finally Admit Their Preference

By ELLIS PARKER BUTLER



"Edcard! Edward Brownlee, let go of this dial!" exclaimed Mrs. Brownlee, tugging at it.

ONE EVENING when Mr. Murchison had seated himself in the smoking car, en route from New York to his home in Westcote, his radio-enthusiastic neighbor, Brownlee, came and sat beside him.

"Hello, Murchison," Mr. Brownlee said. "How is your radio working these days?"

"Brownlee," said Murchison, frowning, "I wish you would not talk about radio to me. It annoys me, Brownlee. But if you must know, Brownlee, my radio is not working at all these days. You know very well, Brownlee, that the last time you were in my house you tried some silly stunt and wired Mrs. Bimberry's ankle to the radiator, and my wife has not spoken to me since. I have not been near my radio, Brownlee, since that night. In my opinion, Brownlee, radio has caused enough trouble in my family."

Mr. Brownlee, who remembered the night of Mr. Murchison's radio party quite well, blushed, but he was a genuinely enthusiastic radio lover and after a moment he said:

"If you will pardon me for saying so, Murchison, that trouble was not the fault of the radio. Radio never causes trouble. Radio brings peace and happiness into the home."

"You mean," said Mr. Murchison,

"that my wife allowed herself to—ah—to become irritated?"

"That is exactly what I mean," said Brownlee frankly. "And I say so because nothing of that sort ever happens in my home. Night after night my wife and I sit before our loud speaker, often holding hands as we did when we were young lovers, and listen to the soothing strains of sweet music as they come to us through the air. Even if I have been irritated by business cares and my wife has come home a little cross from some quarrel at her club, the music soothes and delights us, and we are more loving and amiable than ever before. I do hate to think that you have given up radio, Murchison! I wish you could see how it warms and softens the hearts of my dear Sophia and myself—how we sit there evening after evening!"

He stopped short and slapped Mr. Murchison on the knee.

### A Glove Bout on the Air

"Say!" he exclaimed enthusiastically, "you've got to come over this evening! It is going to be a great evening! Do you know what WPX is broadcasting tonight? Why, man, WPX is broadcasting the Benk-Coogan prizefight right from the ringside!"

"You don't say!" exclaimed Mr. Murchison. "By George, that ought to be great! What time?"

The result of this conversation was that shortly after dinner Mr. Murchison coughed gently and told his wife he believed he would run over to Brownlee's for an hour or so if she did not mind.

"I would far rather you went there than that you brought him here," said

Mrs. Murchison coldly, and Mr. Murchison put on his coat and hat and went over to Brownlee's. When the maid ushered him into the library, where Brownlee's radio was installed, no one was there.

"Mr. Brownlee said, sir," the maid told him, "that I should tell you he had just gone out for some cigars, but he will be back soon. Mrs. Brownlee is not home; she went out auto-riding with Mrs. Bimberry and stopped there for dinner."

Brownlee returned almost immediately. He handed Mr. Murchison one of the cigars and told him to light-up, and lit a cigar himself.

"I'm sorry my wife is not home, Murchison," he said. "This prizefight is going to be great, but what I really wanted was for you to see how two reasonable people can get pleasure out of the radio, even if they are man and wife. Hello! Look at the time; the fight ought to be beginning."

Mr. Murchison dropped into a chair and Brownlee, with the deft fingers of an expert, manipulated the dials. When he had keyed in at 360 meters the voice of WPX's announcer came from the loud speaker with admirable distinctness:

"This is WPX, broadcasting the Benk-

(Continued on page twenty-five)

### This Is Radio Week in New York City

This issue of the New York Herald Tribune Radio Magazine contains two full-page feature articles describing New York City's two radio shows and also much other valuable information relative to the two expositions, including pictures of some of the new apparatus on display this week.



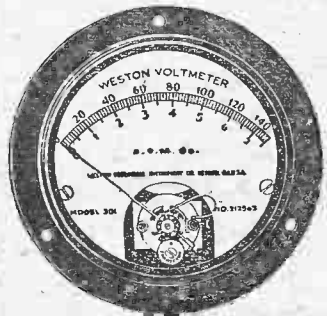




## WESTON DOUBLE RANGE VOLTMETERS

MODEL No. 301, 0-7½-AND 0-150 VOLTS

IN ORDER to get the most in tone, volume and distance out of your set you should always know the true condition of your A and B Batteries and at what voltage your tubes are operating.



LIST PRICE \$10.00 EACH

OUR PRICE  
\$4.75 EA.

EXTRA SPECIAL PRICE \$4.75 EA.  
AMERICAN SALES CO., 21 WARREN ST., N. Y. C.

This you can know by using one of these beautiful WESTON METERS, which are complete with external resistor and are manufactured by the well known WESTON ELECTRICAL INSTRUMENT CO. OF NEWARK, N. J.

They are constructed on the world famous WESTON permanent magnet pivoted movable coil principle.

These instruments are designed to be mounted on the panel of the Receiving Set and are of the Flush type in order that they may not protrude in front and yet add to the appearance of the set.

If a Multi-point switch is employed the Voltmeter may be connected at will across A or B Batteries or tubes, depending upon the number of points on the switch.

Every meter is brand new and guaranteed. Packed in original cartons.

## Improved Appearance Marks New Models of Radio Sets

Decorative Equipment Removes Scientific Air of the Instruments; New Speakers and Battery Eliminators on Hand

A PRELIMINARY examination of the new 1926 radio receivers on exhibit at the radio shows this week reveals the fact that the sets in their fundamental electrical aspect have suffered little change, while in external appearance and mechanical equipment they have undergone noteworthy improvement.

The very first thing that strikes the observer is the evident refinement that has been made in the set housings. Whereas heretofore the dominating note in cabinets has been simplicity of both material and outline, now it is concerned with decoration and embellishment.

Even the modestly priced sets have shed their straight-sawed, barren boxes and now boast prettily fitted scroll work, duo-colored inlays and glass-like piano finishes. The designers have exercised commendable restraint in welding their pencils, and almost without exception the products of the wood-working departments of the radio factories are tasteful and conservative in design. The many women who have until now objected to "radios" because of their ugly and forbidding appearance will revel in choosing among sets that are fully as decorative as any expensive room furnishing.

Of course there still remain many low-priced receivers which retain plain boxes. No attempt has been made to improve on these because their appeal mainly is their cheapness. On the other hand, manufacturers seem to realize that radio is appealing more and more to people of means, and they are now furnishing their receiving units in cabinets of unprecedented beauty and magnificence. Period models, until recently attempted only by a few companies hopeful of attracting an occasional rich customer, are now evident in profusion and variety, and in prices varying as high as \$2,000.

Improved Mechanical Arrangement. The receivers themselves show the result of careful mechanical arrangement and construction, particularly in the matter of dials, condensers and general simplification of control. Where round dials have been retained they are more graceful and easier to handle than before; in a great many sets they have been replaced altogether by small knob-operated pointers traveling over fancy scales or by knob-actuated rotary scales, only small sectors of which are visible for observation through neat little glass windows. On many of the scales space is provided for the records of various station adjustments, which can thus be duplicated instantly without reference to an external log sheet.

Some of the very newest scales are drum-like in shape, and revolve parallel to the horizontal plane of the panel. These, too, allow permanent record of station setting. Still another style makes use of a narrow rectangular scale attached to the panel in an upright position, with a pointer traveling up and down in a small slit through its center. In all cases the devices are highly pleasing in appearance, many being gold-plated.

An outstanding technical accomplishment has been the development of straight line frequency condensers, which permit more convenient and comfortable tuning than the old types. These have been adopted to sets of many kinds.

### Uni-Control Sets

The simplification of control in the reduction of the number of tuning dials from three to two and even one will earn many expressions of approval. A number of the popular models of tuned radio-frequency receivers have been affected in this respect, while the super-heterodyne in particular, formerly the most complicated and imposing of all sets, has been successfully compressed into practical single knob operation. Elimination of one or two controls of a total of three is in some affairs optional, engaging and disengaging coupling mechanisms being provided for the convenience of the set owner. The loud speaker as an individual

item has probably received more improvement than any other. Almost every large and important manufacturer is now marketing a cone speaker, this type having demonstrated perfect acoustical properties. The old irritations of rattling and "sand blasting" have been obviated in the new instruments, which are capable of reproducing without the slightest distortion orchestra music as loud as the original playing. Even musicians who have heretofore condemned radio music as aesthetically impossible now freely admit that radio sets deserve unqualified classification among "musical instruments."

The cones will win favor also from a mechanical standpoint, as they are short and shallow and available in varieties of colors.

Significant achievements have been made in the application of house current to the filaments and plates of the receiving tubes. Although batteries will continue to be used for a long time, already a number of completely current-operated receivers have been put on view. They work quietly and efficiently, and display none of the hoarse, humming noises that have characterized many experimental affairs of similar construction. These power outfits are more or less limited to circuits employing five tubes or more, and considering the convenience they afford, are well worth the prices asked for them.

### B Battery Eliminators

There are external B eliminators without number, their manufacture having been greatly encouraged by the recent appearance of suitable rectifier bulbs. In general they are highly satisfactory and betray no hint of humming or other disturbance. Chemical eliminators in a number of forms have been in use for some time, and continue to find favor. Many of the eliminator units are obtainable in knock-down form for home assembly.

One interesting type of instrument consists of a house current operated power amplifier connected to a cone loud speaker. The combination, available in two models, one extremely powerful, the other moderately so, is designed for attachment to any radio receiving set using at least a single stage of amplification, and when so employed provides loud and unblemished reproduction. The device does not remove the necessity for A and B batteries in the external receiver, but it does end the problem for the audio-amplifying system.

The complete A and B battery eliminator, capable of external connection to any existing set, does not seem to be completely developed. There is at least one such device being advertised, but few radio people have seen one in operation. Providing it does not require a re-wiring of the set, it should prove highly popular if it works at all.

In general the trend in radio seems to be toward the complete factory-built receiver housed in an attractive cabinet and furnished with a good loud speaker. Selectivity and quality are the most desirable features, the inordinate craze for extreme distance regardless of quality apparently having died away. The home set builder by no means has gone out of existence, for radio holds just as much of a fascination for him as it ever did; but the broadcasting itself has become so popular in the average household that even the most enthusiastic fan keeps a complete receiver available for general family service independent of his own precious collection of junk in his bedroom. Many of the people who buy commercial sets become bitten by the radio bug later and start experimenting with all the coils and condensers incidental to the pastime, while many erstwhile experimenters reverse the procedure and purchase ready-made sets. The continual change keeps interest in both experimenting and in complete receivers high.

### Negro Program

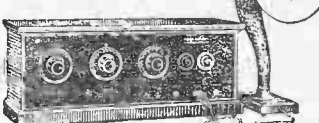
A number of leading colored musicians will be heard on the air at 9:30 Tuesday evening, September 15, when a special program given entirely by Negro artists, will be radioed from WGBS under the direction of the "Amsterdam News," leading colored daily.

## LASTING SERVICE

with the  
Siromberg-Carlson

\$180

Less Accessories



A RADIO SET THAT STANDS UP UNDER ALL CONDITIONS, GIVING YEAR IN AND YEAR OUT SERVICE OF CONSTANT SATISFACTION.

SPECIALS  
RADIOLA SUPER HETERODYNE \$146 COMPLETE WITH HERALD SPEAKER  
ATWATER KENT MODEL 20 \$115 COMPLETE  
FADA New 5-Tube Heterodyne \$122.50 COMPLETE  
DE FOREST MODEL 917 \$149 COMPLETE

TERMS \$3 PER WEEK

TREMONT Radiophone Co.

541 E. TREMONT AVE.  
Phone Tremont 6037  
Test and Largest radio store in Bronx  
MAIL ORDERS PROMPTLY FILLED

## PYRATEK

TRADE MARK  
FIXED Crystal Rectifier  
FOR REFLEX & CRYSTAL CIRCUITS

Preferred By Those Who Know!

Ask your dealer.

The Erisman Laboratories  
3785 Broadway, New York

## AEROVOX

CONDENSERS  
MADE IN ALL CAPACITIES

AEROVOX For Accuracy

AEROVOX For Quality

AEROVOX For Results

Also ask for the new Rheostat

Aerovox Wireless Corporation  
493 Broome St., Dept. H,  
New York City

## CARTER

(Pat. Pend.) "IMP" Rheostat

The smallest rheostat made—less space required than any other. New exclusive Carter designed contact gives constant pressure—smooth, noiseless action. One hole mounting. See one at your dealer today.

(Half Size) 6 ohm or 25 ohm \$1

Carter Radio Co.  
1270 Broadway, New York

## PERFECTION

130 Liberty St., One Block South of Courtlandt St., 59 Courtlandt St. in Elliott's Drug Store

We carry a full line of Standard Merchandise.

Authorized Dealer for Freshman Masterpiece Music Master Erla

Speakers and Sets

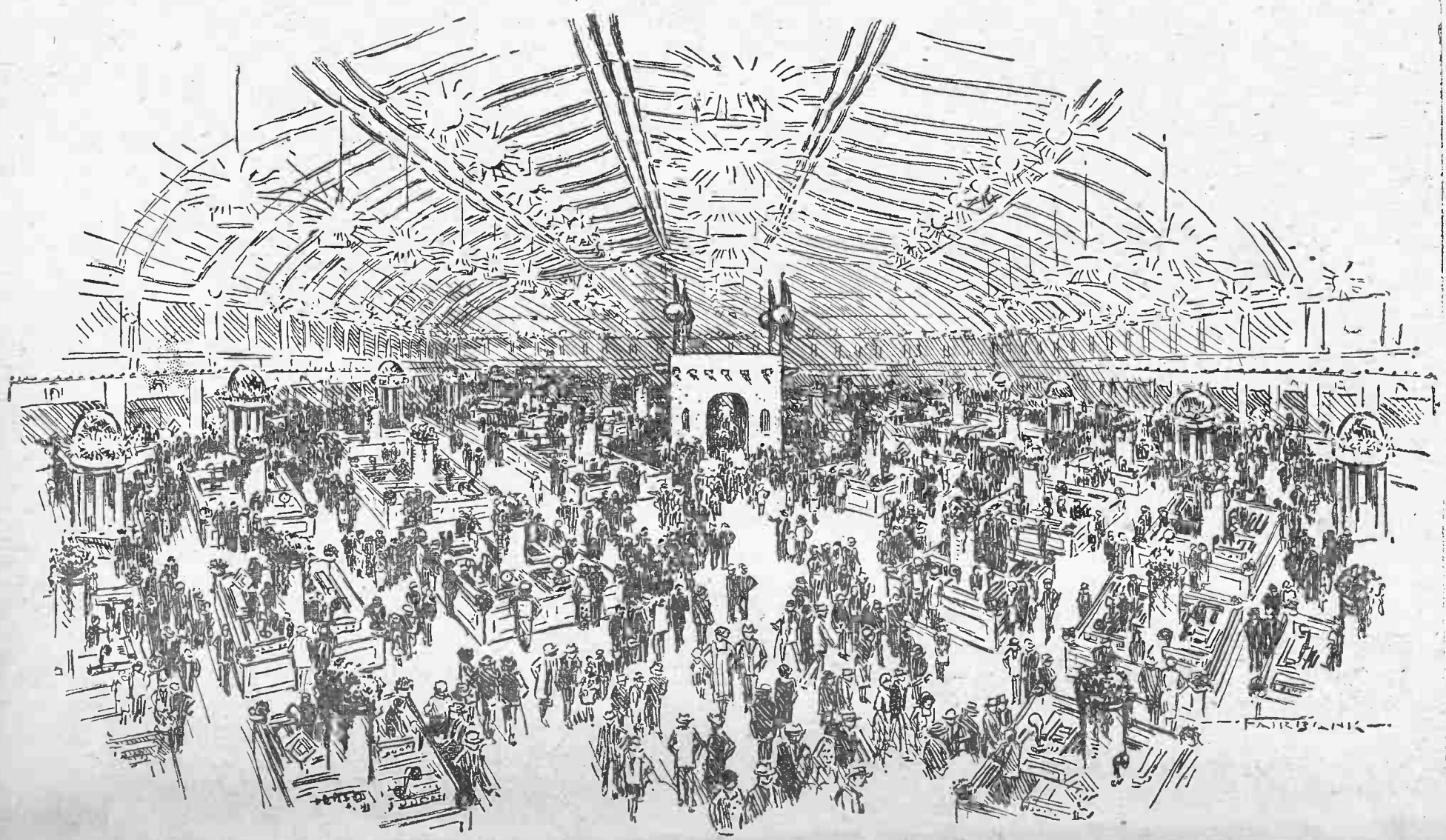
Repaired, Adjusted & Exchanged. We carry in stock one of the largest lines of Radio in New York.

INDEPENDENT RADIO & ELECTRIC COMPANY  
"Where Service Is Paramount"  
65 West 18th Street.

# The Second Annual Radio World's Fair Opens Tomorrow Afternoon

The World's Largest Hall, the 258th Field Artillery Armory, to House the Year's Exhibit

BY ERIC H. PALMER



An interior view of the 258th Field Artillery Armory where the Second Radio World's Fair is to be held

A MID a setting that in magnitude and splendor will prove a revelation to the visitors who will be received in this, the Radio World's Fair will open to-morrow evening at 7 o'clock in the 258th Field Artillery Armory Kingsbridge Road and Jerome Avenue, in the Bronx—in the center of a thickly populated district of the metropolis and within easy access of the entire metropolitan zone.

Here we find the largest hall on earth, a fact that within itself is a testimonial to the strides made by America's new billion-dollar-a-year industry, Radio. The armory is five times the size of Madison Square Garden, which last year proved much too small to accommodate the first Radio World's Fair, requiring the rental also of the 69th Regiment Armory. Every inch of the vast auditorium, 600 feet long, 300 feet wide, and with the ceiling 195 feet from the floor, will be utilized for displays of extraordinary interest to the veteran wireless engineer, and particularly to that enormous and enthusiastic army known as the radio fans of America. New devotees of broadcasting will be amazed at the exhibition. There will be 300 separate showings and demonstrations of everything that is new and much that is historic in the field of radio.

Before the doors are opened at least \$250,000 will have been spent by the trade and the management in the exhibits, decorations and administrative expenses.

Manufacturers will present for the first time their new lines of receivers, in booths that are masterpieces of decorative skill, many exceeding in sheer beauty the famous attractions of the Paris Exposition. Multi-colored lights will play upon hundreds of sets that will evoke the enthusiastic plaudits of women as well as the admiration of men, for this year the cabinets will be distinctive and appealing, ornaments to the home to grace the living-rooms and not be hidden in garrets, as were the first nondescript receivers.

Overhead will hang a silken canopy, costing \$40,000, with several thousand bulbs glimmering amid the folds.

Governor Alfred E. Smith will declare the fair officially open, before an audience that may reach 50,000, within the building,

and probably 2,000,000 listening in as the proceedings are broadcast.

The preliminary concert and the addresses will be broadcast by WAHG, one of the stations broadcasting from the fair, in rotation, and the entertainment for the faraway fans will be maintained until 11 o'clock, the closing hour.

On behalf of the Radio World's Fair, and also representing the radio public, Governor Smith will present trophies to a number of notables. The full program is a secret, but this much is known: First of all, he is to greet and honor "Miss Radio—1925-'26," winner of the competition conducted by the World's Fair to determine the most interested, enthusiastic and successful feminine fan, in recognition of the special concern that women now entertain in the development of radio.

"Miss Radio"—the Diana of DX—verily the goddess of the exposition—is petite Rena Jane Frew, of Beaver, Pa., twenty years of age, a wireless operator since she was sixteen and the heartiest of enthusiasts for broadcasting.

Miss Frew will address the visible and invisible audience. During the week she will be the guest of the exposition and radio clubs, to be entertained at teas and theater parties.

Governor Smith was also to have tendered the trophy emblematic of championship, announcing honors to Graham McNamee, winner of the national popularity contest, amid the plaudits of his colleagues from many stations, but the ceremony was postponed until Saturday night, as one of the principal closing features, Mr. McNamee is recovering from a recent operation.

Another famous figure in radio, whose voice is familiar to millions, Major J. Andrew White, announcer of the leading sporting events and pioneer in radio, then will be presented and given a loving cup as a testimonial from 50,000 or more admirers.

Probably Bernays Johnson, radio engineer and inventor, who has just returned from a tour through Europe, may make known some of the wonders he will display at the show.

Indeed, Mr. Johnson will be a central figure throughout the week, for he predicts

that his newest devices will revolutionize housekeeping—that we are entering the radio age in the conduct of industry likewise.

His first exhibition will be that of a radio lamp.

This is explained in this wise by the inventor:

"A whole house may be illuminated from a special radio transmitter. There will be no wiring at all. Every light in the house, even large lamps bearing five bulbs, may be carried from floor to floor. People will be able to carry electric lights as they used to carry candles. As they move the radio beam will maintain a strong light.

"What I needed for this new invention was a salt which would do away with the ultra-violet ray. This salt I found while in Calais."

After viewing the wonderful display of receiving apparatus all visitors undoubtedly will want to meet the famous stars of radio, stage, screen, the arts and the sciences, who will gather in the reception parlors and studios maintained by the broadcasting stations. Thanks to the immense size of the auditorium, each station will have its own "home."

### The Crystal Studio

In the middle of the armory will be the crystal studio, the largest broadcasting room ever built at an exposition, through whose glass sides the public may see the actual broadcasting of music and song and hear it from the amplifiers on the sides of the hall.

From the engineering standpoint the feature broadcasting by so many stations from the Radio World's Fair has set a standard. Several thousand dollars were spent in the connections and telephone wire equipment which made the tie-up possible. The services of a hundred men are required to handle the broadcasting. Twenty well known metropolitan announcers will be on hand. Major White will be general director.

Stations co-operating and sending out star programs are as follows: WEAF, WOR, WAHG, WBOQ, WMCA, WJLN, WRNY, WOKO, WGBS, WEBJ and WNYC.

It is anticipated that some programs will be relayed to a chain of stations,

about which announcements will be made during the week.

Stations in the Middle West are to dedicate programs to the Radio World's Fair and will be picked up at the armory.

In recognition of the foreign exhibits consuls from twenty countries will participate in the exposition. There will be greetings also from a hundred notables in the field of diplomacy, politics and industry.

During the week conferences will be held by manufacturers, dealers and jobbers and other allied trade interests in the forum that will be a feature of the show.

These will be conducted from 11 a. m. to 1 p. m. The public will be admitted from 1 to 11 p. m.

It is estimated that not less than 50,000 school children will attend from New Jersey and Connecticut as well as from New York City.

### Amateur Contests

Special contests for amateur set builders for valuable prizes will take place each afternoon. Jack Hartley, the Brooklyn boy who captured the honors last year, will be on hand to aid in instruction. And, no matter how far one may be from the spot, these contests can be viewed while walking through the hall, as there are no pillars or posts in the armory.

Months have been spent by the management in the organization and perfection of the exhibition.

As managing director is U. J. Herrmann, who has the backing of the Radio Manufacturers' Association in the annual Radio World's Fair and the Chicago Radio Exposition.

"This has placed a great responsibility upon us," said Mr. Herrmann last evening at the fair headquarters in the Hotel Commodore, "but I am quite sure the public will approve all that has been done to make this the finest radio show ever held."

The general manager is Mr. Herrmann's partner, Clay Irwin, who has been "the busiest man in radio" the last few weeks, having charge of a thousand details about which the public may not be aware in the conduct of a large enterprise. Aiding Messrs. Herrmann and Irwin is

(Continued on page eight)

will always save if you buy at

## YOU VALEY

RADIO  
55 VESEY ST.

Anything in Radio and Always the Best  
Washington Heights Headquarters

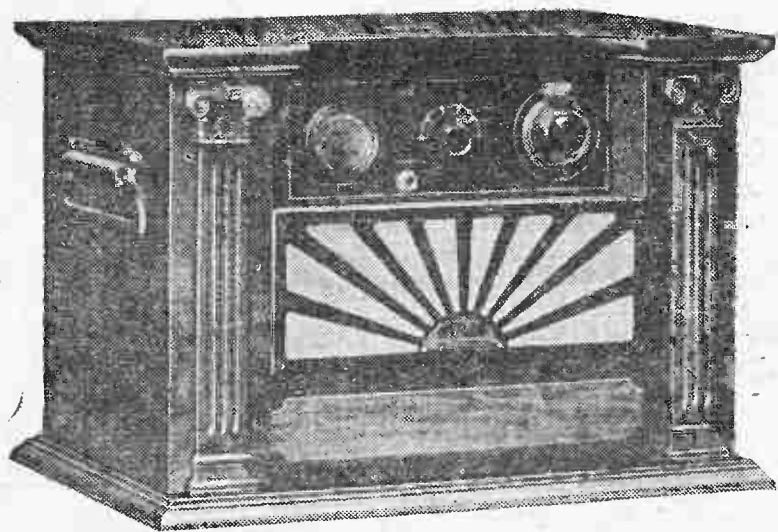
De Forest—Music Master  
Freud-Eismann—Kellogg  
Farrand Godley Speakers  
Time Payments Arranged

For your convenience and  
100% radio satisfaction  
YEARLY SERVICE PLAN  
BATTERY SERVICE

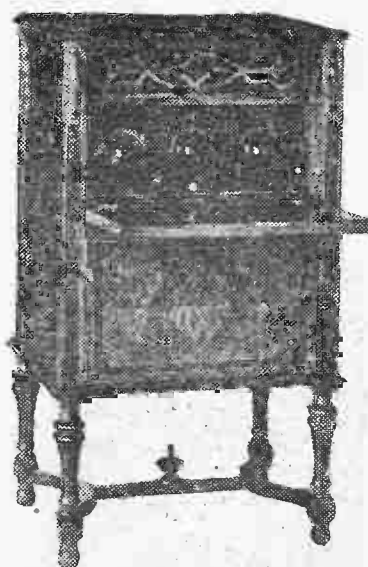
SERVICE  
**BACH RADIO CO.**  
SATISFACTION  
601 West 145th St.  
Phone Building. Tel. Bradhurst 4182



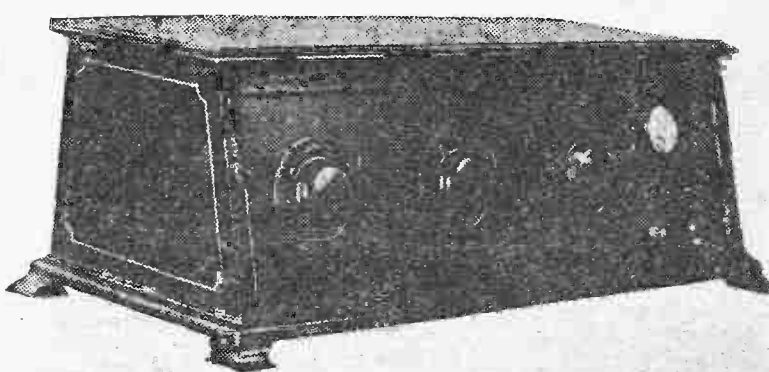
# Radio Apparatus and Receivers on Display



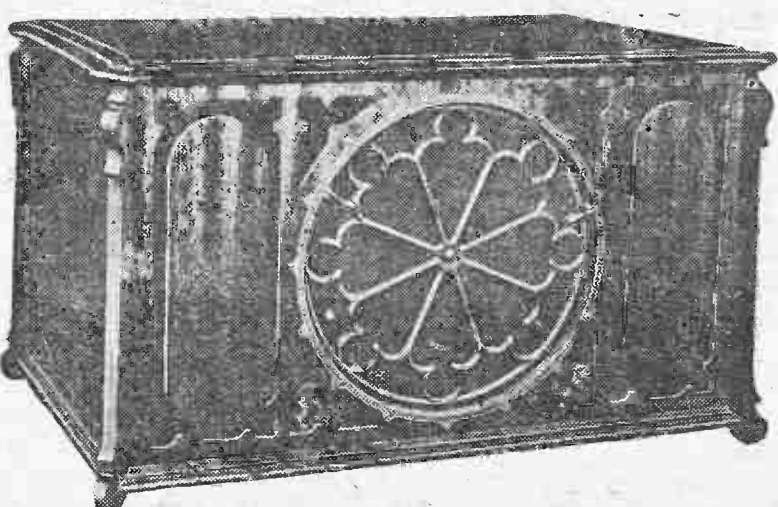
This year the Operadio Corporation will introduce a new type of portable receiver which is primarily designed for use in the home. The receiver operates from a loop antenna with six tubes. The batteries, loop and loud speaker are fitted into a finished cabinet, thus making the set easy to move from place to place.



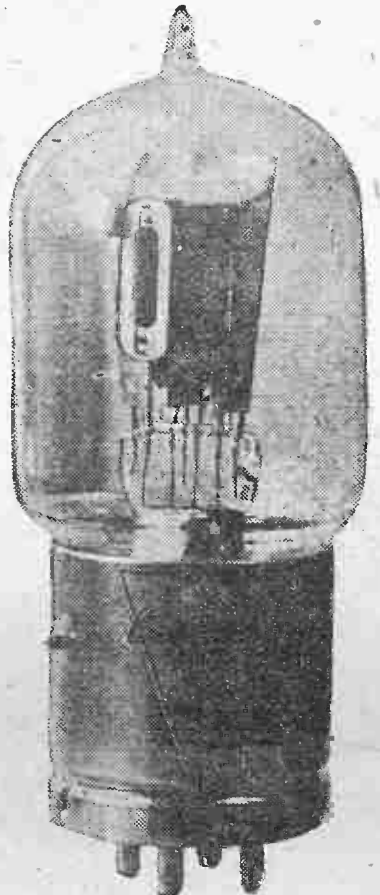
The Electrical Research Laboratories (Erla), of Chicago, is to exhibit the new Deluxe Console sole model receiver.



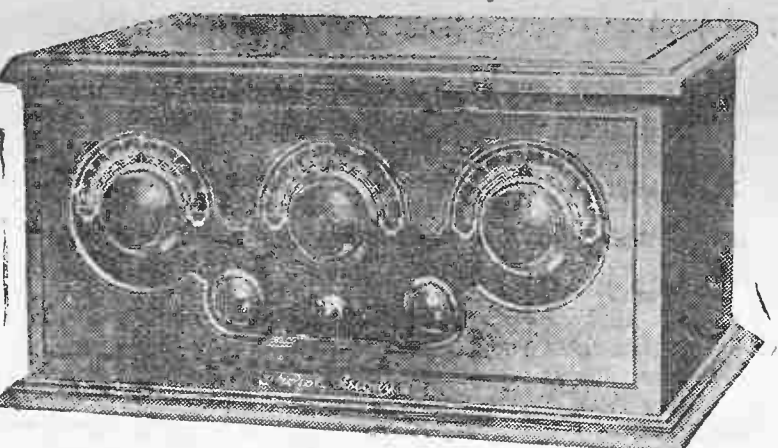
The Garod Corporation, Newark, N. J., will continue to manufacture their V and Georgian models at the request of the public and their distributors. Above is shown the Garod V five-tube neodyne receiver, for which beauty, selectivity, control of volume and clear reproduction are claimed.



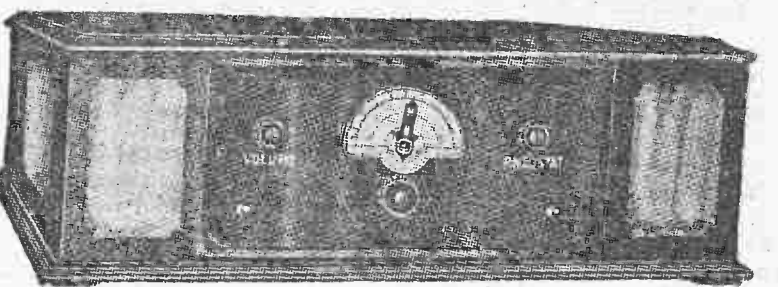
The new model L-3 Ultradyne receiver, which is manufactured by the Phenix Radio Corporation, stands forth as a set possessing much individuality in design. It has no dials, but rather two small levers, which run parallel to the periphery of the grill. The set employs six tubes in a radio frequency circuit and is very easy to tune.



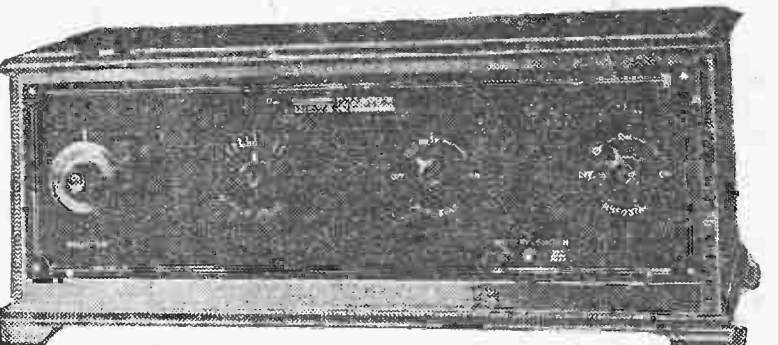
One of the problems radio tube manufacturers have tried to solve is shrinkage in transportation, due to dislodged elements. The Schickling Products Corporation has designed a tube eliminating shrinkage. A model six feet in height will be on exhibition this week.



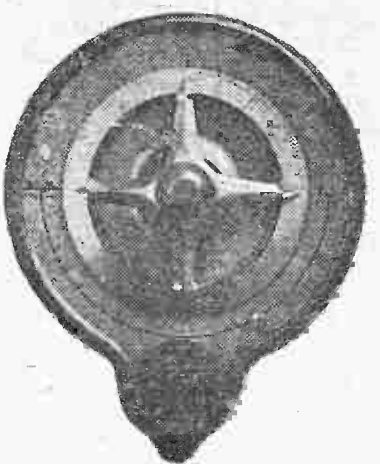
A new feature in the radio industry is the introduction of thorola coils adapted for radio reception. A set employing the use of these coils will be exhibited by the Reichmann Company of Chicago. It is enclosed in a Cirassian walnut cabinet which gives a neat appearance.



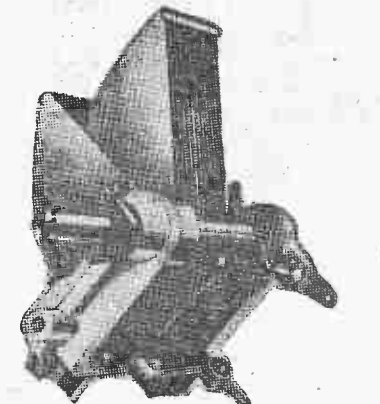
The model B Mu-Rad manufactured by the Mu-Rad Radio Corporation of Asbury Park, N. J., is a one control five-tube receiver. It is claimed that this set gives clear life-like reception with volume sufficient for all purposes. The set is supplied in several different styles of cabinets by the manufacturer.



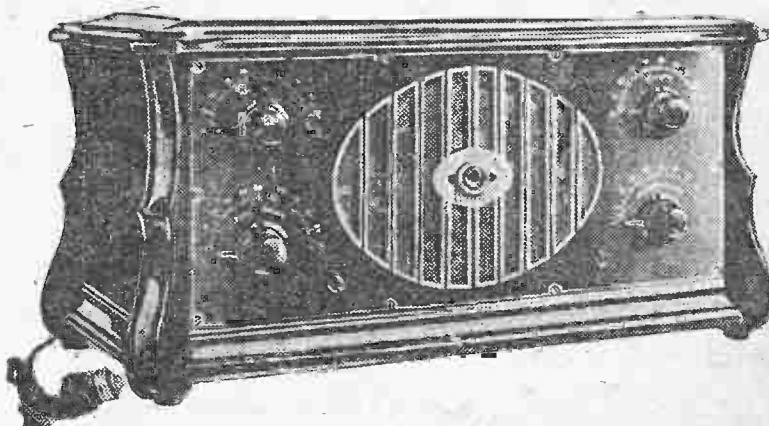
A new receiver employing an entirely new method of tuning the radio-frequency stages is to be exhibited by the Kellogg Switchboard and Supply Company of Chicago. The receiver is tuned with a variometer arrangement instead of variable condensers, thereby giving only two tuning controls.



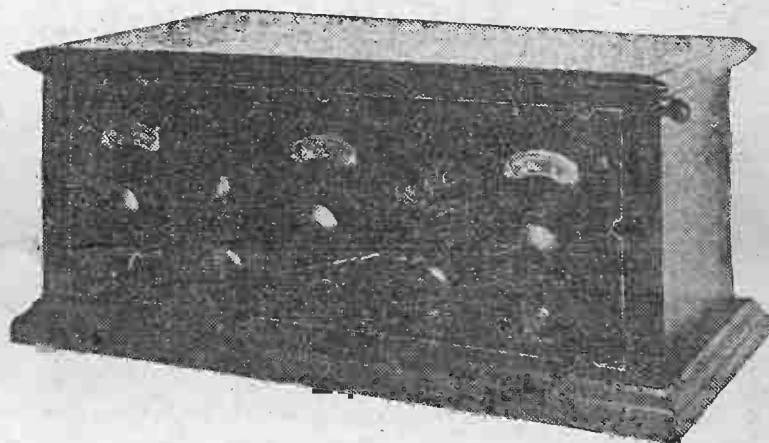
The Patent Electric Company are introducing to the radio public the Microvern, a new type of vernier



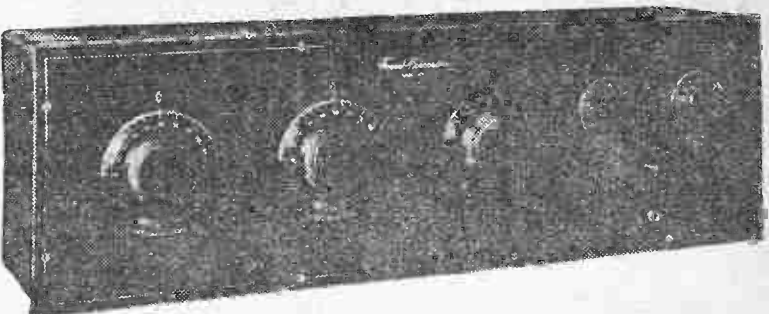
A new design of straight-line frequency variable condenser made by the Hammerlund Manufacturing Company



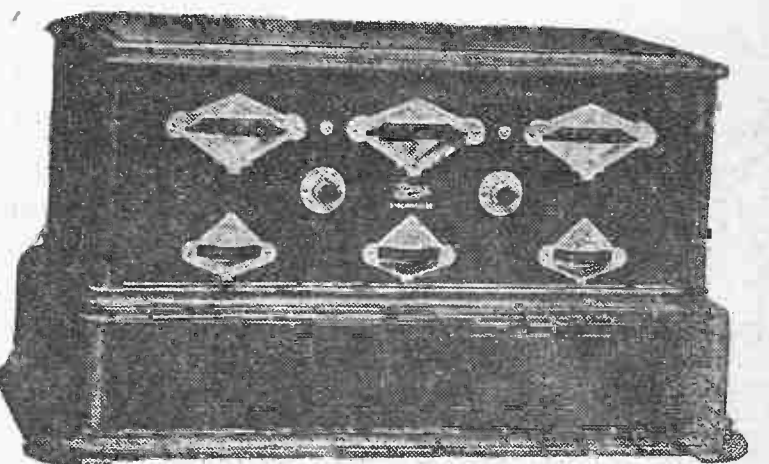
The new "Batteryless" radio receiver which was recently announced by the Messner Radio Corporation is to be exhibited at the show this week. The set operates directly from the house current socket and consumes but eight watts, which makes the approximate operating cost a tenth of a cent an hour.



At this year's radio show the Eagle Radio Company will present their new Model F neodyne. On the panel of this set there is a selectivity control, a volume control and a clarity control in addition to the three tuning controls. The radio-frequency transformers on the set have been improved to make possible better results on short wave lengths.



This radio receiver is to be known as the NR-7. It is the newest model to be manufactured by the Freed-Eismann Radio Corporation and employs several new features. Six tubes are used with a novel method of audio frequency amplification which provides flawless tone quality.



Externally the Grebe 1926 Synchrophase is the same as last year's model; however, the new set embodies many new features. The receiver is equipped with an automatic wave length range extension circuit which provides a tuning range of 150 to 550 meters. In addition the "color-tone circuit" improves reproduction and the flexible unit control simplifies tuning.

## Brownlees Get Into a Mix-Up

(Continued from page one)

Coogan fight from the ringside, AKG side. "The contestants seem to be announcing," said the voice. "The huge auditorium is filled to its utmost capacity; I notice many of the notables of the sporting world present; Butcher Benk has just climbed into the ring—you can hear the cheering. He is bowing to his friends. The louder cheering you hear now is for Farmer Coogan—he has just entered the ring and has thrown off his bathrobe. Both men seem to be in prime condition. Benk is now leaning over the ropes to shake hands with Gus Tubbert, the promoter of the fight. Now Mr. Tubbert is shaking hands with Coogan. Benk's trainer has drawn him into a corner of the ring and is whispering in his ear."

"Edward!" said a voice from the doorway somewhat sharply, but Mr. Brownlee did not turn.

"Keep still, please, Sophia," said Mr. Brownlee pleasantly, "the fight is just beginning and we don't want to miss anything."

"Edward," said Mrs. Brownlee a little more sharply, "will you please pay me enough attention to notice who I have with me?"

"Sophia," said Mr. Brownlee, "I don't want to seem rude, but when you talk I can't hear what?"

At that moment a haughty voice from the hall said:

"I think I had better not stay, Sophia, dear. Evidently your husband is so deeply engaged that he cannot spare time to"

"Janel! What nonsense!" cried Mrs. Brownlee. "I invited you here to hear Dora Dovell read her poems and you shall not be disappointed! Edward, Mrs. Bimberry has come to hear Dora Dovell read her poems over the radio."

Mr. Brownlee turned and saw Westcote's society leader entering the library.

"Butcher Benk and Farmer Coogan have now stepped to their corners. This is WPX, broadcasting from the ringside. But Griffin, the sport writer of 'The Star,' will now describe the fight for you, round by round and blow for blow. I introduce Bud Griffin."

"How-do-you-do, Mrs. Griffin," said Brownlee and hastily corrected himself; "I mean Mrs. Bimberry. Just in time! The fight is just beginning."

It was, indeed.

"Fight!" exclaimed Mrs. Brownlee. "Do you think Mrs. Bimberry has come here to listen to a brutal, cruel prize fight, Edward Brownlee?"

"Sophia," said Mr. Brownlee, "I asked Murchison to come here and listen in this evening. If you think two red-blooded men are going to sit here and listen to a wishy-washy poetess read her silly poems!"

"Coogan and Benk shake hands," shouted the radio. "They go to their corners. The gong rings. Coogan jumps to the center of the ring. Benk comes forward crouching. Coogan swings with his right. The blow!"

"—as sweet as buds in April dew. Responsive flows from me to you, And gentle as a cooing dove. The echo murmurs 'This is love!'"

It was the honey-sweet voice of the peerless poetess, Dora Dovell, for Mrs. Brownlee had touched the dial and changed the wave length to 400, which was that of the admirable station KZKX from which the peerless poetess was broadcasting. A dark frown gathered on the brow of Mr. Brownlee; he put his hand over the hand of Sophia.

"Let go," he whispered tensely. "I'll not! I'll not!" whispered Mrs. Brownlee.

"Ah! dearer far than precious stones I love the song thy voice intones, And quickly to they arms I fly. When—"

Two Kinds of Fight

"Coogan biffs him in the eye," shouted Bud Griffin, as Mr. Brownlee twisted the wave length back to 360. "Benk uppercuts to the ear. Coogan feints with his left and drives his right to Benk's ribs. They clinch. They break!"

"To part! Ah, this is sad indeed. When closer union is our need, But still in peace my eyes I'll close. It!"

"Coogan reaches Butcher's nose," shouted Griffin from the ringside. "The Butcher replies with a short jab to the stomach. Coogan spars. Benk rushes!"

"Edward! Edward Brownlee, let go of this dial!" exclaimed Mrs. Brownlee, tugging at it.

"Everybody is becoming excited," declared Bud Griffin from the ring—

"I'll not let go! I own this radio, don't I?" demanded Mr. Brownlee. "What do you think this is?"

"This is Station KZKX," said the radio, "ABJ announcing. The next selection by Miss Dora Dovell, the soul poet, will be—"

"End of Round 1," declared Bud Griffin, broadcasting at 360-meter wave length from the ringside.

"I think it is a most shameful piece of behavior; that's what I think, Edward Brownlee," said Mrs. Brownlee. "If I cannot bring a friend to this house!"

"And what about my friend?" demanded Mr. Brownlee angrily. "I've no rights in my own house, I suppose. A nice piece of business if I invite a friend here and set the radio working and you can rush in and cut off what we want to hear and turn on a lot of mush—yes, mush! that's what I said. I said mush, Mrs. Brownlee. A lot of pifficated, poetic mush! It's getting so, nowadays, a man has no rights in his own home."

"Edward Brownlee! Stop right there! That's enough!"

"Round 2!" cried Bud Griffin. "Both scrappers still in good condition. As the gong rings—"

"The daisies and the violets Leap up to greet the spring."

"Slush!" cried Mr. Brownlee bitterly, twisting the dial. "Slush!"

"Edward Brownlee, I will not have you talking that way about Mrs. Bimberry's favorite poetess!" cried Mrs. Brownlee.

Murchison Has Enough

"I think, perhaps, I'll go now," said the meek Mr. Murchison.

"You'll do nothing of the kind," declared Brownlee, angrily. "You'll stay, and you'll hear what you came here to hear—a prizefight and mushy mush. It's about time I showed who is master in this house, once and for all. Sophia, take your hands off that dial! Do you hear me? Once! Twice! For the third and last time!"

"I'll not. I asked Mrs. Bimberry to come here!"

Mr. Murchison got out of his chair and moved delicately toward the door, like a cat walking on ice.

"I really think I'd better be going," he said, coughing his apologetic little cough. "I left my wife all alone—so many burglars about these days—letter to mail—expecting a telegram—really must be getting along."

In her easy chair the haughty Mrs. Bimberry sat with sternly compressed lips. She did not mean to desert her dear friend Sophia—a member of her own sex—who was doing battle for her. Mr. Murchison might run, but she did not mean to run. She cast a glance at Brownlee that let him know quite plainly what she thought of his behavior. Brownlee gave the dial knob one last vicious twist.

"Benk sends a jarring wallop to Coogan's chest," shouted WPX. "For the third and last time, Sophia, I ask you—will you take your hand from this dial?" Brownlee asked in a dangerously quiet voice. For answer Mrs. Brownlee twisted the dial knob.

"Say nay, my soul! Say nay, my heart! Say nay, and ever nay!"

Gives His Radio Away

"Very well, then!" said Brownlee, releasing his wife's hand. "Very well! You may have this radio. I give it to you. What I think of this behavior I shall not say, for I am a gentleman. I will leave you to listen to your mushy poetess, Sophia, and you need not wait up for me. I am going to the club, where a man has some rights. But this I will say, Sophia—never, although I live to be a thousand years old, will I listen to a poetess of the soul!"

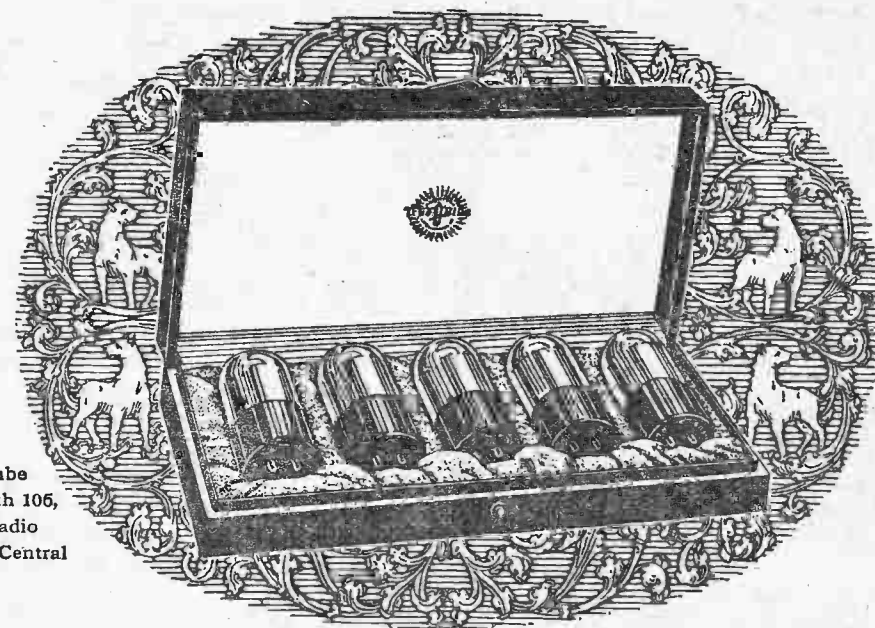
"Brownlee," he said, "I'm very sorry to have been the cause of this quarrel, because I would have much preferred to hear Dora Dovell. To tell you the truth, Brownlee, Dora Dovell is my favorite poet, and I am passionately—yes, passionately—fond of her poems."

"Great Scott!" exclaimed Brownlee. "If that's so why don't you go in the house again and hear her?"

But Murchison did not go in the house again, and it would not have done him any good if he had gone, for—as soon as the two men had closed the front door—Mrs. Bimberry had spoken to Mrs. Brownlee: "Let's listen to the prizefight; I'd much rather hear the prizefight, Sophia."

"So would I," said Mrs. Brownlee, truthfully.

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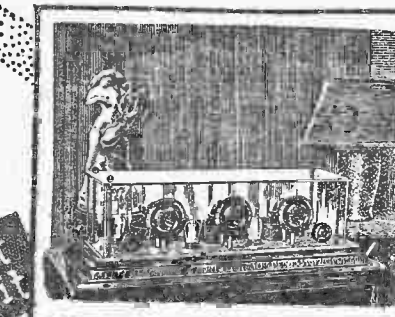
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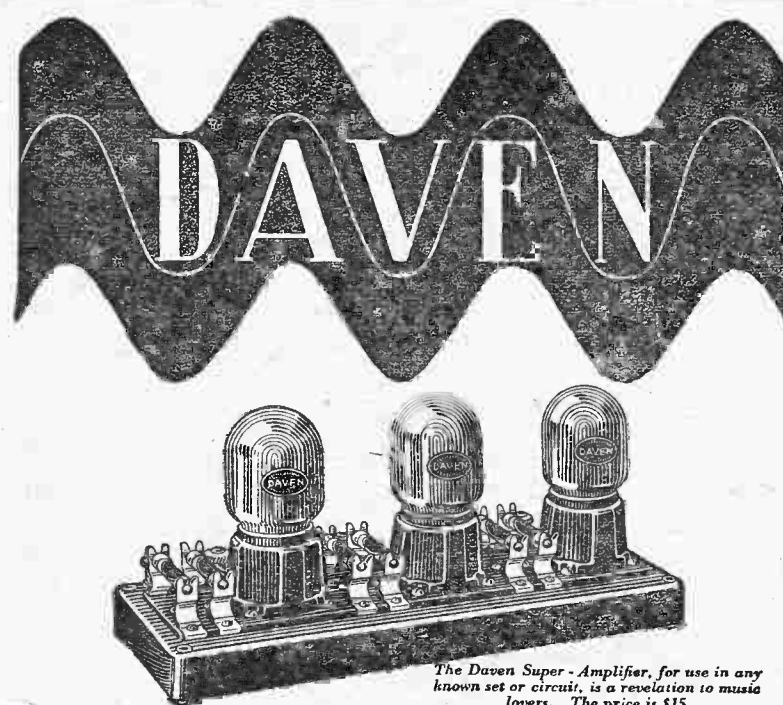
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and finished off with two-tone line cuttings. The grill in the center, which conceals the loud-speaker horn, is a statuary bronze color and is backed by a meshing of dull gold.

The new Ultradyne employs six vacuum tubes of the 6-volt 4-ampere type. The first three function as radio-frequency amplifiers, the fourth as detector and the last two as audio-frequency amplifiers. Automatic filament controls take the place of rheostats, and this has simplified the operation of the set a great deal.

The first two stages of radio-frequency amplification are tuned while the third stage is fixed. A special resistance system of stabilization is utilized which prevents these circuits from oscillating at resonance points.

The use of straight line-frequency condensers results in an even distribution of wave lengths over the entire scale readings. Furthermore, the lever system of control provides a vernier action of a new order.

### An All-Wood Loud Speaker

The Radio Cabinet Company, Indianapolis, Ind., has placed on exhibit at the National Radio Exposition a new type of loud speaker to be known as the all-wood orchestration de luxe radio loud speaker. This speaker, it is said, is the first and only loud speaker to be entirely made of wood and as a result it is claimed that remarkably clear reproduction is obtained.

### Molded Radio Parts

The Auburn Button Works, Inc., was founded in 1876 for the manufacture of buttons, which were molded from shellac composition. The raw materials of the company are now bakelite and celluloid in place of shellac compositions. The firm is now manufacturing parts for radio apparatus, such as tube sockets, bases, dials, knobs, binding posts, etc. These bakelite molded parts are usually black or brown, but they may be green, mahogany or mottled color. These parts are on exhibit this week.

### A Tube Exhibit

Radio fans interested particularly in tubes can learn all about what they look like inside, how each part is made and how the whole thing is put together in order to produce the finished product at the radio exposition.

The Gold Seal Products Company has set up an entire tube manufacturing plant where every step in the process of making tubes will be carried on in view of the visitors to the exposition.

### A Battery Chargers

The 1926 models of the Apco Manufacturing Company's radio apparatus include several items which should be of interest to the radio enthusiast. The new type Apco A battery charger, which is now on exhibit, is attractively housed in a black-enamelled metal case. This case is designed to enable the user to observe the action of the contact pins and, if necessary, to adjust the vibrating unit without removing the cover. The charger employs an automatic kickoff, is self-polarizing, and also provides the battery with a tapered charge.

In addition to the A battery charger a B battery charger also is manufactured by this company. This is an independent unit, which uses the same principle of charging as does the A battery unit. Its charging rate is from 1-10 to 1-14 of an ampere, and it will fully charge a 100-volt B battery in ten hours. Another item featured in the Apco line is the B battery eliminator, which employs two ordinary vacuum tubes and supplies the plate potential direct from the alternating-current house line.

### Sockets for New Tubes

This fall the tube makers are bringing forth tubes of somewhat changed design, in that the contact prongs are longer. The "sidewipe" type of socket is therefore in order, and to meet this demand a new line of Radion sockets is appearing. These new sockets are made in four styles to accommodate both old and new tubes as well as to meet the situations arising from the change from old to new.

### Thermodyne Booth

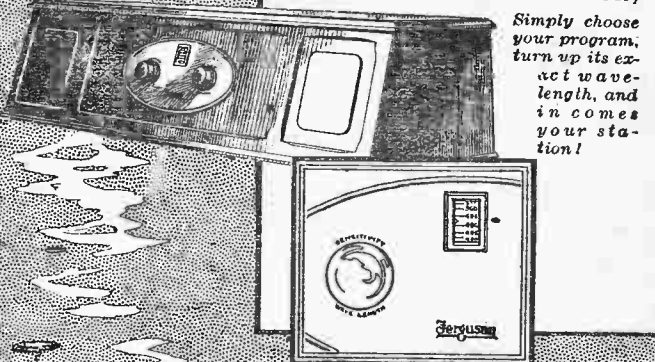
One of the very attractive display booths at the Grand Central Palace is built around the beautiful old legend of Aladdin and his wonderful lamp. The setting reproduces a desert scene with sand wastes in the foreground and palm trees and setting sun in the background. Aladdin and his everfaithful Genii are effectively grouped with the latest models of Thermodyne sets. The spirit of the desert has been faithfully reproduced in this interesting exhibit.

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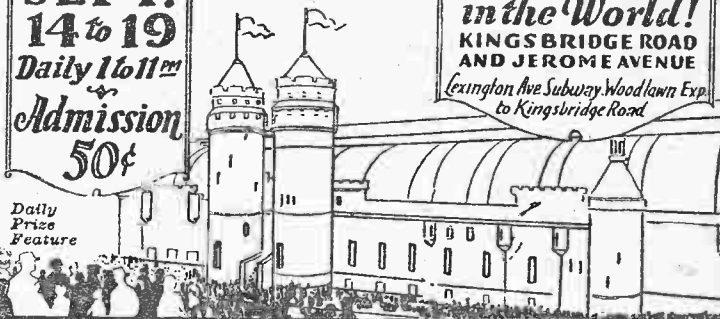
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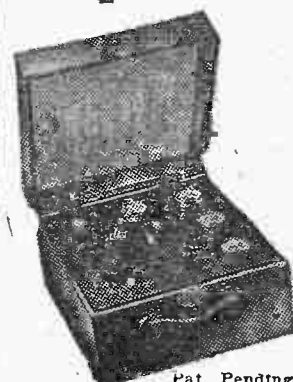
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## Superadio Dynometer

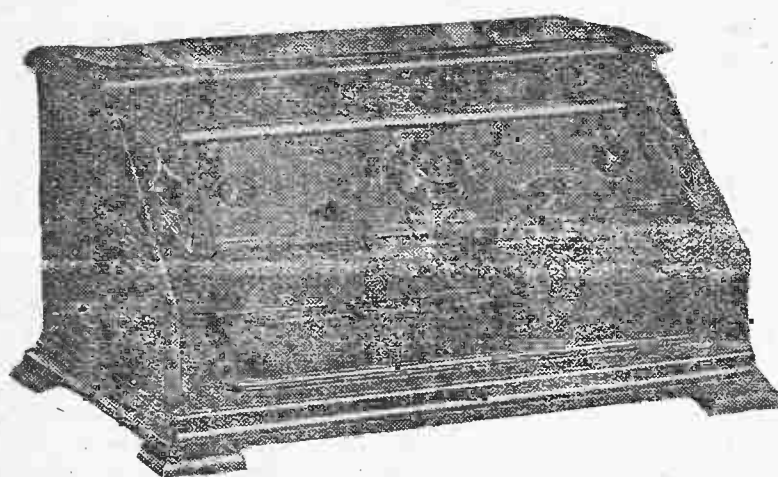
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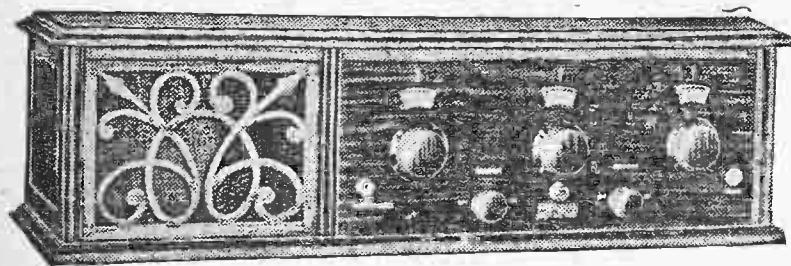
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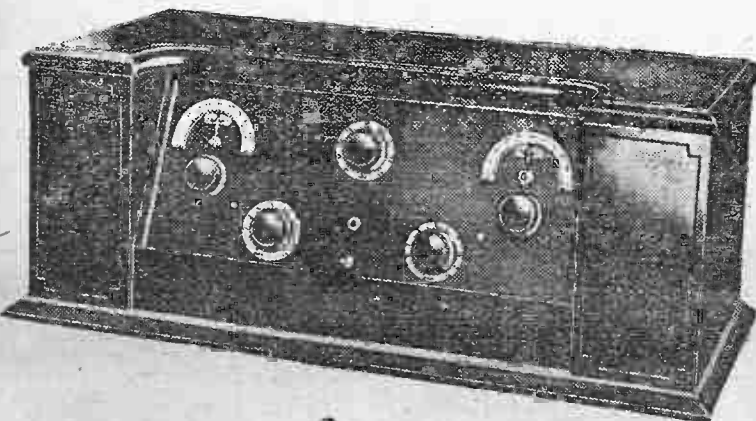
# This Week at Two New York Expositions



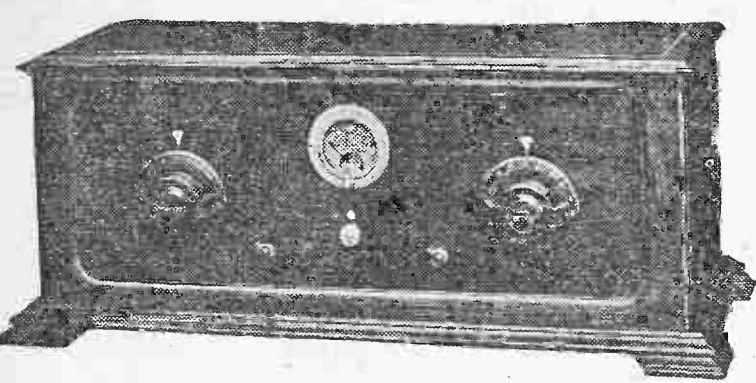
The Thermodyne Radio Corporation is presenting its new model TF5 Thermodyne five-tube radio receiver. This receiver employs the efficient master control tuning system and is said to possess great selectivity, distance getting ability and tone quality. It is also noted for simplicity of tuning.



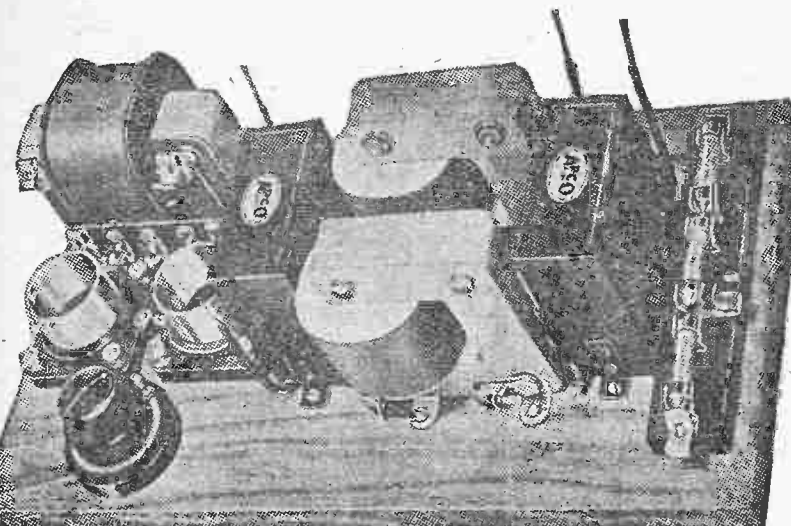
The Charles Freshman Company's Model 5-F-5 radio receiver employs a circuit similar to the one used in the well-known Freshman "Masterpiece." The set has a built-in loud speaker and uses five tubes, two as radio frequency amplifiers, one as a detector and the remaining two as audio frequency amplifiers.



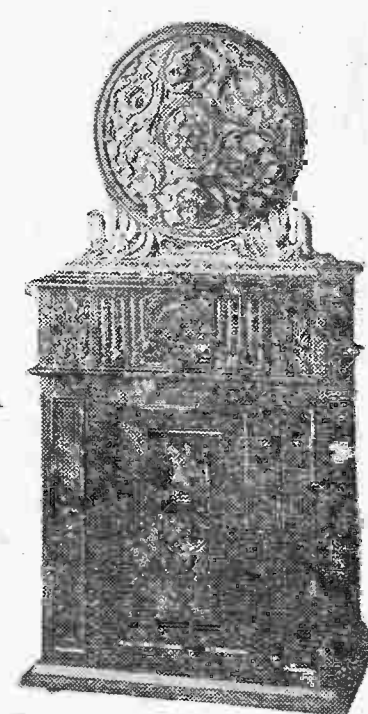
The latest model of the Crosley Radio Corporation, Cincinnati, is the Super-Tridyne. This set is housed in a solid mahogany cabinet which also contains the necessary A and B batteries. The electrical features of the set are simplicity of tuning, greater signal strength and increased selectivity. It employs three tubes.



The New Jewett Radio Receiving Set, which embodies both beauty and simplicity, is now on exhibit. This receiver is manufactured by the Jewett Radio and Phonograph Company, Detroit, and is said to be very efficient. It employs five tubes in a tuned radio frequency circuit, two as R. F. amplifiers, one as detector and two as audio amplifiers.



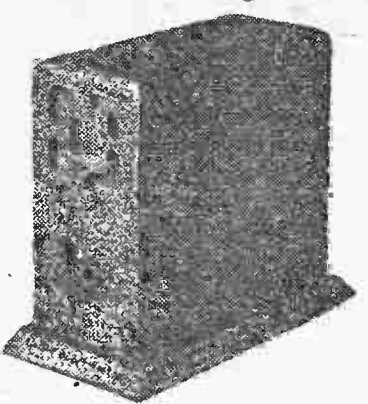
A somewhat different design of B battery eliminator is to be exhibited by the Apco Manufacturing Company. The device employs two rectifying tubes in circuit designed to rectify both halves of the cycle of the alternating current supply. This results in an increase in power and efficiency.



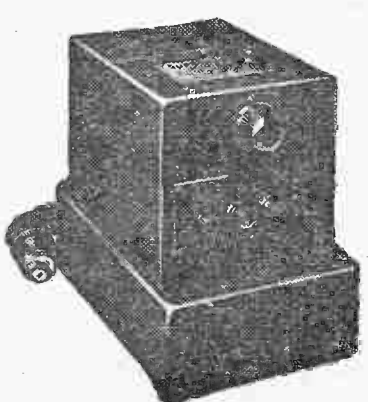
The De Forest W-6 broadcast receiver which employs the new Weagant Circuit will be introduced by the De Forest Radio Company this week. The designers claim more perfect reproduction, greater beauty and increased efficiency for the set.



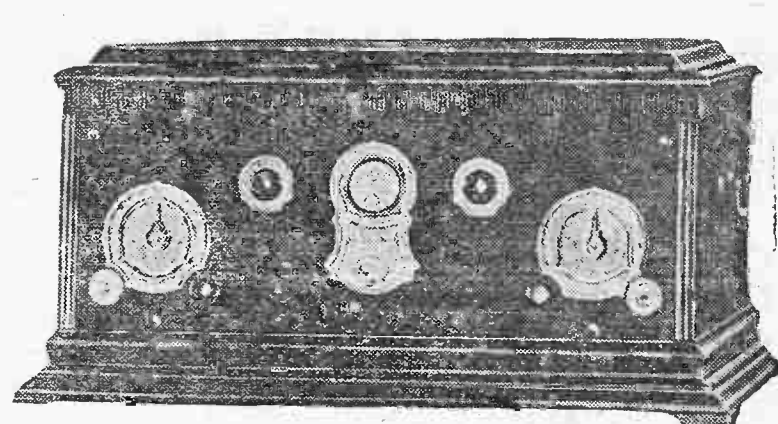
The Bruno Magic Dial, which is manufactured by the Bruno Radio Corporation, when attached to an ordinary semi-circular plate condenser will make it tune like a straight line frequency condenser.



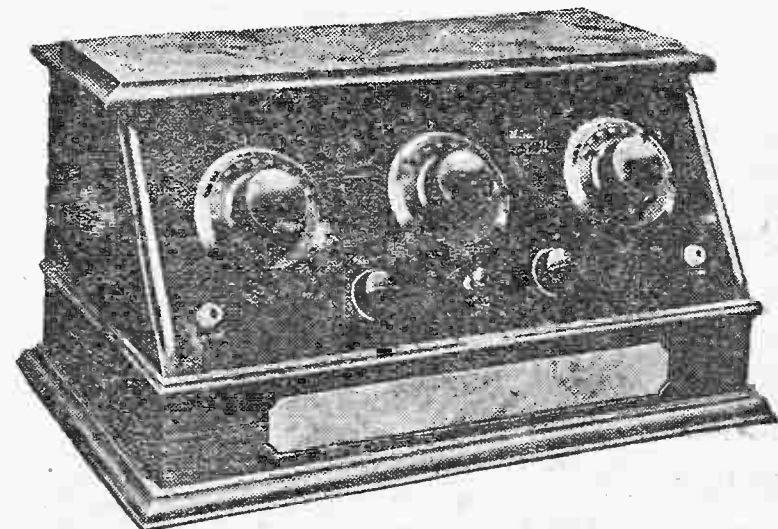
The Bel-Canto Manufacturing Company has developed a small loud speaker, to be known as the "Mite," which is said to be very efficient and which measures but 2 1/2 by 6 inches.



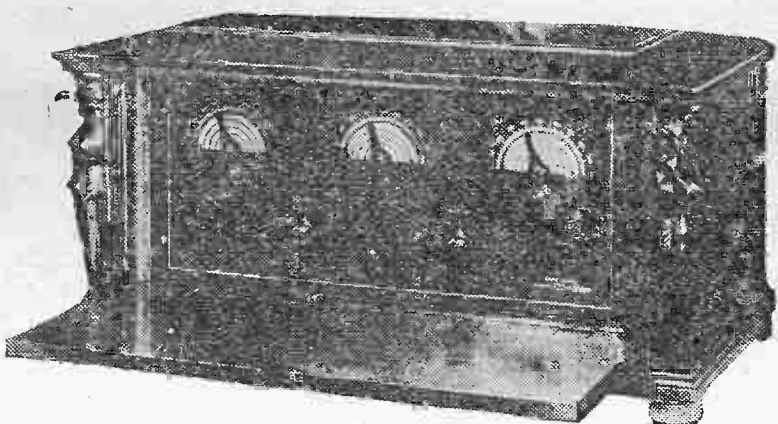
The Priess "Straight 8" is the new eight-tube receiver manufactured by the Priess Radio Corporation, which possesses remarkable distance-getting properties when operated from a loop antenna. It employs five stages of radio frequency and is very easily tuned by manipulating two tuning controls.



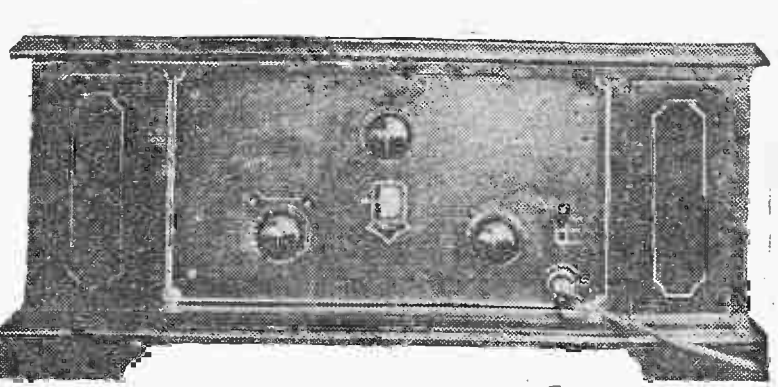
A new six-tube neutralized radio-frequency receiver is to make its appearance at the Stromberg-Carlson Manufacturing Company's booth. Three stages of tuned radio-frequency amplification are employed. Each stage is totally shielded, which is said to insure maximum selectivity.



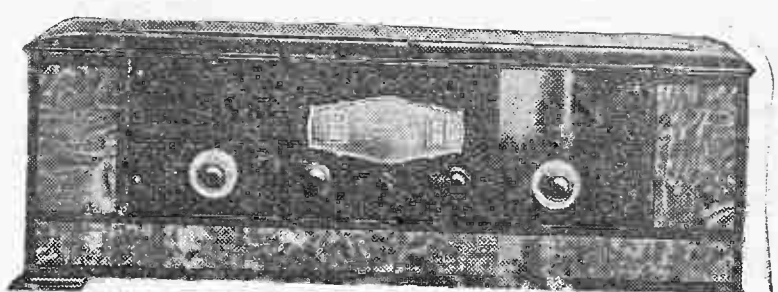
The Blair Model 11 radio receiver, manufactured by the Blair Manufacturing Company is a six-tube set employing a tuned radio frequency, a detector and three stages of resistance coupled audio frequency amplification, thus insuring volume, clear reproduction and distance reception.



This four-tube reflex radio receiver, which is to be known as the Grimes Empire model, is made by David Grimes, Inc. Three stages of radio and three stages of audio-frequency amplification with a vacuum tube detector are used. Batteries are contained in the cabinet and the set may be used on either a loop or an outdoor antenna.



The Super-Ducon B battery eliminator, manufactured by the Dubilier Condenser and Radio Corporation, which operates direct from the alternating current house circuit, is on exhibit this week.



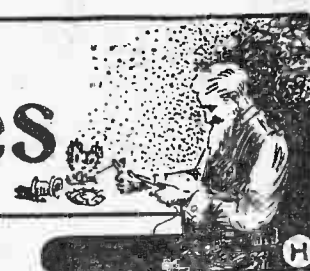
Considerable attention has been given to simplifying the panel and exterior of the cabinet and also to improving the tonal qualities in the American Bosch Magneto Corporation's new six-tube receiver—the Amborola. This receiver has three stages of audio amplification and the new power tubes may be used in the last stage.





# The Radio Beginners' Series

By R. P. Clarkson  
(Copyright by the Author)



THE problem of audio-frequency amplification is not new, so far as voice amplification is concerned. It has always been necessary to amplify voice currents in telephone work in order to increase the distance over which telephone communication can be held. But voice amplification, as in telephone work, does not begin to present the problems that audio amplification in radio gives to us. Before the broadcasting no one listened to music over the phone unless as an experiment. And, in fact, seldom did any one attempt to listen to any unfamiliar words. The listener could guess at what was being said, and the writer believes it was one of the telephone research engineers who once said before a distinguished gathering that all the sound which came over a telephone line was a mass of unintelligible noises dependent entirely on the imagination of the listener to translate these noises into words. As an example he suggested some one reading a lot of unfamiliar code words to a friend and marking the percentage of correct words recorded at the listener's end of the line. He predicted that the percentage would be extremely low, and probably zero. We are helped out on the phone immensely by a familiar voice and by familiarity with the subject matter being discussed.

In radio, on the other hand, only the voice of the announcer is familiar. Even the subject matter may not be familiar. That we are able to distinguish as much as we do shows the great advance in audio amplification, with the use of the vacuum tube. With music only the vacuum tube has given anything like faithful amplification, and while the writer inclined to doubt the statements made that the tube itself will not distort sound, it is no doubt true that most of the distortion is due to the particular method of coupling tubes together to make an amplifier. We have, as already pointed out, transformer coupling and choke coil or impedance coupling, as well as resistance coupling. All of these distort to some extent, but most of us have ears which are not sensitive enough to distinguish the extent of the distortion.

## Meaning of Distortion

It is well known that the amplifier at the broadcasting station distorts the signal before it ever goes out on the ether wave. The more it is amplified in the transmitter, the more it is distorted, just as in your receiver, the more it is amplified, the less faithful is the reproduction regardless of what method of amplification is used. And regardless of what the amplifier puts out, the mechanism for changing this output into sound will cause some more distortion, whether it is a speaker or a pair of headphones. We cannot do away with distortion, but that is not so hopeless a state of affairs as might be imagined. Distortion is not such a terrible thing in small quantities. A bad cold is even worse from the hearer's standpoint. All distortion means is that some sounds are amplified more in proportion than others, so that we do not hear music, for example, as it is played.

Probably, if we were right in the studio we might have the same trouble, and in the open air it is seldom that we hear the music as it is played. Certain instruments and certain sounds are accentuated. Some notes carry better than others. Some instruments may be heard much farther than others, and at certain distances some instruments are lost entirely, while others are heard. This is distortion in the same

sense as we use it in connection with amplifiers.

With transformers and, in fact, with almost any means of coupling the tubes together, the lower frequencies are not amplified anywhere near as much as medium frequencies, and very high frequencies are very largely lost altogether. The result is that low notes may seem weak and high sounds lose their timbre or quality. It is difficult to distinguish what instrument is playing the high notes because the only difference between instruments playing the same note is a difference in quality or timbre. The fundamental note is always the same, but different instruments add to that fundamental other subsidiary notes, usually higher in frequency, called har-

We do not often stop to realize that every sound has some particular frequency, whether it is the beat of a tom-tom or the sound of breaking china or chopping wood. By frequency we do not refer to rhythm. We refer to the vibration of the thing itself which gives a pitch to the sound. Striking a hollow trunk makes a different pitch from what we have by striking a solid tree. Striking an empty glass gives one pitch, and as the glass is filled with water and struck at intervals the pitch changes. In general the heavier the vibrating thing, the lower is the note when it is struck.

In stringed instruments the heavier strings produce the lower pitches because

tions or as a whole or both, and the result is that a very complicated air motion results. The air wave is anything but a simple wave, and its complication varies with different instruments. It is this difference in complication that distinguishes one from the other, and the wiping out of one or more of these frequencies upsets the complication, gives new timbre or tone or quality to the resulting sound, and we say it is distorted. We might truly say a piano tone is a distorted harp tone. Distortion merely means an upsetting of qualities, a change in wave form or shape or complication.

The harmonics, of course, are individually weaker than the fundamental, and an amplifier must be designed to retain these weaker qualities. A speaker must be designed to retain these weaker impulses and not to add other vibrations of its own. To retain the weaker impulses is a problem which is impossible of solution when they must be produced by a diaphragm, because the diaphragm has a natural period of its own, a definite weight of its own and a definite mechanical inertia. To make it vibrate at a very high frequency would require a very great force, a greater force than to move it at a lower frequency, and, as we have seen, the force available is weaker instead of stronger. We lose something there. Then in the horn, if it is permitted to vibrate at all, it may add to the forced vibration imparted to it by the air currents, another vibration of its own. For this reason horns are deadened by various methods, usually aiming to make their natural period very low.

## Result of Amplification

In the amplifier itself we assume that the output of the detector is as faithful a reproduction as we may obtain. One step of good transformer coupling makes little change in values, stepping them all up pretty much in the same proportion, not so much on the low notes, perhaps, but the loss is not greatly appreciable. A second step makes the loss more noticeable, a third step still more noticeable and so on. For that reason in nearly every amplifier the first step is retained and the variation in design comes in the following steps. We have shown how the resistance amplifier is added, how the choke coil amplifier is added, how the tone filter is added, and the diagram herewith shows how the push-pull amplifier is added.

A long while ago the writer gave a rule for connecting tubes. The input always goes to grid and filament. The output is always from plate and B battery. That is just as true in the push-pull as in any other form of tube coupling. The push-pull transformers, in effect, have a double winding. In the top half of the diagram a single step is shown. The secondary of the input transformer is a double winding joined together. One winding goes to grid and filament of one tube. The other winding goes to grid and filament of the second tube. The filaments of both tubes are joined together as usual, so there is but one central connection.

On the output side the primary is the double winding. One half goes to plate and B battery of the one tube and the other half goes to plate and B battery of the other tube. Both tubes have the same B battery, as usual, so there is only one central point needed here.

Two steps of push-pull follow exactly the same arrangement, but, of course, the middle transformer must have both primary and secondary double windings.

Push-pull amplification does not of itself give any increase in volume over what a similar number of single tube stages would give. Higher B voltages may be used, however, but no higher than the tubes individually are rated for. That is, the tubes being in parallel, must not exceed their B voltage rating, but, also being in parallel, they are not overloaded by using the maximum. The drain on the B battery is twice as great. There is no reason why distortion is any less than with single transformer coupling, except that there is less liability of the tubes clogging up. Any advantage is in tube action. The transformer action is probably not as advantageous. It is almost essential to use a C battery.

## News of New Developments From New York's Radio Shows

Many Changes and Some New Inventions Will Be Found Among the Wireless Apparatus on Exhibit This Year

### A New Vernier Dial

A new dial, known as the "Vernier-Juster," has recently been announced by the Brooklyn Metal Stamping Corporation. The dial is insulated from the shaft of the instrument it is to be used in connection with, and is said to have no hand capacity, due to its being constructed of metal. It has a gear ratio of 15 to 1 and is calibrated from 0 to 100, covering 180 degrees. The dials are made with both clockwise and counter-clockwise calibration.

### The Town Crier Speaker

The "Town Crier," a new loud speaker of unique design, is now being exhibited by the Pioneer Sales Company of this city. The speaker is molded in one piece. The distance from the unit to the outlet of the speaker is approximately twenty-one inches. The channel through which the signals after being amplified by the receiving set flow rises to the outlet of the speaker in an even gradual column. The over all height of the speaker is 12½ inches, the bell being ten inches in diameter.

### New Products on Display

The new line of the Kismet radio products will be on display at the Radio World's Fair this week. The new apparatus includes a five-tube radio frequency receiver with some unique features, vacuum tubes and several other radio devices. These are to be manufactured by the Radio Telephone and Telegraph Corporation of this city.

### A New Five-Tube Receiver

The most interesting portion of the exhibit of the Jewett Radio and Phonograph Company at the Radio World's Fair will be the receiving set which this company introduces this season. It is a five-tube receiver.

The set has been designed to yield a clear tonal quality and accurate reproduction of the best programs. Its wave length band covers a spread of from 125 to 300 meters, selective within 10 kilocycles for distant stations and within 25 kilocycles of correctly tuned local stations. There are two models—the table and the console. The latter is a self-contained unit with the loud speaker built in.

### The First Portable

An interesting exhibit at the Radio World's Fair will be that of the pioneer developments of J. M. Stone, president of the Operadio Corporation, manufacturers of self-contained radio sets. The first portable radio set and one of the old horseless carriages, both of which were used by Mr. Stone in 1909, will be shown along with the latest developments of his organization. That the antique radio, which will be displayed, was first shown in the days of the horseless carriages, is the best proof that even the portable radio receiver, which has been considered by many to be a development of the last two years, has gone through quite the same degree of development as the automobile.

### A Tube Tester

One of the newest devices on exhibit at the Grand Central Radio Exposition is the Superdiod Dymometer, for measuring the power of vacuum tubes. Visitors to the exposition are invited to bring all their tubes to the place where the instrument is on display and have them tested.

The instrument is manufactured by the De Witt La France Company, of Cambridge, Mass. It is said that it tells whether the tube under test is a good amplifier or detector and how good. It also enables tubes to be matched and measures accurately their performance without calculation. Three tubes a minute may be tested by any one who has not had any previous experience with the device.

### A New Power Tube

After considerable experimenting, covering the best part of two years, the De Forest Radio Company announced the perfection of their new type "H" transmitting tube for amateur use. In the development and design of this new tube the engineering staff considered first and foremost the exact needs of the amateurs who would use the tube.

### In order to make the tube operate

at all wave lengths efficiently it was necessary to reduce the capacity between grid and plate to only that which existed between these elements, thus practically removing all capacities between leads and other portions of the tube structure. For that reason the tube has a cross-like structure and appearance, all leads being actually separated. In the "H" tube there is no place where leads carrying high voltages are in proximity to one another, which would cause capacitive effects. Its construction is also such that voltage surges to which the tube may be subjected cannot cause breakage of glass parts, with consequent loss of vacuum and ruin of the tube.

The tube will oscillate on all plate voltages from 750 to 5,000. While the tube has actually been used in an oscillating circuit employing 5,000 volts, special arrangements were necessary to prevent the tube from seriously overheating, so that 3,000 volts is recommended as the limit for general use.

The tube fully meets the requirements of the amateur field of to-day, especially those interested in the ultra-low wave work, notalone for its rugged construction but for its power to stand up under heavy loads. Furthermore, its range of power and wave length is such that it will meet all the needs of the amateurs.

### Glass Enclosed Receiver

The "Clarified de Luxe" is one of unique design. The working parts are entirely enclosed in a polished French plate glass panel and cabinet.

The circuit is tuned radio frequency with resistance-coupled amplification. The set employs six tubes in all. It also is mounted on a polished mahogany base with polished nickel finishings and special straight-line condensers. The plate glass top is so arranged that it may be removed easily by unscrewing the acorn nuts holding it in place. Battery connections to the receiver are all contained in a silk-covered cable attached to the rear. The set is manufactured by the Sherman Radio Manufacturing Corporation of New York City.

### A Potential Balance Circuit

What is claimed to be an entirely new innovation in radio manufacturing will be released for public inspection at the Radio World's Fair this week. A new controlled method of tuned radio frequency circuit employs the "potential balance circuit" for suppressing oscillation is to be presented to the listening public in the form of an unusual receiving set—the Valleytone. It is said that, due to the potential balance control, stations a few meters apart can be brought in as clearly and distinctly as if they were 200 meters apart in wave length. The tendency of conventional receivers to squeal and howl has been reduced to a minimum, according to V. H. Laughter, who conceived the principle of the potential balance method.

The New Model L-3 Ultradyne. The present tendency in the design of radio receiving sets is toward simplicity, relative to operation, and artistic lines. This together with much originality is displayed in the design of the new Ultradyne Model L-3 receiver.

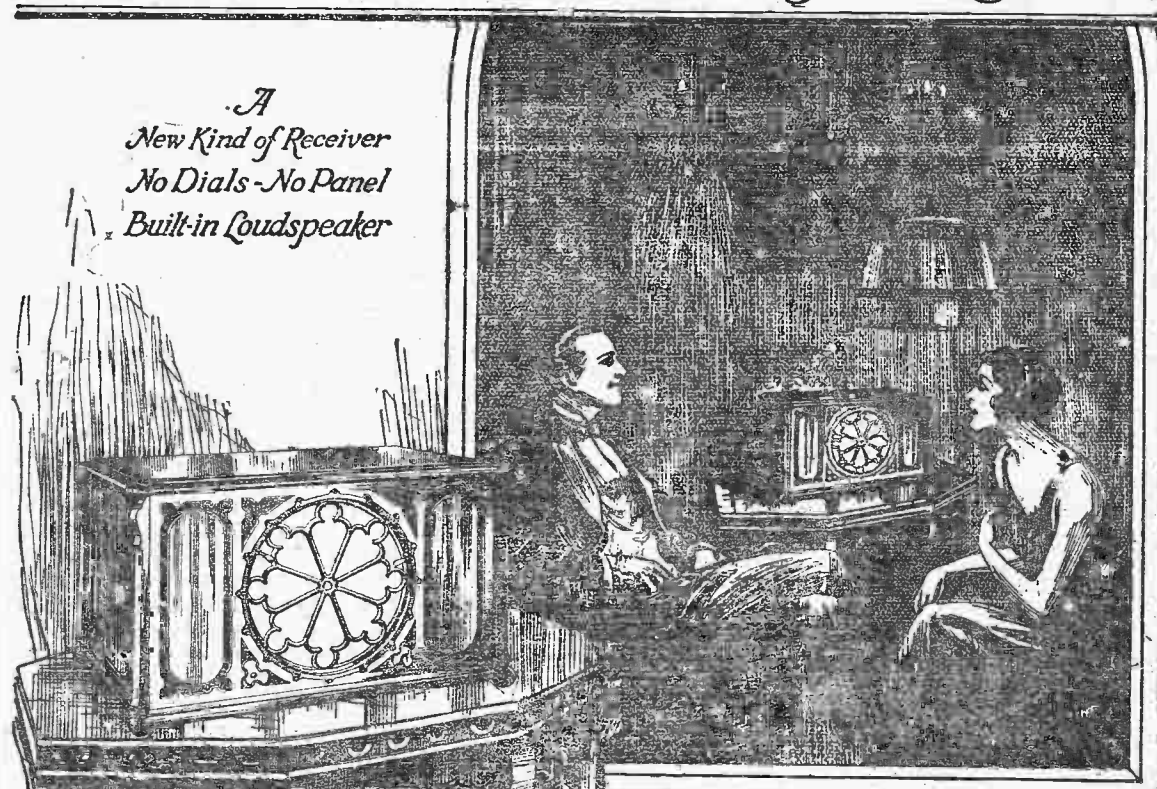
One of the novel characteristics of the new Ultradyne, which is on display this week, is the control system. There are no knobs or dials, but rather two levers with small handles on their ends which run parallel to the periphery of the circular grill in the center of the cabinet front upon which is marked two scales with degree markings. These are the only variable elements requiring adjustment when selecting a station. All one has to do is move them upward or downward until he hears the station he wishes.

Just below the grill and to the right of it is a small knob, which controls the output volume of the loud speaker. When the knob is turned full to the left the A battery circuit is opened, thus cutting off the vacuum tubes.

Head phones can be used by employing the jack mounted to the left of the grill. The loud speaker is disconnected from the circuit when the phone plug is inserted.

The cabinet is a rich brown color made of five-ply mahogany veneer

## A New Conception of Radio



A New Kind of Receiver  
No Dials—No Panel  
Built-in Loudspeaker

Ultra Simplicity—  
Tastefully Unobtrusive

\$135

The Ultradyne, Model L-3, is a six-tube receiver embodying the fundamental principles of the best circuits, greatly refined and marvellously simplified. No dials—no panel: Just two inconspicuous levers which constitute a station selector. Duo finished, two-toned mahogany cabinet.

Designed by R. E. L. Lamm, R.E., Chief Engineer of this Company, and formerly Radio Research Engineer with the French Signal Corps Research Laboratories.

To protect the public, Mr. Lamm's personal program seal is on the back of the cabinet. All receivers are guaranteed as long as these seals remain unbroken.

THIS new kind of radio-musical instrument marks the mastery of technicalities to the point where the whole range of radio's resources are literally at your instant command.

The Ultradyne, Model L-3, supplants the usual "laboratory machine." It is a new artistic table-piece that makes the entrance of radio into the well-appointed home unobtrusive, inconspicuous. It represents the triumph of art over mere mechanics.

The Ultradyne Receiver is worthy of the place of honor in luxurious homes.

Illustrated folder on request.

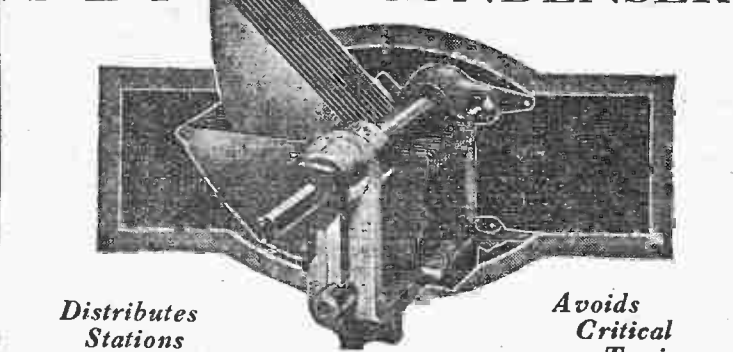
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ULTRADYNE  
MODEL L-3

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At the Armory—Booth 37, Section B

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Distributes  
Stations  
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Avoids  
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Tuning

Crowding of stations on the low-wave side of your dials is entirely avoided by the new Hammarlund Straight-Line-Frequency Condenser.

The new Hammarlund is a mechanical and electrical masterpiece, containing all of the features that have won world renown for Hammarlund workmanship, plus several new ones, representing the perfections of advanced engineering.

Examine Hammarlund Precision Condensers and Coils at the Radio Show, Grand Central Palace, Space 24, Hammarlund Manufacturing Company, 424-438 West 33rd Street, New York.

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Hammarlund  
PRECISION  
PRODUCTS

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During September

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Two for  
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Handiest  
Radio  
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Tightens all  
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and nuts. A set  
of tools—five sockets  
and pliers, all  
in one wrench.

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## Have you ever LOST A STATION you wanted to get?

Have you? Perhaps it just naturally faded away. Perhaps some nearby powerful set stole its distant thunder. Don't blame the weather or your receiver entirely. It can't do its best on weak batteries. Keep those storage batteries live with the Ful-Wave Charger. So convenient—no renewing of bulbs, no water or acids, no attention.

Ful-Wave Chargers are the most efficient made.

Ful-Wave cannot overheat. They are quiet.

Ful-Wave Chargers are factory sealed. Type "A-B" will charge "A" and "B" storage batteries simultaneously. Type "A," operating at almost twice the speed, charges "A" storage batteries in record time.



**RADIO BATTERY CHARGER**

For Charging "A" Batteries in Jig Time

Model "A"  
For radio "A" batteries. A.C. line, 110-120 volts, 40 to 60 cycle. Battery— "A" 6 volts 6-8 ampere.  
**Price \$18**

For Charging "A" and "B" Batteries Simultaneously

Model "A-B"  
For radio "A" and "B" batteries. A.C. line, 110-120 volts, 40 to 60 cycle. Battery— "A" 6 volts, 3-4 ampere. Battery— "B" 100 volts, 110 ampere and up.  
**Price \$22**

LIBERTY ELECTRIC CORPORATION of New York  
342 Madison Avenue

ON EXHIBIT AT BOTH RADIO SHOWS  
258TH FIELD ARTILLERY ARMORY BOOTH 41-J  
GRAND CENTRAL PALACE BOOTH 36  
AT ALL FIRST-CLASS DEALERS

sional neighbor who has time to visit with him for a few moments.  
You can imagine the new light brought to the mind of such a man who has always been active, but who, for two years, has had to live in darkness more complete than any ever produced by the elimination of daylight. He informed me yesterday that he had heard more news, more music, had received more pleasure during the past week from his radio set than he had received from all other sources for over two years.

Tenafly, N. J.  
Once more I beg to thank you for the wonderful idea of your good selves to present the blind with a radio, and indeed I must say the selection made by you was the best. You may rest assured that I shall enjoy the instrument very much. Nothing could have given me greater pleasure. Once more my sincere thanks for your kindness.

Fort Worth, Tex.  
Words fail to express my gratitude in your efforts in placing in my hands an efficient radio set. It has opened up a new avenue of enjoyment by keeping me in touch with current events, as well as providing wholesale enjoyment.

New York City, N. Y.  
It is a week to-day since my radio was installed, and I cannot tell you how much joy it has already brought to me. It is certainly a wonderful work you are doing for the blind, and one must feel there are compensations even for being blind. I am sure with my radio I shall never feel so shut off from the world. I feel this is a double joy to me, as with my blindness I am fighting against a serious illness.  
Surely I can never show my gratitude enough for dear Miss Rhoades sending you my name and to have such a wonderful gift. It is big work, and I am sure all interested in helping make life a joy to us will be rewarded.

Strool, S. D.  
If I am to keep this radio I want to say how much we appreciate it. We never hear or see anything of the world out here, only through the papers. We are fifty miles from railroad and three miles from our little inland town. I thank you and all those who donated in any way to get these radios for us. I know I will spend many a pleasant evening with mine.

Ocoquan, Va.  
I must thank you very much indeed for the splendid present and for the pleasure it has given to me in my loneliness and isolation from the pleasures that others enjoy.

Fillmore, Calif.  
I was able to get San Francisco the first night, which is a distance of about 400 miles. The radio set does all that you said it would, for it brings to me such wonderful concerts and messages from some of the best artists and speakers of the day, which I would otherwise not have the privilege of hearing. Since I have entered "Radioland" it seems like a new world to me.

Summerville, S. C.  
Every one says this is such a fine instrument that I know it will give me a great deal of pleasure. Thank you very much for giving me this, which will brighten many a dull day on which I would otherwise have to sit down silently and be quiet when my hands are too tired to go on with my chair caning.

Baltimore.  
My radio arrived in fine condition. It has been installed and the results have been fine. My heart is full of gratitude toward you, who have provided this pleasure for us. The radio was installed by a regular radio man, who says that the instrument is beyond all question a fine one.

It was made possible to supply so many blind people with sets through the Herald Tribune fund by the hearty co-operation of the Adams Morgan Company, which furnished the sets at approximately cost and in addition took upon themselves the labor of handling all shipments of these sets, together with their accessories, to the individual recipients.

The accessory manufacturers who co-operated in this work were the National Carbon Company (batteries), Radio Corporation of America (tubes), Herbert H. Frost Company (phones and adaptors), Daven Radio Corporation (grid leaks), L. S. Brach Manufacturing Company (antenna equipment) and the Manhattan Electric Supply Company (batteries).

**SITTIN' PRETTY Kismet**  
Knows all - Hears all - Tells all  
SEE THE KISMET DISPLAY AT THE RADIO WORLDS FAIR 258 FIELD ARTILLERY ARMORY BOOTH 1 - SECTION F.  
**RADIO TEL. & TEL. CORP.**  
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**FANMILL RADIO CO. INC.**  
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TUNGAR "A" & "B" CHARGER \$11.75	K. K. DIALS 4-INCH 45¢	JONES' "A" BATTERY SWITCH 35¢	
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[FANMILL] Music Master Loud Speaker Cabinet Type List \$35 QUANTITY LIMITED \$16.75	[FANMILL] Exide 100 Amp. Rubber Case Storage "A" Battery \$10.95	[FANMILL] WESTINGHOUSE 5 Amp. RECTICON Charger with Bulb Factory Sealed Carton \$15
[RCA] AND [Cunningham] TUBES New UX and CX in stock at special prices TRUE BLUE in stock	FRESHMAN KIT \$7.95	DAVEN 3-TUBE SUPER-AMPLIFIER \$11.25
	TUNGAR 5 Amp. Charger With Bulb \$17.95	THREE-TUBE WARE \$21.95

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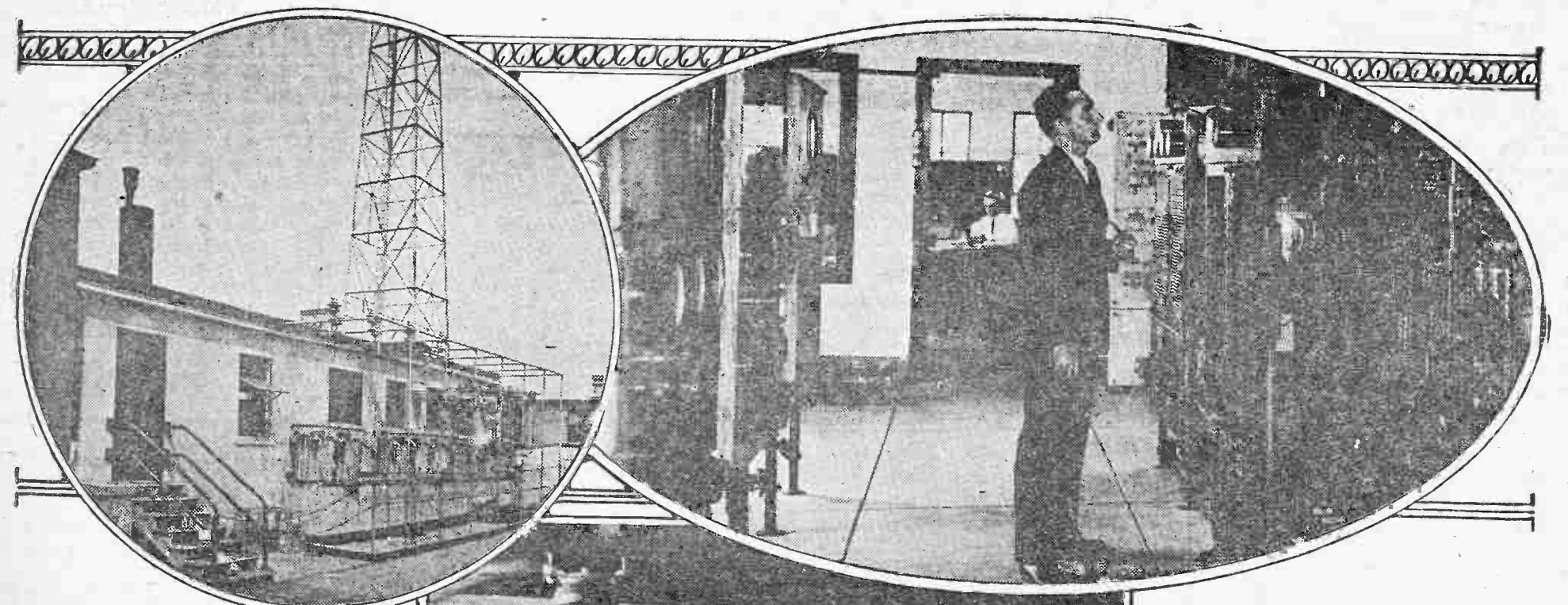
### IMPORTANT RADIO ANNOUNCEMENT!

WATCH for grand opening of our new store this week. Send postal for list of more than 100 important radio items reduced in price for our opening week. Special mail order department. Mail orders filled promptly.

**Times Radio Corporation**  
159 Greenwich Street (near Cortlandt Street)  
New York City  
Please address all communication to Department C for immediate attention.

# Popular American Broadcasting Stations

No. 9—KYW, Chicago, Ill.



External view of KYW showing the transformer equipment and the base of one of the antenna supports

The power room and the control room in the background. From left to right are shown the rectifier and modulator panels

RADIO broadcasting came into being in the West on Armistice Day, November 11, 1921, with the opening at Chicago of the Westinghouse Station KYW. Broadcasting was already known in the East, as a result of the work of KDKA, at Pittsburgh, which had been opened a year before KYW first went on the air.

On that memorable occasion when KYW's voice was first heard, there appeared on the program two of the leading artists of the United States, Mary Garden, who gave a short talk, and Edith Mason, who sang two selections. The program required in all not more than half an hour, which stands in marked contrast to the twenty-four-hour service now given by the station.

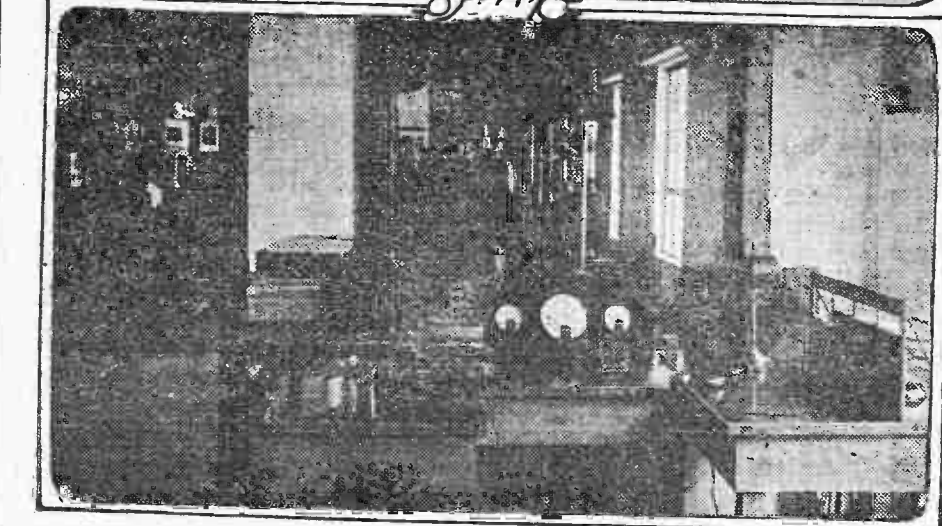
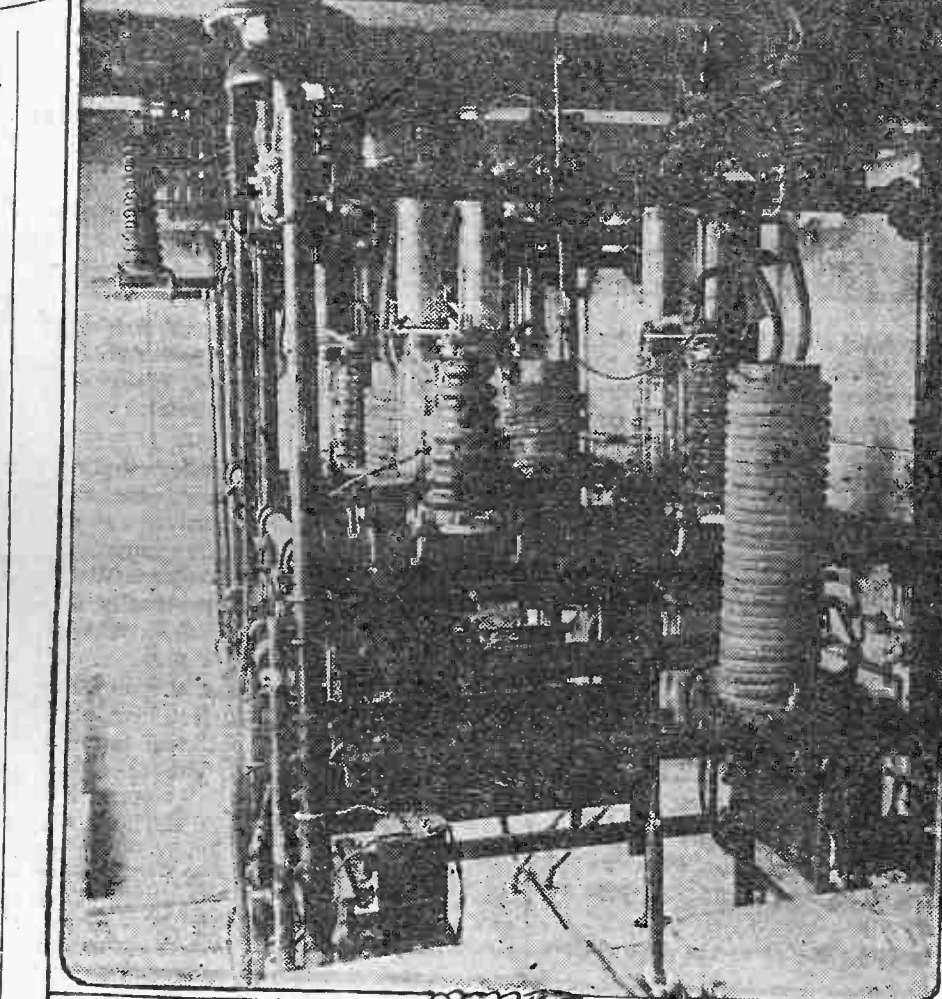
In its three years of existence KYW has grown rapidly. From a station that required only three or four in its personnel, it has been expanded until today there are more than thirty men and women on the staff, and from a series of programs covering only a short period daily the station now broadcasts almost seventy-two hours a week, which is equivalent to an average of over ten hours' daily broadcast. This covers a period of twenty-four hours a day, seven days a week, during which time almost all phases of human interest are embraced.

#### Four Years of Service

Armistice Day, November 11, 1925, will close KYW's fourth year of amazing changes and growth. From its first broadcast, which went out from the stage of the auditorium, the station now enjoys the use of two large studios—one in the Congress Hotel, a palatial up-to-the-minute type of studio constructed with acoustics conducive to the best broadcasting, and another studio, located in the "Chicago Evening American" Building. The new station on the roof of the Congress Hotel is a sister station to KDKA, East Pittsburgh, and represents the peak of radio ingenuity, including equipment of the finest construction. The new station which was recently put into service, replaces the good old KYW on the roof of the Edison Building, which for almost four years furnished radio fans with programs.

In order that we may obtain an accurate impression of the extensive service given by KYW, let us glance through one day's broadcasting. During the twenty-four-hour daily broadcast will be found the morning exercises given daily at 7 a. m. to 7:30 a. m. Immediately following the exercises is broadcast the fifteen minute "Devotional Period."

Mrs. Anna J. Peterson favors the housewives with her daily "Table Talks," a feature that has become paramount in importance in KYW's service.



Above: Rear view of the broadcasting apparatus with the modulator panel in the foreground. Below: Looking through the window from the operator's desk

A visit to the studio on Tuesday, Thursday and Saturday afternoons, from 2:30 to 4 o'clock, would bring you there just in time to hear the Frolics, which are composed of popular song and instrumental selections from the local stage. Tuesday and Thursday evenings, from 10 to 11:30, from this same studio are broadcast the "Evening at Home" shows, composed largely of staff talent. From this studio comes the "Midnight Revue" broadcast every Wednesday and Friday night.

The programs formerly broadcast from the Edison Studio are now being given from the new Congress Studio. On Saturday evenings at 9:30 a classical program is presented from the Congress, including the very best known artists of this country and abroad.

Midnight each Saturday jumps into the limelight with a snappy popular program, selected from the best talent. This is known as the Congress Carnival.

A pioneer feature of the station is its bedtime stories. Surely Uncle Bob is known in every home. He is that happy gentleman whose more intimate sobriquet is Walter Wilson, and it is he who tells the animal and bird stories to the kiddies each evening, and it is his jovial songs and merry laughter which have become the spice of the children's evenings.

From bedtime stories we travel to "Twenty Minutes of Good Reading"—a feature made famous by the Rev. Claude J. Pernin, S. J., who is well known as the head of the Department of English at Loyola University.

In seeking radio service for everybody there looms up a very important type of broadcast; the farmer requires close attention, and in that pursuit KYW again is seen as the forerunner of what is now a very active field. Several years ago the station, in co-operation with the American Farm Bureau Federation, instigated the Farm Radio Service, which to-day is one of the station's outstanding features.

During the winter months the "Insomnia Club" presents lively syncopation. The Coon & Sanders Original Nighthawks, of radio fame, have been well named. Going on the ether at 1 a. m., with a type of playing unique and frivolous, they have kept so many people out of bed that some one suggested the cognomen "Insomnia Club," which explains the origin of that name. They have been heard all over the country and have ardent supporters in far-off Apia, Samoa, whence letters are received telling about the opportune "dinner" music they are furnishing, the refrains being tuned in at about 7 o'clock in the evening in Apia.

All these features and many others have been developed under the supervision of Wilson Wetherbee, director of the station. Having come with KYW during its infancy, he has witnessed the changes as they took place, playing an important part therein. The building up of the program activity is directly attributable to him.

KYW became the first station to have newspaper affiliation, and the radio news service became the pioneer radio herald, and William J. Clark was the first editor.

#### Engineering Staff

Some of the foregoing explains the reason for needing a crew of more than thirty men and women. Walter Evans, KYW's first and present chief engineer, has increased his staff of engineers and operators, until to-day he has under him a capable, well-trained crew, who attend to all the outside pick-ups and studio broadcasting. Mr. Evans' reputation as an expert radio engineer is well known. Having a natural lust to study radio when a boy, he soon entered into that class, limited in number, who really knew something about it. With America's advent into the recent war, Mr. Evans joined the service in that capacity and served the government on land and sea. After the armistice in 1918, he joined the station's ranks and was given charge of KYW when it was decided to build that station.

#### Selection of Artists

There is still another angle that enters into the production of good programs. Artists must peculiarly lend themselves to that kind of entertainment. Voice is one of the big considerations, personality is another, and so forth. In selecting suitable artists and choosing their repertoire, Morgan Eastman, who is musical director of the station, is found to be a very valuable ally.

(Continued on page eight)

**The LARGEST and most complete RADIO STORES in BROOKLYN**  
THE "BOROUGH HALL" SELLING POLICY RELIEVES YOU OF ALL DOUBT  
1—Standard. Good—tested and tried. 2—No seconds or jobs.  
3—Any article exchanged or refunded. 4—Honest advice, regardless of sale.  
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REPRODUCER of Distinctive Beauty  
Great Volume with remarkable Clarity.  
No. 2051—Burns Reprod. All Black Finish. \$22.50  
No. 2052—Burns Reprod. "De Luxe" Finish. \$25.00  
Burns Horn is the nearest reproduction to the human voice. Willing to demonstrate it in your home. Nothing like it has ever been heard. It will surprise you!

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**Marwol**  
**Music Master**

A complete line of parts always in stock. Valley Chargers—Bright Star "3" Batteries—Yale Storage Batteries, etc.  
Our new RADIO PARLOR is now open in our Washington St. Store. Features your Radio Home.  
Stores Open Till 10 P. M. Daily. Saturday 11 P. M.

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333 WASHINGTON ST. (BOROUGH HALL) MAIN 10258-4199  
1625 BROADWAY (COR. DECATUR ST.) FOXCROFT 4543



# Popular American Broadcasting Stations

The principal considerations striven for in the design of the new installation were perfection of quality, reliability and reserve power. The resources and best engineering skill have gone into the new equipment in order that the vocal solo or complex orchestration may be turned over to a discriminating public, identical with the original sound. Years of experience in the design of electrical apparatus is apparent in the well arranged panels, the easily accessible units with everything in duplicate so that program interruption due to electrical causes may be reduced to an absolute minimum.

Considerable more power is provided for than will ever, in all probability, be needed for ordinary broadcasting. This is a desirable feature, for it is a better operating proposition to run a large piece of electrical equipment at a fraction of its capacity than to overload a small installation. This will leave a large margin of reserve power in case of national emergencies, paralysis of telegraph and telephone lines or similar contingencies.

To obtain a working idea of this levitation of the radio field we will begin with the primary source of power and follow it through to the antenna.

## Power Supply Apparatus

Current at 4,400 volts is obtained from the local public service company over two separate transmission lines from different generating stations. This gives 100 per cent insurance against power line interruptions. A 100 kilowatt transformer substation has been built in the basement of the hotel where the transmission lines are stepped down to 220 volts and carried through large capacity cables to the radio station on the roof. These are connected with a power distribution board or feeder panel through which all of the different pieces of apparatus draw their source of power. This panel also carries suitable cut-outs to open the circuits and shuts off the current should accidents occur to the different machines.

Next in line is the contactor panel which does the thinking for the set (and, if necessary, for the operator). It is so arranged that the operator need only press one small push button and in slightly over ten seconds the whole station is under way. The push button first energizes the water pump which forces a stream of cold water through the jackets of the tubes. When the water pressure comes up to a predetermined value it allows the next contactor to operate which starts up the filament motor generator units. As the generators reach their full voltage, relays in the filament lines make contact, the next circuit breaker does its bit and the 60 cycle rectifier for the grid bias,

and another small rectifier for the plates of the fifty watt amplifier tubes, add their energy to the circuit. If everything to this point has taken place to the satisfaction of the control panel, it allows the large contactor to close, and current is furnished to the bank of 22,000 volt transformers outside the station room. Should



The personnel of KYW. Top: John Michaels, operator; Fred Belsing, electrician. Middle: L. S. Fisk, operator; C. W. Sheets, operator; Chas. C. Hines, operator; H. J. Pomy, electrician. Bottom: H. E. Randol, operator; Fred A. Hill, operator; Walter C. Evans, chief engineer; E. H. Gagr, operator; D. A. Meyer, chief operator.

anything be amiss while this procedure is going on the contactor will remove the offending apparatus from the circuit and start over again.

The four 10 kilowatt, 22,000-volt transformers outside the station are connected with the two transformers in parallel on each phase and the output is connected to four water-cooled kenotron rectifier tubes, which give full wave rectification on two phases, with a resulting pure direct current at voltages up to 10,000. The output of the rectifiers passes through a bank of high voltage choke coils and condensers which smooth out the direct current until it is free from the slightest traces of ripple or hum.

This current is fed to the four water-

cooled modulator tubes and to two water-cooled oscillators. The oscillators work directly into a "tank" circuit which determines and holds the wave length constant, and which is impedance coupled to the antenna. A development of the Hartley oscillating circuit is used and the modulators work on the Heising prin-

and three-fourths of hard drawn copper wire went into the construction of the antenna system.

Two cables, each containing fifty pairs of telephone wires, connect the new KYW station with the several studios and the numerous outside points from which programs are broadcast. The cables terminate on a large telephone test board, through which telephone lines may be balanced and equalized to pass all the complex voice and musical frequencies from 50 to 6,000 cycles. Provision is made on this board for setting up phantom and simplex circuits over any line, so that studio equipment may be remotely controlled and adjusted from the station. The telephone test board is connected through plug and jack arrangement to a smaller board on the operating desk, only the circuits to be used that day coming in on the operator's board. By means of this small switchboard he is able to change from one studio to another, talk to any studio or connect back the output of one studio into another so the waiting artists there may hear the program.

## Control Apparatus

A small, well arranged control desk starts, stops and adjusts the entire station as well as handles the programs coming in over the telephone lines. The operator need not leave his chair to test any part of the equipment or to take care of any of the manifold details incidental to the operation of a broadcasting station.

A bank of amplifiers or repeaters within easy reach of the operator passes the incoming voice current through tubes progressing from a few watts in the first stage to four fifty-watt tubes in the last stage. The volume of the voice current is many times multiplied in this manner until it reaches a value sufficient to actuate the four water-cooled modulator tubes.

One of the unique features of the station is in the fact that there are only two moving parts, the circulating pump and the filament generators. Power for every other use, from the giant power tubes to the smallest amplifier, being secured through the rectification of sixty-cycle alternating current.

There has been no expense spared to make it possible for the new KYW to uphold the traditional reliability of the station. Every facility for servicing and repairing the equipment has been built into the new plant, including a completely equipped machine shop.

KYW is now on an equal basis with her older sisters, KDKA and WBZ, and is prepared to put a consistent signal of the highest quality into the homes of the Middle Western listeners-in throughout the entire year.

# Fourth Annual National Radio Exposition Opened Yesterday Afternoon

Designed for AC lighting mains, will attract a large amount of technical and popular attention. Intensive research, it is said, has developed the fact that the employment of a powerful amplifying tube in the last audio stage will result in revolutionary improvement in volume and in the quality of reproduction.

Other tubes, designed in some cases for storage battery operation and in other cases for dry battery use, will result in a remarkable improvement in reception this year, it is claimed.

Sets that operate directly off lighting circuits; single controlled sets; new and improved styles of battery eliminators; new principles of battery construction, are among other features that will be shown at the exhibition.

Radio amateurs throughout the United States are taking great interest in the contests to be staged at the exposition. Because of the extraordinary scope and diversity of the contests this year, the more important amateur contests will be conducted under the auspices of the Second District Executive Radio Council, which includes in its membership all the chief amateur radio clubs in the second radio district. A committee of the most prominent radio amateurs in the United States will be appointed by the council to act as judges.

Silver cups, radio sets and hundreds of dollars in cash prizes will be distributed to the contestants.

Leading radio manufacturers, broadcasting stations and amateur clubs are taking an active part in promoting these events. Manufacturers are contributing to the fund for prizes and broadcasting stations

will co-operate by announcing the details of the contests.

The value placed by the radio industry upon the resource and ingenuity of the American radio amateur, is evidenced by the fact that three prizes are being offered this year for best home-made receiving sets. Any type of circuit may be entered.

Throughout exposition week an extraordinary program of entertainment will be

broadcast from Grand Central Palace from special studios erected there by the leading broadcasting stations of the country. Famous announcers, leading radio entertainers, prominent theatrical stars will appear in person. New features will be presented in the radio program and there will be a constant round of entertainment from the radio theater erected on the third floor of Grand Central Palace.

## The Second Radio World's Fair

(Continued from page three)

a big staff of men and women, who will be on hand each afternoon and evening to extend courtesies and to give information to the visitors.

They have arranged special nights for the public and the trade. Wednesday will be "New York Night," at which Mayor Hylan is to be guest of honor; Thursday Bronx Night, with Borough President Henry Bruckner as presiding officer; Friday, Queens Night, with President Maurice Connolly, and Saturday Brooklyn Night, with President Joseph Guider. Monday and Tuesday Manhattan and Richmond will be especially featured, with their borough officials and leading residents.

On Tuesday night, it is expected, Senator James J. Walker will officiate at an interesting ceremony, presenting a cup to Thornton Fisher, cartoonist and sports announcer, on behalf of his friends in the athletic world.

Another presentation of importance will

take place on Wednesday, when Arthur H. Lynch, director of the international tests, will be given a trophy celebrating his contribution to radio development.

"The Happiness Boys," Ernest Jones and Billy Hare, and other famous radio stars also will come in for special honors, part of a long sequence of popular events. Another feature of the exposition will be the reception of messages from the MacMillan expedition, together with the presentation of a silver cup to the wireless operator who heard most messages from the scientist and explorer, the National Geographic Society and the American Radio League co-operating with the Radio World's Fair in this award.

The management has installed directional signs on the Grand Concourse and other places to aid motorists in reaching the 25th Field Artillery Armory, where there is splendid parking space, as known to those who attended the Automobile Show held there last year.

Following is the official program of the fourth annual National Radio Exposition:

SATURDAY, SEPTEMBER 12	
12-Exposition and fair formally opened.	
2:30-3:30-Radio Fashion Show.	
6:30-Greeting to America by the Duke of Sutherland by radio-telegraph and broadcast from England.	
8:30-9:30-Radio Fashion Show.	
10-Address by Secretary Hoover.	
SUNDAY, SEPTEMBER 13	
1-2-Radio Jobbers' forum.	
2:30-3:30-Radio Fashion Show.	
7:30-8:30-First demonstration of television by the radio transmission of a speech and photograph of speaker simultaneously, Grand Central Palace.	
8:30-9:30-Radio Fashion Show.	
9-11-Reception to prominent announcers, radio and stage stars.	
TUESDAY, SEPTEMBER 15	
1-2-Radio Jobbers' forum.	
2:30-3:30-Radio Fashion Show.	
8-4-Radio dealers' conference.	
7:30-World roll call by radio, demonstrating phenomenal record in world communication by wireless.	
7:30-8:30-Entertainment by leading announcers and radio stars.	
8:30-9:30-Radio Fashion Show.	
9:30-11-General entertainment from Radio Theater.	
WEDNESDAY, SEPTEMBER 16	
1-2-Radio Jobbers' forum.	
2:30-3:30-Radio Fashion Show.	
8-4-Radio dealers' conference.	
7:30-8:30-Radio pageant, showing prominent stage stars and artist models, demonstrating the service of radio to the home.	
8:30-9:30-Radio Fashion Show.	
9:30-11-Entertainment program from Radio Theater.	
THURSDAY, SEPTEMBER 17	
1-2-Radio Jobbers' forum.	
2:30-3:30-Radio Fashion Show.	
8-4-Radio dealers' conference.	
7:30-8-4-American Women's Association. Address by Miss Gertrude Robinson Smith, president. Songs by Marie Dressler and Miss Vaughn de Leath, the original "Radio Girl."	
8:30-9:30-Radio Fashion Show.	
9:30-11-Address from Radio Theater.	
FRIDAY, SEPTEMBER 18	
1-2-Radio Jobbers' forum.	
2:30-3:30-Radio Fashion Show.	
8-4-Radio dealers' conference.	
7:30-10-Voice recognition contest; speed receiving contest; frank art building contest.	
8:30-9:30-Radio Fashion Show.	
9:30-11-Entertainment from Radio Theater.	
SATURDAY, SEPTEMBER 19	
1-2-Radio Jobbers' forum.	
2:30-3:30-Radio Fashion Show.	
8-4-Radio dealers' conference.	
10-6-Prize awards.	
8:30-9:30-Radio Fashion Show.	
9:30-11-General entertainment in Radio Theater.	

# The Herald Tribune Radio Fund Brings Joy to Blind

Approximately 2,000 Wireless Sets Have Been Installed in the Homes of the Needy Blind With Money Contributed by Readers

"DOES Mr. Madden live here?" a boyish voice asked as a stream of light poured through the open door, revealing three Boy Scouts in uniform. "Yes, you will find him on the third floor," was the reply.

Three pairs of hands simultaneously lifted heavy packages from the floor of the rickety porch, and one by one they fled through the door and up the battered stairway.

Reaching the top, they were confronted by an open doorway leading into a dark room. Timidly they approached the door and inquiringly said, "Mr. Madden?" "Yes, come in. Who is it?"

"We are Boy Scouts who have come to install a radio set that has been given you by the American Foundation for the Blind." "Me, a radio set? There must be some mistake."

The leader smiled and said, "No, there is no mistake. We have full instructions here and your name and address, and the set is for you, all right."

In his eagerness the blind man fell over the chair that stood between him and the light, which as it blazed up revealed a room entirely devoid of any cheerful aspect. A single iron bed with grimy spread, a washstand, a chiffonier and two chairs completed the furnishings, all of which were of poor quality and battered where chairs had struck when tipped over by the sightless man in his journeyings about the room.

A few deft strokes of a knife blade, the packages were laid open, the radio set lifted from its shipping case, batteries wiped off and set in place, phones plugged in, tubes inserted and part of a coil of wire dropped out of the window for an antenna. The ground wire was then attached and the switch pushed in to light the tubes. "To-morrow we will rig up the antenna right," the boys said.

With practiced ease the leader of the Scouts slipped on the head phones, gave the single dial of the set a twist, then, as music flooded in, stepped back and adjusted the phones to the ears of the blind man.

With tears streaming from his sightless eyes, the unfortunate one, with trembling hands, removed the phones from his head, and, turning to the boys, said: "I don't know how it would be possible for me to thank you for your kindness in coming here to install this set. Words could not tell how much I appreciate what the American Foundation for the Blind has done, and certainly I never could thank the New York Herald Tribune for collecting the fund and the readers who so generously gave to the radio fund for the blind. All I can do is to say, with Tiny Tim, 'God bless and keep you, every one!'"

The little pen picture given above is a true recital of what has been repeated, with varying details, about 2,000 times throughout the country. All this has been made possible through the money so generously contributed to the Radio Fund for the Blind by the Herald Tribune readers. The Herald Tribune has waited until now, when the installation of these

sets was completed, so as to be able to render a comprehensive report of what has been accomplished with this fund.

Four sets were selected on the basis of efficiency, tone quality and ease of operation. These four sets were then taken to "The Matilda Ziegler Magazine for the Blind" and the blind girls who were employed there cast the deciding vote for the machine which most adequately met their idea of the ideal machine for the blind.

Their vote was 100 per cent for the machine which had been unanimously given first place by the advisory committee and their technical advisers. This was the Paragon two-tube set for dry cell use, with UV-199 tubes, which is made by the Adams Morgan Company, of Upper Montclair, N. J.

100 Test Installations. One hundred test installations were first made throughout the country to insure uniform operation, and the reports indicated such complete satisfaction that an order was placed to the limit of the fund.

Approximately 2,000 installations have been made and the letters from the recipients of these sets are so joyous, thankful and enthusiastic that they constitute one of the brightest pages in the history of this newspaper.

In order that you may have your proper share of the joy that has been brought to these unfortunates through your generosity we are quoting from some of these letters:

West Burke, Vt.  
I cannot find words to tell you just what this new friend of mine is going to mean to me in the days to come, but the enclosed verses may give you some idea of my grateful appreciation of all the care and trouble that has been so cheerfully given by you and the Foundation to make this wonderful blessing to the blind come true.

MY RADIO  
I have a little wonder box,  
A marvel of delight,  
That brings the choicest things to me  
Across the air at night.  
When weary of my daily tasks,  
I long for something sweet;  
I turn its dial just a bit  
And find a restful seat.  
Then music floods the quiet room,  
A dance, a charming song;  
A violin, an organ grand,  
With chords so deep and long.

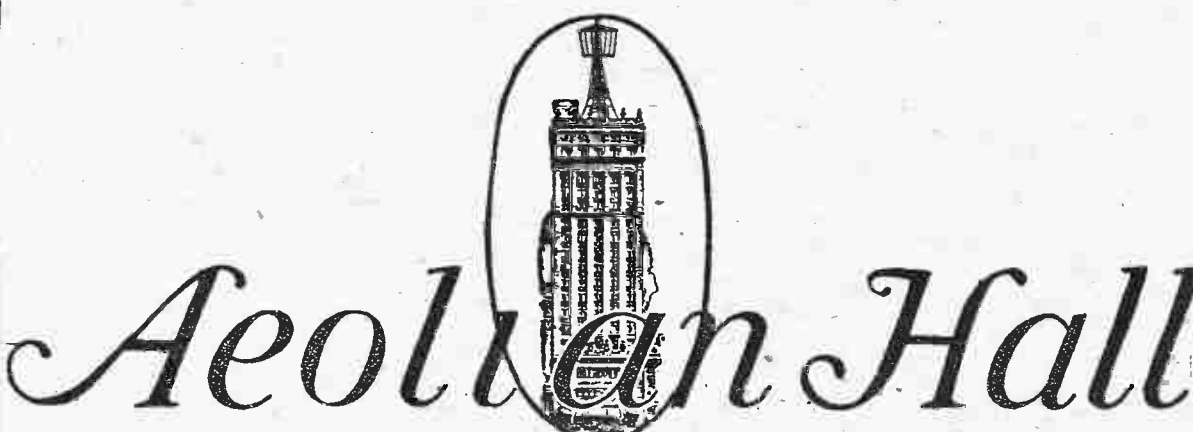
Schenectady and Washington, Springfield, Pittsburgh and Troy; New York, Chicago, Davenport, But, oh, it is a joy.  
To bring them through the silent night,  
From South and East and West,  
From Canada, up in the North,  
Scarce knowing which is best.

Aladdin's lamp could not compare  
With my dear magic box,  
That plays all kinds of instruments;  
That laughs and sings and talks.  
It brings to me the master minds,  
The artists of renown,  
And makes a great metropolis  
Of this small, quiet town.  
It gives me comfort, joy and cheer,  
And helps my soul to grow;  
I would not part with it for worlds,  
My friend, the radio.  
MYRTLE ANNA ALDRICH.  
Youngstown, Ohio.

Mr. Rice attended one of our social functions yesterday afternoon and asked that I write you his word of thanks and appreciation for the outfit. This man lives ten miles from the city on a small farm, and is too poor to buy even the daily or weekly newspapers, and his sources of information are limited to the occa-



Fleetwood Ward, an Indian scout with Custer in the Wild West in '69, is shown tuning in on his radio set, recently installed by local Boy Scouts. Mr. Ward is blind. The radio set is the gift of the New York Herald Tribune's Radio Fund for the Blind.



"WJZ" and "WJY" Broadcasting Headquarters for The Radio Corporation of America

The Aeolian Company stands behind every radio purchase — and Aeolian service, world-famous for courtesy and efficiency, insures continued satisfaction

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RADIOLA III.  
RADIOLA III-A  
RADIOLA-SUPER-HETERODYNE  
RADIOLA-SUPER VIII

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BURGESS BATTERIES ("A," "B," and "C" Dry Cells)

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EVEREADY 45-volt, large	Special
BRIGHT STAR Battery, Best by Test	Special
NEW APCO Charger	\$4.00
WESTERN ELECTRIC Phones	\$5.25
WESTON Plugs	.39
BRETWOOD Leaks	\$1.19
BEEDER Voltmeter, 0 to 50	.59
STERLING Voltmeter, 0 to 50	\$1.45
FEDERAL 65-65A Transformer	\$3.45
SAMSON 3-1 and 6-1 RATIO Transformer	\$2.95
MARCO DIALS	\$1.95
DUBILIER RADIO FREQUENCY	\$2.10
CARBORUNDUM CRYSTAL Det.	\$1.10
BROWNLEY VER. CRYSTAL Det.	\$1.25
BROWNLEY Refill	.55
Chargers for All Tubes	.39
C H Switch	.45
C H TOGGLE New Switch	.45
BATTERY CABLE	.59
New Type SICKLES Coils for Roberts	\$5.95
100-Amp. Rubber Case Storage	\$8.95
Ful Wave, Westinghouse, Balkite, Tungar and Unitron	
Chargers	Special
We Carry a full line of standard tubes: True-Blue, Magnavox, Do Forest, R. C. A., Cunningham, Daven, Schicklering	
NEW DAY FAN, CROSLY AND DAVID GRIMES	
SETS in stock	
\$30 Atlas Horn	\$9.95
FAMOUS JOURNAL 1-tube Set	\$2.49
FAMOUS 5-tube Set complete	\$42.50
NEW BRUNO 8 Tube Power Kit	Special
We carry a full line of Bruno parts for Diamond of the Air	
MAIL ORDERS PROMPTLY FILLED	

\$4.75

APOLLO

A loud speaker of surprising musical quality and volume. In the class with high-priced speakers. Artistically designed. Swivel neck type. Adjustable unit where volume and tone are at all times under control. Mail orders filled same day. Send no money. Just pay the postman.

RIX RADIO

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EMPIRE CONSOLE CABINET

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Consists of any at. also Batteries up to 30 in. long.

Special discount to dealers during this sale. Complete line of Cabinets and Consoles.

Empire Radio Cabinets, Mfg. Co.

Empire-United Hat Block Co.

312-314 East 22d St., N.Y., near 2d Av.



## Cunningham RADIO TUBES

are a definite economy when you divide first cost by hours of uninterrupted service.

**Add** the satisfaction that comes from the use of a standard product with ten years of leadership to its credit and your preference for Cunningham Radio Tubes is more than justified.

In the Orange and Blue Carton  
Types C-301A; C-299; C-300  
C-11; C-12

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182 Second Street - San Francisco  
CHICAGO NEW YORK

**\$2.50 Each**

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Our Dealer Service is unexcelled—immediate deliveries on all tubes including the new types.

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Auburn, N. Y.  
OFFICES: New York, Cleveland, Chicago

**SAVE AT NETSON'S**  
MONEY-BACK GUARANTEE

## Netson

THE HOUSE OF QUALITY SERVICE

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We always carry an unusual number of Specials of all the latest, Standard Radio Merchandise, for those **WHO BUILD THEIR OWN.**

A Complete line of Loud Speakers, Batteries, Chargers, KITS, Coils, Headphones, Condensers, Transformers, etc.

**AT LOWEST PRICES.**

For the Public's Convenience we have established a SPECIAL STORE, at 78-A Cortlandt St., two doors below our regular store, which is devoted entirely and exclusively to

## READY SETS

No Parts carried in this SET STORE, in order to be able to give you the best and most courteous attention. Expert Mechanics are always at your Service!!

### Radio for Railroad Communication

(Continued from page eighteen)

system. Mr. Boddie early appreciated the fact that a successful system must combine the ordinary automatic telephone system and the carrier current system, as it was known at that time, and bring them into a harmonious device.

Now, those of you who are familiar with automatic telephony appreciate that it is a very complex art and you likewise appreciate the complexity of the radio art. To bring those two developments into complete harmony, so that they will work reliably day in and day out was a decided accomplishment.

The Westinghouse company in the states has perfected an automatic system of carrier current communication applicable to practically any system of electrical conductors, and I shall describe it in detail, as it will doubtless find many uses on electrical railroads.

#### Description of Wired Wireless

You have, as you have in radio, a transmitter and a receiver. However, the antenna to which these parts are connected, instead of being suspended in the air, is suspended in close proximity to a high tension line or to a trolley wire. It is found that when the antennae are thus suspended the waves, instead of radiating off into space, follow these wires. They can be picked up therefore by suitable receivers that have their antennae likewise suspended in close proximity to the same elevated wire. There is no tuning done either at the receiver or transmitter. The adjustment is installed, and the operator merely talks as one would talk over a wire telephone. In order to obtain duplex communication; that is, in order to be able to talk from station No. 1 to station No. 2 at the same time that station No. 2 talks to station No. 1, two different frequencies are used. For example, transmitter 1 is adjusted to 60,000 cycles per second, and the receiver 1 to 50,000. This transmitter works with receiver No. 2 and transmitter No. 2 with receiver No. 1. You will note that the frequencies that are used are of the same order of magnitude as are the frequencies used in space radio communication.

A carrier current transmitter is very similar to a radio transmitter. It utilizes the same kind of vacuum tubes and much of the other apparatus is very similar. The main difference between this and the pure radio equipment is the frequency at which it operates. It, of course, has many automatic features not found in radio transmitters, but the basic features are the same. The transmitter is only in use during the talking operation. When the operator takes the telephone off the hook switch all tubes are connected to the source of power.

#### Carrier Current Receiver

The carrier current receiver is similar electrically to the radio receiver used on shipboard, but in construction to such receivers, carrier current receivers are all adjusted and locked when the equipment is installed. No adjustment is made during operation. The receiver is mounted in a manner similar to switchboard construction and is thus self-supporting.

An electrified railroad can thus utilize its power-carrying conductors or even telegraph wires to guide carrier current impulses and so augment its present wire communication facilities.

In the cases of long freight trains on electrified roads, particularly where there are a large number of curves, it is found that at times the air whistle on a locomotive is insufficient in volume to be heard the length of the train. In other words, if the engineer desires to signal the caboose or a helping locomotive very frequently the signal fails to get back. Many solutions have been suggested to alleviate this difficulty, but none of them has been practical, principally because they would require equipping every car on the entire system, the expense of which would be prohibitive. Finally carrier current signaling was suggested. It was proposed to utilize the trolley wire or third rail as the guiding medium and it would thus be necessary to equip the engines and cabooses only.

I have endeavored to give you very briefly an outline of some of the things that have been done in the way of supplying communicating facilities for the railroads.

## See the TIMMONS B-Liminator at the RADIO SHOW

Booth 98  
Mezzanine Grand Central Palace



Remember that it's the Timmons B-Liminator which has been so highly endorsed by Radio publications, authorities and newspapers. Takes the place of all B batteries and operates on any 110 volt 60 cycles AC light circuit. For sale by all good dealers.

Stop at Booth 98, Mezzanine, in the Grand Central Palace, and get one of these folders which quote authorities who have tested Timmons B-Liminators.

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## Up-to-the-Minute News of Radio in Pictures



Where New York City's radio shows are being held: The 258th Field Artillery Armory which houses the Second Radio World's Fair. (Right) Grand Central Palace, three floors of which are used by the fourth Annual National Radio Exposition.

America's Miss Radio 1925-26, Reno Jane Frew, Beaver, Pa., winner of a competition to determine the popular feminine listener.

In 1909 J.M. Stone was the owner of a horseless carriage and the first portable radio receiving set.

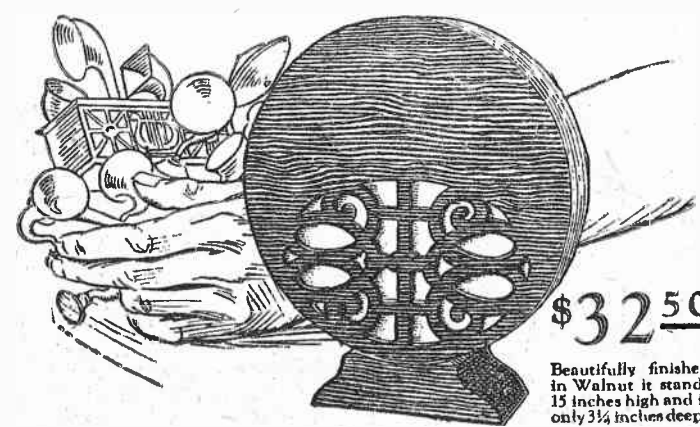
World's Champion Radio Enthusiast, W.D. Johnson, Cambridge, Mass., who rode a bicycle to Chicago to attend a Radio Convention

Sir Thomas Lipton, his crew, his yacht, and the radio receiver which helped him win a boat race



# BUILT LIKE A VIOLIN TELEPHONE CABINET SPEAKER

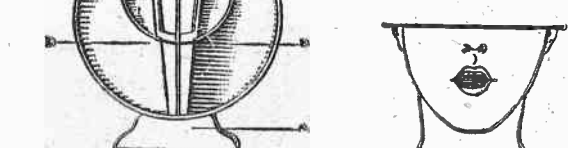
"Makes Any Receiver Sound Better"



There's Now Just  
One Loud Speaker

TELEPHONE—hear it at any of the dealers' listed below—test it on any receiving set. You'll be amazed at the difference. Telephone reproduces with exact naturalness of tone—a jazz band, with its eccentric instrumentation, a symphony orchestra with its exquisite shading and tonal quality, any instrument, any voice—all with absolute naturalness. This is why—

The New Telephone Principle of Sound-Wave Conduction and Amplification—Based on Structure of Throat and Mouth



Refer to the above sectional view of Telephone. Note that a sound-wave coming from the sound producing unit "A" (the human vocal cords) is amplified through the orifice "B" (the human larynx) until it reaches the conducting area "C" (the back of the throat), whence it is again conducted to the point of greatest amplification "D" (the correctly formed and opened mouth of the singer).

## HEAR IT AT

**MANHATTAN**  
Municipal Radio Stores, 174 Greenwich St.  
John Wanamaker, 345 Broadway  
Jolley Radio Co., 297 Sixth Ave.  
Jake Klein, 1170 Broadway  
Elite Radio Co., 419 Eighth Ave.  
C. J. S. Radio, 170 W. 84th St.  
Ace Electric Co., Inc., 204 W. 84th St.  
Ludwig Baumann, Eighth Ave. & 35th St.  
Morrison Electrical Supply, 21 E. 40th St.  
Wuritzer, 424 St.  
Herbert & Huesgen, 18 E. 42d St.  
General Electric & Radio, 524 W. 42d St.  
Chas. W. Down Radio, 711 Eighth Ave.  
G. F. Ackert, 115 W. 44th St.  
H. Roy, 110 W. 46th St.  
Uneda Radio Shop, 852 Eighth Ave.  
Flex-O-Dyne, Broadway and 52d St.  
Marconi Bros. Music Shop, 120 E. 59th St.  
Conecna Distributing Co., 2018 Broadway  
Horn Electric Supply Co., 205 Amsterdam Ave.  
Almanac Radio Shop, 2050 Broadway  
Dreher Radio, 815 Amsterdam Ave.  
Riverside Radio Shop, 200 W. 84th St.  
West End Radio Co., Inc., 2511 Broadway.

**BROOKLYN**  
Harlem Radio Exchange, 2067 Third Ave.  
Nissan Radio & Battery Co., 909 Westchester Ave.  
Morris Music Shop, 1438 St. & Lenox Ave.  
Tremont Radio Phone Co., 541 E. Tremont Ave.  
F. Farr, 531 E. 168th St.  
Edmore Radio, 893 E. Tremont Ave.  
Jerome Electric Co., 1305 Webster Ave.  
Webster Radio Co., 2525 Webster Ave.

**LONG ISLAND**  
First Electric Co., 53 Vernon Ave.  
Etabl Bros., 14 Astoria Sq., Astoria.  
Garam Bros., 295 Ditmars Ave., Astoria.

**WHOLESALE DISTRIBUTORS**  
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Silas E. Pearsall Co., 10 East 39th Street  
R. H. McMann, 122 Chambers Street

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## SERVICE

FROM NEW YORK STOCK  
Fabricating, repairing, and  
stripping of Fibre and Color, and  
specialties and parts. Radio pieces  
drilled, milled and machined to specifications.  
We can now give service on our new  
gang-slicer for adjusting dials and other  
parts metal.  
EDGAR G. OETERS, Dept. H, 206 Lafayette  
St. (bet. Spring & Broome Sts., N. Y. C.)

## BRACH COMPLETE AERIAL OUTFITS

Each Part A Radio Engineer's  
Choice. Insure Maximum Results

## AMATEUR AKICKBACKS

It is just about this time of year that every enthusiastic radio amateur begins to become more interested in the radio art than he has during the last summer. The warm days of the summer make it rather hard for the "brass pounder" to stick at the key and try to communicate with his fellow enthusiasts. The fierce summer static does all in its power to discourage him, and the result is he gradually drifts away from radio and turns toward other sports more adapted to the summer weather.

But now the summer is slowly but surely slipping away—the days are becoming cooler and the static is beginning to fade away into oblivion as if beat by the oncoming fall and winter. As a result the hand of the amateur begins to itch for the "key" and he longs to hear the "chirp" of the continuous-wave transmitter of some other member of his fraternity in some other state or possibly in some distant land.

With renewed interest he dusts off his old transmitter and cleans the receiver in anticipation of the coming season—the season which every dyed-in-the-wool amateur awaits for each year.

All evidence points toward an excellent year for amateur radio this winter. There are more amateurs operating on the ultra-short wave lengths and the majority of them seem to be good operators. We have noticed during the last few weeks that there is an absence of the "CQ hound" on forty meters. Those who are using this signal are using it correctly.

Foreign amateurs have started to arrange test schedules on 30 meters and less during the daytime for the especial purpose of establishing two-way daylight communication between the two great continents. Undoubtedly the American and European amateur will be communicating while the sun is above the horizon before the ghost of winter has passed. This is something to strive for, and those of us who are fortunate to be home in the daytime should listen for the signals of our foreign cousin in effort to gain communication during the daytime.

The MacMillan expedition is at last heading for home after having a successful winter as far as radio was concerned. It is said that not a single night passed without some amateur in the United States having communicated with either WNP or WAP. Now that the expedition is homeward bound in all probability there will be an increased amount of traffic bound for various points, all of which will be of great importance to the receiver. Therefore every amateur should strive to maintain constant communication with the Arctic expedition and relay all messages to their destination without the slightest delay.

It seems that the signals of WAP have been more consistent than those of WNP, which is probably due to the better antenna equipment aboard the Perry. WAP is easily distinguished by the peculiar note emitted by the transmitter. It is not a perfect direct current note, but seems to have a ripple and seems to surge when the key is pressed. This expedition has established the dependability of the short waves and has added another volume to the history of amateur radio.

Word has reached us that the experimental transmitter of the Bureau of Standards, located at Washington and known to the amateur fraternity as NKF, is to transmit time signals on short waves at 6 a. m. daily. The wave length that is to be used is 71.5 meters. Incidentally this will serve as an excellent means for the amateur to calibrate one point in the 80 meter band of his receiver.

It is understood these signals are to be transmitted for the special purpose of the Austrian amateur.

During the past few weeks there has been an absence of amateur signals on the 150-200 meter wave band. There are only a few of the old-time stations using this band and those who are employing its use are seldom heard. In spite of the few stations operating we succeeded in communicating with several ninth district stations and 5ANL the other morning.

We received word from 2BW that he is away on a second vacation, but intends to return soon and rebuild his short wave transmitter. It will probably employ a fifty-watt tube.



## another leader added to the Sibley-Pitman Line

ADHERING strictly to its policy of handling the products of only the leading manufacturers in each branch of the electrical industry, SIBLEY-PITMAN now announces that it will sell to the public, through reliable radio dealers, RCA Radiolas, Radiotrons, Radiola Loudspeakers and RCA accessories.

In buying RCA products from radio dealers serviced by SIBLEY-PITMAN your purchase is backed by three dependable organizations—RCA, SIBLEY-PITMAN and the carefully selected radio dealer in your neighborhood.

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Radiolas  
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American Blower Ventilating Fans  
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S-P Vacuum Cleaner  
Universal Heating Appliances  
Hotpoint Heating Appliances  
Wahle Lighting Fixtures  
Jeannette Glassware  
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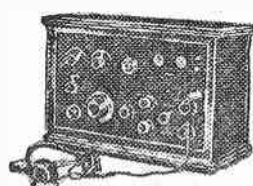
## This Is Your Chance

An opportunity like this will never again be presented as long as you live. This is not just advertising talk, but a statement of Fact Which Cannot Be Contested, Disputed or Doubtful. Please Note—We advertised 1,400 of type 110 sets in the Times, Telegram, Sun and Herald-Tribune last week. Hundreds bought from all over the country. They're going fast—very fast. First come—first served.

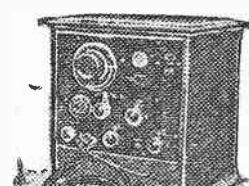


Please consider—The Federal is a Ten Million Dollar Corporation (\$10,000,000) and the Federal is one of the best sets on the market.

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Type 59 Receiver  
4 TUBES  
List \$177.00.



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The receiver comprises one stage of radio detector and two stages of audio frequency amplification with a control which allows the degree of amplification to be varied between wide limits.

Our  
Sale  
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The Type 110 radio receiver consists of one stage radio detector and one stage of audio frequency amplification with a control which allows the degree of amplification to be varied between wide limits.

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Free!  
to  
you

Including in the purchase of either one of these sets, we will give ABSOLUTELY FREE a \$7 Federal Head Set and an 80c Phone Plug.

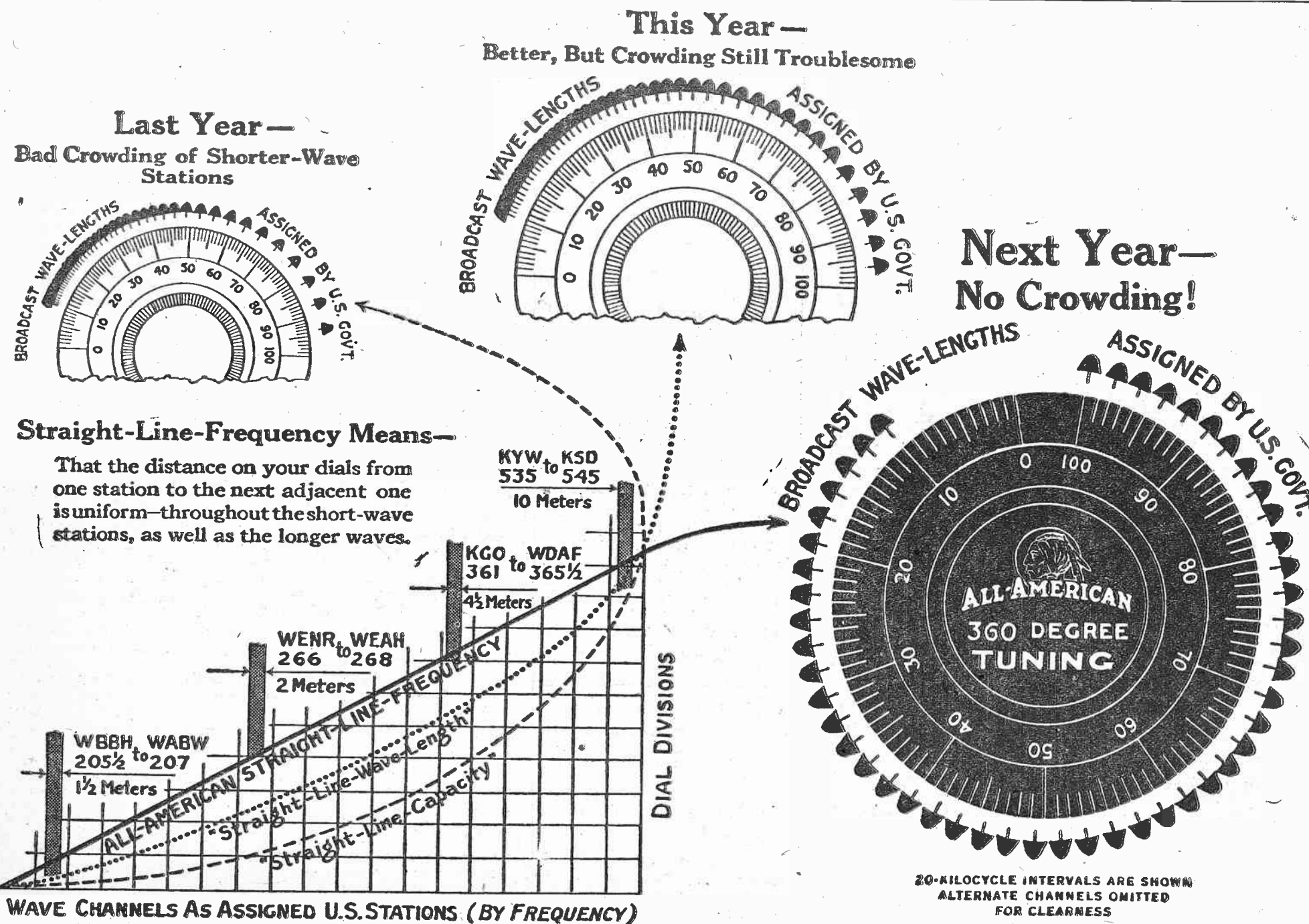
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All-American Straight-Line-Frequency Condensers  
Type C-35 Max. 350 micromicrofarads (Min. 10.5 mmf.) ..... \$4.50  
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All-American Toroid Coils  
Type T-1 Antenna Coupler \$3.50  
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Set of 3 Coils complete . . \$10.50

Ease and certainty in tuning—no more crowding of short-wave stations—no need to buy vernier dials—no gears or other back-lash makers—body capacity absolutely *not distinguishable*—electrical efficiency unsurpassed—on one-half the panel space: that is the All-American Straight-Line-Frequency Condensers.

New power for distance reception through close coupling—tuning of arrow-like sharpness—elimination of all oscillation worries through the self-enclosed endless magnetic field—non-radiating reception: that is All-American Toroid Coils—Antenna Coupler and Radio Frequency Transformers. See them at your dealer's.

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OWNING AND OPERATING STATION WENR—266 METERS

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Pioneers in the Radio Industry



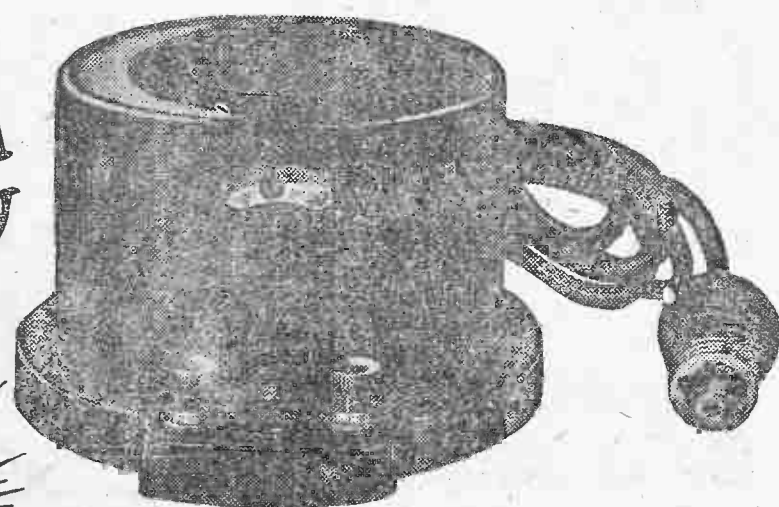
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Every night thousands of APCO Chargers go to work—when morning comes an equal number of batteries are FULLY CHARGED. Because of its handsome appearance and quiet operation most people keep it by the receiving set, ready to hook-up instantly.

It does its ten hours' work for a nickel!

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"B" Eliminator Kit, No. 65 \$30.00  
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Victory Electric Supply Company, 1207 Bedford Avenue, Brooklyn

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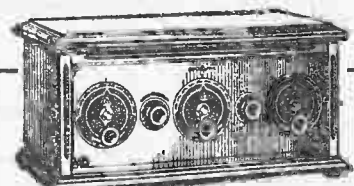
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There's no backlash in the new Fynur dial. It operates by friction (beveled, gearless wheels) and will give absolute accuracy.

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Newark, N. J.

## The Use of Radio as a Means of Communication for Railroads

G. Y. Allen Urges the Use of Wireless Systems for Emergency Work; Sets May Be Installed at Small Cost; Wired Wireless Suggested

AT THE fall meeting of the Canadian Railway Club, which was held at the Windsor Hotel, in Montreal last Tuesday evening G. Y. Allen, assistant to manager, radio department, Westinghouse Electric and Manufacturing Company addressed the members on the subject "How the Railroads Can Use Radio." Abstracts from Mr. Allen's speech are as follows:

Reliable communication and signaling are of paramount importance in the efficient operation of any railroad. Radio communication's first appeal is the fact that its continued performance does not depend upon the continuity of electric circuits far removed from the immediate jurisdiction of maintenance personnel. On the other hand, there are certain limitations in the application of radio as a means of communication, and there has rightly been a great deal of conservatism on the part of all railroads in using this new communicating system. I am not suggesting, therefore, the adoption of radio as a system that will supersede the present systems in use, but I intend rather to point out some things that have been done in this comparatively new field and to outline some of the possibilities of the future.

The development of radio communication for use by railroads in the United States, is being actively pressed by the Telegraph and Telephone Section of the American Railway Association, and much of the progress there is directly traceable to the co-operative assistance of this organization. They have developed the fact that the most urgent present need of the railroads for radio communication lies in the following classes: 1. Spacing radio communication of emergency purpose. 2. Communication over existing telegraph and power wires to increase number of communicating channels. 3. Communication between front and rear ends of long freight trains. 4. Portable apparatus suitable for attaching to hand cars or gasoline driven cars to cover moderate distances in an emergency. 5. Short range portable sets that can be carried by track walkers.

Practical Applications

An interesting application of a low power radio set has developed in this country, due to the severe rainstorms that sometimes occur in the Middle West. It happens at times that bridges are washed away or parts of the roadbed are so seriously damaged that trains cannot pass. Generally the storm interrupts the communication system at the same time, and the entire railroad is divided by the area damaged. The railroads feel that if they had a small emergency radio telegraph system mounted on a hand car this emergency equipment could be brought into play to bridge the damaged area. No actual tests have been made of such a system up to the present time, but doubtless apparatus will be designed for this specific purpose in the near future.

### Railroads Use Radio

The most obvious application of space radio communication, is to supplement the present wire communicating system in case of emergencies. When wire telegraph or telephone lines are made inoperative due to storms, stand-by radio telegraph or telephone systems can be used to maintain the running of trains. Some of the railroads in the states have gone to the expense of installing equipment for such emergency purposes, and when the emergency has arisen, the expense of radio equipment has been entirely justified. A nominally powered continuous wave transmitter will cover considerable distances, particularly in the winter time when storms are most severe, and consequently when emergency equipment is most needed, and in most cases, moderate powered equipment will perform satisfactorily.

A continuous wave telegraph transmitter that has a wide range in wave lengths (600 to 2,500 meters), and which has an output of 500 to 750 watts, will work reliably over a distance of 500 to 1,500 miles, depending upon whether it is used during the day or night. The cost of equipment for a station of this power output, exclusive of masts, would be well under \$4,000.

### Possibilities of Short Waves

The use of short wave telegraph equipment where licenses can be obtained to use short waves, presents a very interesting development that the railroads will doubtless use. While short waves are subject to erratic behavior at times, they are sufficiently reliable to warrant a thorough investigation.

The method of accomplishing the keying operation on our short wave sets is extremely interesting. We simply modify a standard telegraph sounder by employing an aluminum lever, somewhat longer than the standard. On the end of this lever is mounted an aluminum disc 1 1/2 inches in diameter. If the sounder operates this aluminum disc is moved closer to or farther away from a similar stationary disc, but is separated therefrom by a circular piece of mica. The two discs form a condenser that is part of the oscillating circuit. When

the sounder is "down" the capacity of this condenser is greater than when the sounder is up, and this serves to change the frequency of the emitted wave. The change is extremely slight, and width of the wave band used for each transmitting station is, therefore, reduced to a minimum.

For a given distance, the cost of installation of the short wave equipment is perhaps lower than for any other type of radio equipment. No elaborate towers are required to support the antenna, and the distance that can be covered per kilowatt of energy is large.

Either the short wave or long wave pure radio system may be used for emergency purposes or for regular communication between salient points. It may be further augmented to communicate with a moving train. Communication with a moving train, however, is fraught with difficulties, due to the fact that the antenna on board the train must necessarily be low to come within the tunnel clearances, etc. Such a low antenna forms an efficient receiver, but it is impossible to transmit great distances from the train.

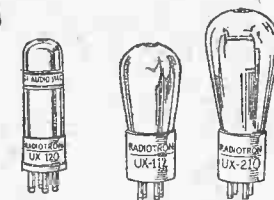
A more recent development of the radio art is shown as the carrier current communicating system. This system uses the same high frequency alternating current as does the space radio communicating system, but, instead of the energy being radiated from an elevated antenna, it is guided by wires already existing and it travels along these wires. The signals are picked off by receivers at various points along the system.

In such a system the energy is confined to the wires to which it is supplied and interference with other stations is thus greatly reduced. Furthermore, the reliability of the system depends to a very large degree on the proper maintenance of the terminal apparatus and is not entirely dependent on the electrical continuity of wires themselves. For instance, if the system were applied to an existing set of telegraph wires or power wires, the breakage of one or two of these wires would probably not interfere with the successful performance of the system. As a matter of fact, it has been possible to communicate through wires that were completely discontinued for short distances. The application of such a wired wireless system to existing wires does not in any way interfere with their normal use.

As this system is comparatively new, a brief detailed description of it will doubtless be of interest. About fifteen years ago some preliminary experiments were conducted with this new communicating system. Instead of sending the energy across the space, as was done in the space radio system, it was applied to wires. It was found that the energy followed those wires substantially and did not radiate from them. The advantage, of course, was that less power was required to cover a given distance and that the signals were received only at the point to which they were directed.

A Westinghouse engineer, C. A. Boddin, is largely responsible for directing these early experiments into a practical carrier current telephone

(Continued on page twenty)

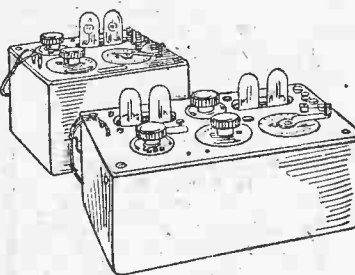


New Radiotrons, to be used in the last audio stage.

Radiotron UX-120, for great volume on dry batteries . . . \$2.50

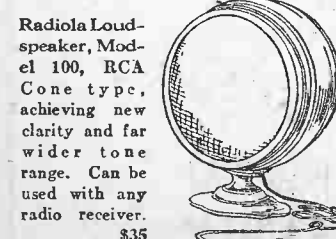
Radiotron UX-112, similar to Radiotron UX-120-A, but several times as powerful . . . \$6.50

Radiotron UX-210, a super-power tube several times as powerful as UX-120. . . \$9.00

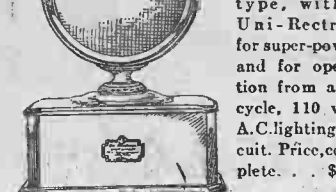


Radiola III, a two-tube set of antenna type. Over 300,000 already in use! A distance-getter with the headphones. Without accessories . . . \$15 With 2 Radiotrons and headphones . . . \$24.50

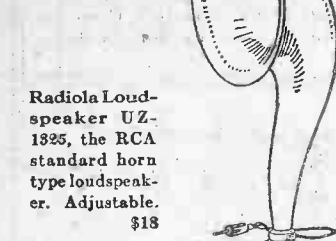
Radiola III-a, a four-tube Radiola that is known from coast to coast. Without accessories . . . \$35 With 4 Radiotrons and headphones . . . \$49.50



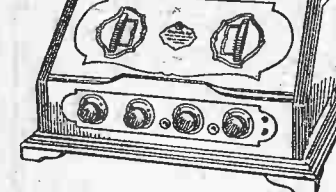
Radiola Loudspeaker, Model 100, RCA Cone type, achieving new clarity and far wider tone range. Can be used with any radio receiver. . . \$35



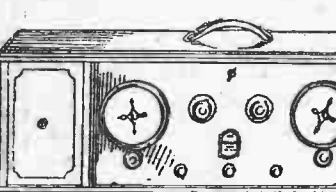
Radiola Loudspeaker, Model 104, the RCA Cone type, with a Uni-Rectron, for super-power, and for operation from a 60 cycle, 110 volt A.C. lighting circuit. Price, complete . . . \$140



Radiola Loudspeaker, Model 104, the RCA standard horn type loudspeaker. Adjustable. . . \$18



Radiola 20, an entirely new five-tube tuned radio frequency set, with regeneration. Antenna type, with the new dry battery power Radiotron. Without accessories . . . \$101.50 With 5 Radiotrons . . . \$115



Radiola Super-Heterodyne, standard six-tube Super-Heterodyne. Used with new power Radiotron UX-120 it gives greater volume and finer tone than ever. Without accessories . . . \$116



Radiola 25, (pictured above) a six-tube uni-control Super-Heterodyne, that uses the new power tube. It has space in the cabinet for dry batteries, but can be used with Loudspeaker, Model 104 without batteries. With 6 Radiotrons . . . \$165

## New principles in radio developed by RCA

RCA, General Electric and Westinghouse manufacturing skill and experience—of General Electric and Westinghouse. These Radiolas embody new principles of radio reception—achieve new standards of performance—fulfill the responsibility which America places upon RCA for leadership in radio.

The new Radiolas meet the requirements of all five fundamentals of good radio reception.

1. **Quality of Tone**—Faithful reproduction of tone is the most important element in the enjoyment of radio. Now by the development of new Radiotrons, together with loudspeakers built on an entirely new principle—and by the acoustical synchronization of all elements from the broadcasting station to the receiver—RCA has brought quality of tone to a perfection never before possible. The new speakers are capable of tremendous volume without distortion and achieve faithful reproduction in every range of tone, high or low.

2. **Volume of Tone**—Even the most perfect tone, to be fully enjoyed, must reach your home with sufficient volume. The new Radiotrons give greater volume on dry batteries than storage battery sets give today—and they make possible amplification up to tremendous power. The new loudspeakers give forth this increased volume of sound without distortion.

3. **Selectivity**—The most perfect reception can be destroyed by an interfering station; therefore selectivity is tremendously important. The new Radiotrons give greater volume on dry batteries than storage battery sets give today—and they make possible amplification up to tremendous power. The new loudspeakers give forth this increased volume of sound without distortion.

4. **Distance Range**—In these modern days of broadcasting, Reception should be able to listen with enjoyment to distant as well as local stations. The Super-Heterodyne is already famous for distance reception. With the new tubes and the new loudspeakers, greater amplification is possible without distortion of the tone. This means enjoyment of improved distance reception.

5. **Simplicity of Operation**—Tuning Easy tuning—exact tuning—with-out technical knowledge of radio, has been carried to the last degree by a new uni-control system, at last accomplishing single control tuning without sacrifice of quality or selectivity.

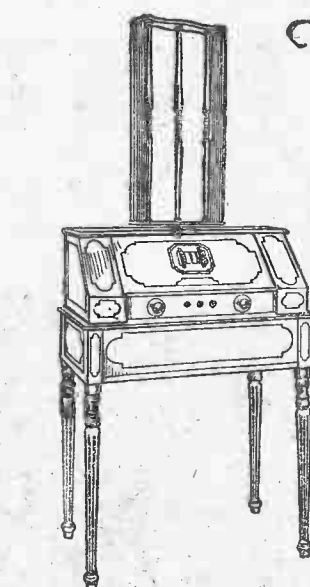
Sets without batteries—operated directly from the 110 volt, 60 cycle A.C. lighting circuit, without batteries. They are attached as easily as your vacuum cleaner or electric lamp.

In addition to new developments in radio, RCA has achieved a record in low price for highest quality reception, by greatly reducing the price of Radiolas that have already proved their worth.

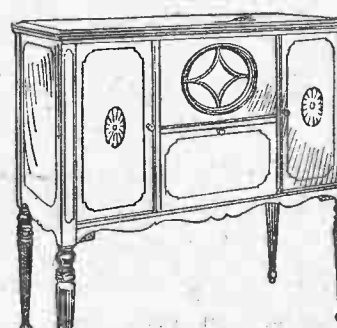
SEE all the new RCA Radiolas and RCA Loudspeakers at the Radio Show this week. HEAR them all this week at the private demonstration in the Hotel Pennsylvania, Southeast Ballroom. Ask for cards of invitation at the Radio Show, Grand Central Palace, Booths 17 and 18.

# RCA-Radiola

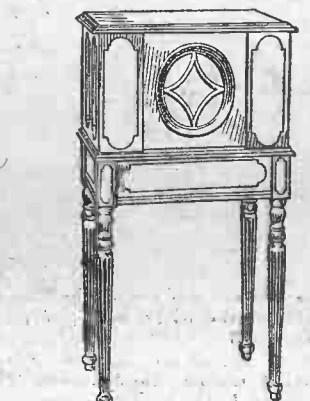
MADE BY THE MAKERS OF RADIOTRONS



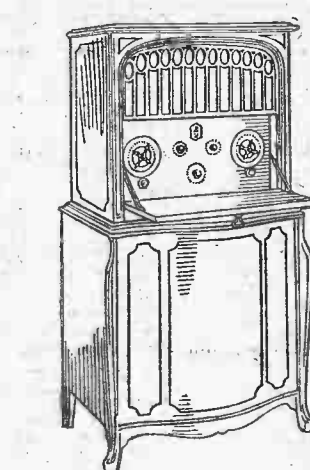
Radiola 28, eight-tube uni-control Super-Heterodyne, extremely selective. It gives great volume on dry batteries, or if used with the Model 104 Loudspeaker, all batteries can be replaced by 110 volt, 60 cycle A.C. lighting current. With 8 Radiotrons . . . \$260



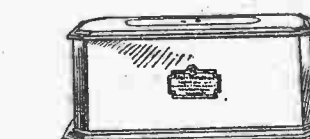
Radiola 30, a beautifully cabinet eight-tube Super-Heterodyne, with uni-control. It contains the new Cone type Loudspeaker, Model 100, and also—needs no antenna or batteries, but operates on the 110 volt, 60 cycle A.C. lighting current. It is remarkable for faithful reproduction of tone, and is capable of great power. Entirely complete. . . \$575



Radiola Loudspeaker, Model 104, has volume, range, and amazing acoustical fidelity never before achieved. Built on an entirely new principle. With Radiolas 25 or 28, it can be made to replace all batteries, operating entirely from 110 volt, 60 cycle A.C. house current. With all tubes . . . \$245



Radiola Super-VIII, the famous standard six-tube Super-Heterodyne, in a cabinet that encloses both loop and double loudspeaker. Including the new dry battery power tube, entirely complete, except batteries. . . \$340



RCA Uni-Rectron, a rectifier-amplifier unit, that may be used to operate any type of loudspeaker from a 60 cycle, 110 volt A.C. lighting circuit. Complete \$105

RCA Duo-Rectron, a "B" battery eliminator that will supply plate voltage to any type of receiver. It provides uniform voltage at lightest or heaviest current output. Operates from 110 volt, 60 cycle A.C. lighting circuit. Complete \$65

Write for booklet giving descriptions in more complete detail. Address the RCA office nearest you.

Radio Corporation of America  
Chicago New York San Francisco



# The Boston Post

## Now Leads

by

# 95,101

lines of

## RADIO ADVERTISING

and the lead is constantly increasing

Here Are the RADIO ADVERTISING  
Figures for the First Eight Months of 1925:

	LOCAL Radio Advertising	NATIONAL Radio Advertising	TOTAL Radio Advertising
<b>Boston Post</b> (Week-Day and Sunday)	<b>115,877</b>	<b>108,306</b>	<b>224,183</b>
<b>Herald-Traveler</b> (Week-Day and Sunday)	<b>48,892</b>	<b>80,190</b>	<b>129,082</b>
<b>Globe</b> (Week-Day and Sunday).....	<b>51,225</b>	<b>40,973</b>	<b>92,198</b>
<b>American</b> (Week-Day)	<b>26,536</b>	<b>46,419</b>	<b>72,955</b>
<b>Advertiser</b> (Week-Day and Sunday)	<b>22,727</b>	<b>13,573</b>	<b>36,300</b>

### For The Eight Months

The Post LEADS the Herald-Traveler by 95,101 lines  
The Post LEADS the Globe by - - - - - 131,985 lines  
The Post LEADS the American by - - - 151,228 lines  
The Post LEADS the Advertiser by - - - 187,883 lines

## For 16 Consecutive Years The Boston Post Has Led in Total Display Advertising

Here are the figures, furnished by the Boston Newspapers' Statistical Bureau, showing the volume of Display Advertising (excluding all Classified) published from Jan. 1 to Sept. 9, 1925.

	Agate Lines	
<b>BOSTON POST</b> (Daily and Sunday).....	<b>7,159,035</b>	
<b>Boston Globe</b> (Daily and Sunday).....	<b>6,740,672</b>	Post LEADS by 418,363 lines
<b>Herald-Traveler</b> (Daily and Sunday).....	<b>6,729,741</b>	Post LEADS by 429,294 lines
<b>Boston American</b> (Daily) .....	<b>2,523,889</b>	Post LEADS by 4,635,146 lines
<b>Boston Advertiser</b> (Daily and Sunday).....	<b>2,255,424</b>	Post LEADS by 4,903,611 lines

Turn In On THE BOSTON POST For Results In The New England Market

### Routes Leading to This Week's Shows

While two radio exhibitions are being conducted in this city at the same time, although widely separated, it is possible to attend both in the same evening. The one in the 258th Field Artillery Armory, on Kingsbridge Road, leads directly to the Lexington Avenue subway, which has a station at Grand Central. The other exhibition is being conducted at the Grand Central Palace, Lexington Avenue and East Forty-seventh Street. The nearest station is at the Grand Central. The express time between the Grand Central and the Kingsbridge Road station is twenty-eight minutes.

The exhibition in the armory may be reached by subway, elevated and surface car. The routes follow:

Subway  
East Side. Lexington Avenue line—Jerome Avenue-Woodlawn express to Kingsbridge Road.

West Side. Lenox Avenue-Bronx Park express to Mott Avenue station, transferring (upstairs) to Jerome Avenue-Woodlawn express to Kingsbridge Road.

West Side. Broadway-Van Cortlandt Park express to 225th Street station (Kingsbridge Road). Walk east or take Bronx Park trolley to armory.

Elevated  
Sixth Avenue local to 167th Street and Jerome Avenue, changing on same platform to Woodlawn express to Kingsbridge Road station. During rush hours take Sixth Avenue express.

Ninth Avenue local to 145th Street, changing to Sixth Avenue and 167th Street train as above. During rush hours: Ninth Avenue express to Fordham Road, changing on same platform to Woodlawn express to Kingsbridge Road (one station).

East Side. Third Avenue "L" express to Fordham Road station (these express trains operate all afternoon until about 6:30, after that express to 125th Street, then local). Take Van Cortlandt Park trolley at foot of "L" station to armory.

Surface Cars  
Any northbound Bronx trolley (Southern Boulevard, Third Avenue, Webster Avenue) to Fordham Road, transferring to Van Cortlandt Park line direct to armory.

From Manhattan. Third Avenue trolley from 125th Street and Third Avenue (Broadway-225th Street line) to terminus, then walk or ride east on Kingsbridge Road to armory.

The exhibition in the Grand Central Palace may be reached by first going to the Grand Central Station and then walking to Forty-seventh Street, or taking a surface car which runs along Lexington Avenue and passes directly in front of the Palace.

Automobile routes to the Kingsbridge Road exposition follow:

East Side  
Fifth Avenue to 138th Street, right over Madison Avenue Bridge to Mott Avenue, to Concourse, to Kingsbridge Road, to armory.

West Side  
Broadway to 225th Street, right up the hill to the armory.

Riverside Drive to end at Dyckman

### Amateurs Aid Each Other in Northland

An interesting story of assistance rendered by one radio amateur to another is told about the MacMillan and Canadian government Far North expeditions when they were both at Etah, Greenland. The Canadian government steamer Arctic, on which Robert McA. Foster is operator, had some difficulties with its short wave radio transmitter that hampered communication with Canadian members of the American Radio Relay League.

At Etah Foster called in two brother members of the league, also distinguished for their contributions to amateur radio records with exploring expeditions. John L. Reinartz, noted exponent of short wave radio transmission theories and operator of WNP, radio station on board the Bowdoin, flagship of the MacMillan expedition, with Paul J. McGee, operator of WAP, the Peary station, worked as consultants with Foster in improving the sending qualities of VDM, station of the Arctic.

Foster, who, by the way, bears the title of "District Superintendent of the Canadian Arctic Region," thus acting as an American Radio Relay League headquarters station for that section of the world, has been getting the messages from VDM back with greater regularity since the work was completed.

Reports of reception of messages from VDM have been made by a number of member stations of the league, with Walter Ellis, owner and operator of station 5AGN, at Oklahoma City, Okla., as the station farthest south in the group. Ellis reported hearing VDM call several Canadian amateurs and then hearing the stations working each other.

### New Radio Store Opens

The Fanmill Radio Company, a corporation formed by merchants who are said to have had many years of experience, opened a new radio store at 62 Cortlandt Street, of this city. The owners of the establishment have not spared expense in furnishings. Sound-proof booths containing distinct wiring systems are installed so that any set may be instantly demonstrated.

The store also has a part department in which parts which are usually difficult to obtain may be purchased. The salesmen have an accurate knowledge of the radio art.

### Rumania Now Allows Sets

On June 8, 1925, the Rumanian Parliament passed an act permitting the use of radio receiving sets in that country. It is expected that a worthwhile and active market will soon

Street, north on Broadway to 225th Street and as above to armory.

Westchester County  
Hudson River towns—South on Broadway to 225th Street, up the hill to the armory.

Harlem River to division towns—Bronx River Parkway south to Gun Hill Road, west to Jerome Avenue, to armory.

Sound Shore towns—Boston Post Road to Bronx and Pelham Parkway, continuing into Fordham Road to Jerome Avenue, north to armory.

### SAVE with SAFETY at VIM

We are Authorized Agents for the following:

**Brunswick** RADIOLA  
**Stromberg-Carlson**

*Frederick C. Simmons*

**RADA** NEUTRODYNE

**RCA** All Products

**FRESHMAN MASTERPIECE** **JEWETT**  
**APCO** **ATWATER-KENT**  
**Poolley** **CONSOLE** **APEX** **SONORA**

*David Grimes*

**Exide** and **VALEY** Products

any other nationally advertised sets sold on easy terms. No interest charged.

Liberal Allowances Made on All Old Sets in Exchange for 1925 Models

OPEN EVENINGS

**VIM** 66 Cortlandt St. **VIM**

*Again They said it couldn't be done!*

**Here it is**

New and Improved  
**FRESHMAN  
MASTERPIECE**

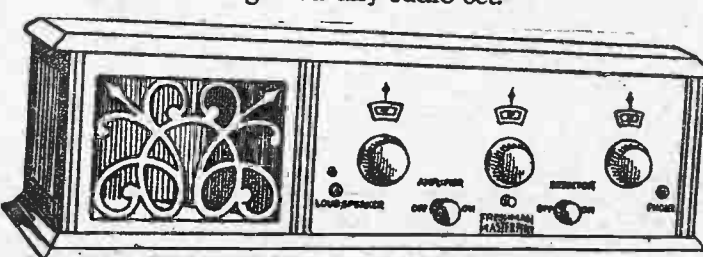
**\$60**

**But now . . .**

Complete with built in loud speaker of great volume and superb tone quality.

**Encased in . . .**

As fine a heavy genuine solid mahogany cabinet as ever graced any radio set.



Model  
5-F-5

**At sixty dollars . .**

Not only complete with built in loud speaker and massive mahogany cabinet, but this wonder circuit has been scientifically perfected and each and every single part strengthened and co-ordinated.

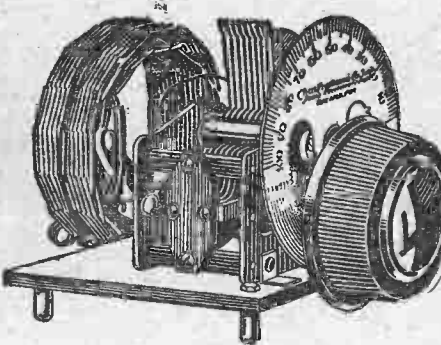
**For example . . .**

The new Freshman Masterpiece straightline wave length condenser with vernier attachment which assures hair-line selectivity—permitting you to tune in the station you want without interference over the entire wave length range. This is merely one exclusive feature of the

**World's Greatest Radio Receiver**

For sale at AUTHORIZED FRESHMAN dealers only

**Chas. Freshman Co. Inc.**  
Radio Receivers and Parts  
FRESHMAN BUILDING  
240-242 WEST 40TH ST. NEW YORK, N.Y.  
CHICAGO OFFICE — 427 S. LA SALLE ST.



See our line at  
both shows—  
Booths 53-57  
at  
the Armory  
Booths 66-67  
at  
the Palace

### Leading Radio Manufacturers

recognize McMANN SERVICE as the sure fire "Contact Point" for distribution of their profit building products.

Dealers who want Close Contact and Complete Jobbing Service can have it from us—Now.

Cunningham Tubes

Burgess Batteries  
Philco Batteries  
Amplion Speakers  
Teletone Speakers  
Marvodyne Sets

Balkite Chargers  
Ward Leonard Chargers  
Paragon Sets  
Akradyne Sets  
Tone-a-dyne Sets

Remler Parts  
Pacent Parts  
Frost Parts  
Blandin Cabinets  
Signal Cabinets

Timmons B Laminators and Speakers  
Haynes Griffin Parts  
Bremer Tully Parts  
Sangamo Condensers  
Fiat Loops  
Deutsche Collapsible Loops

Karas Straight Line Condensers  
Weston Meters  
Jewel Meters

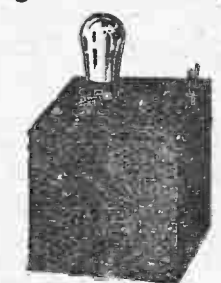
We are distributors for every part from Binding Posts to Complete Sets.

"When Close Contact Is Required  
McMANN Service Is Desired."

**R.H.McMann, Inc.**

Distributors of Radio Equipment,  
122 Chambers Street, New York  
Telephone Walker 2100

### Waage "B" Eliminator



At last! A "B" Battery Eliminator that has no hum, that will give complete satisfaction on all receiving sets and is within the MEANS of every Radio fan.

**JUST THINK OF IT!**

**ONLY \$22.50** (without tube)

Use your old tube that will not operate in set but still lights. Cost one-twentieth of a cent per hour. Will save you enough in a year to pay for itself.

Guaranteed. Money back if not satisfactory.

Mail orders promptly filled.

**A. H. WAAGE**

6 Reade Street, New York

### SEND FOR PRICE LIST

**D-X**  
TRADE MARK  
WHOLESALE OF  
RADIO SETS—PARTS  
ACCESSORIES

Distributors for

**CROSLY**

ULTRADYNE

KING CHARGERS

B. M. S. PRODUCTS

ALL-AMERICAN

DUBILET

BALKITE

DAVEY

AMSCO

and 25 Other Standard Brands

**Specialty Service Co.**

"Service is our middle name."

9 Hanson Pl., op. L. I. R. R.

Brooklyn, N. Y. Nevin 7670-7671



## Selling Fast! The Radio Sensation of the Season!



**5-F-5 New and Improved Freshman Masterpiece  
5-Tube Tuned Frequency Radio Receiver!**

On Terms as Low as  
\$1 Weekly

**\$60**

What Other Set Offers  
So Much for \$60?

*Truly the Wonder Set of the Season!*  
*Read These Specifications*

Built-in loud speaker in same one-piece cabinet containing the set. The loud speaker is of great volume and superb tone quality—fashioned by makers of the highest class phonograph in the world. Entire cabinet finely polished and made of beautiful solid mahogany.

Set equipped with new loss straight line vernier condensers of high ratio issuing hairline selectivity.

New patented precision speedometer type dials showing only a small portion of the wavelength band at one time—an exclusive Freshman feature.

Highest class accessories to complete this set for only \$1.00 extra per week.

Bloomingdale's—Radio Salon, Third Floor.

**Bloomingdale's**

Radio Dept.  
**Open Monday  
Night Till 9**  
An entrance at 166  
E. 60th St.

59th to 60th Street—Lexington to Third Avenue

## Women Have Had Huge Influence on Radio Development

By Frances Robinson  
Field Secretary Radio Corporation  
of America

In the early days of broadcasting radio was chiefly a man's game. Appeal to his love for making models at home, his pleasure in mastering a complicated mechanism and his masculine liking for "junk" were the dominant ideas in the first sets put on the market. This may be called the "storage battery" era, when acid was almost sure to be spilled over the parlor rug and when sweeping and dusting were subordinate to wires and batteries all over the place. Soon the slogan of "Radio in the Home" was coined, and it was realized that radio must make its appeal to those whose domain the home is—the women. Radio design and development began rapidly to proceed along these new lines.

First came the dry-battery tube. This is really a monument to woman's distaste for messiness, and she won a signal victory when storage cells were relegated from the parlor to the attic. Son may still charge his cells with a home-made rectifier, but mother wants a set with nice, clean dry cells, and out-of-sight ones at that.

Then came simplifying the controls. Father rather liked the old ten-knob sets, for they proved his cleverness in mastering them—when he did! But the lady of the house has no time to try, try again when she wants a little radio music to lighten the burden of sweeping or ironing—she wants to turn on the battery switch, twist one dial to the station she likes best, and then have it work while she sweeps. This explains why the single-circuit receiver proved so popular when it was brought out and why manufacturers to-day are stressing the single-dial set.

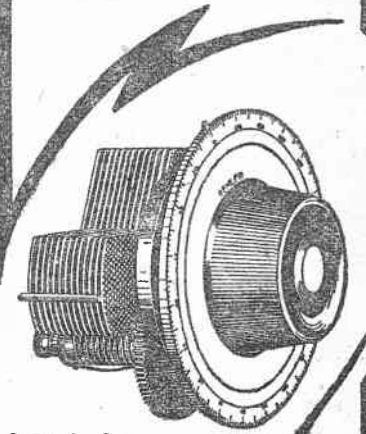
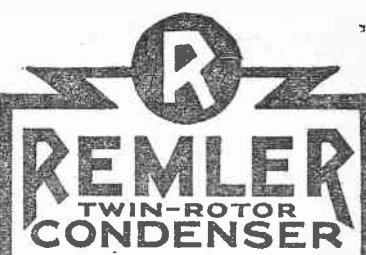
Lastly, woman's influence was clearly shown in the outward design of receivers. No woman ever liked the sight of an ungainly loud speaker on the table or over the set, so receivers with built-in loud speakers found popularity among the women-folks. Hand in hand with this came artistic designs of cabinets. The earlier receivers for the home were about as beautiful as varnished cigar boxes, but to-day mildy is not satisfied unless the radio receiver matches the rest of her carefully selected furniture. Home beautiful and radio beautiful owe their development to the women of the home.

Possibly the pendulum has swung just a little too far. Perhaps a trifle too much attention is being placed to outward looks and not enough to the inner qualities of the set. After all, what a radio receiver must do is bring in stations within a moderate distance with perfect reproduction and with no distortion or "tinny" sound, and with the least interference from other stations. Beauty of cabinet will not help one iota in these lines. The engineer who designs the radio circuits, the workman who assembles the parts, decide this. This merely by way of a word of caution to the ladies, to choose for performance first and elegance a close second.

We are going back to storage batteries, too. Some of the newer sets will have "trickle-charge" storage batteries in them, but there will be no danger of spilled acid, so the ladies need have no fear. Others of the latest types of sets will operate right off the lamp socket, so that mother can forget her dearly learned knowledge of connecting plus to minus when putting in new filament batteries. But the basic principles of beauty, no sloppiness and performance still remain.

Broadcasting has, of course, kept pace with the swing toward pleasing the real buyer of a radio set—the woman of the house. Prizefights, baseball descriptions, the stock market used to predominate in broadcasting specialties. To-day we have fashion shows described by radio, marketing for the day described by an expert, cooking lessons over the loud speaker, and the like, fast crowding out the masculine specialties.

The transition period from the home-made sets to high-grade outfits designed and constructed by reputable manufacturers is passed. Little by little the last par-built receiver is being sent up to the attic, and almost universally we find the artistic receiving equipment which women have demanded and are now getting.



\$5.00

Complete with Dial

### Factory Testing

of each condenser for capacity at broadcast wave lengths is only one of the many precautions which place this instrument in a class by itself.

Another feature of vital importance is the elimination of body capacity by proper insulation.

Now is the time to replace old equipment with the condenser that is making radio history.

**REMLER  
RADIO MFG. CO.**  
SAN FRANCISCO • CHICAGO • NEW YORK

## DYNAMIC RADIO STORES

NEW YORK—178 Greenwich St.  
Corner Duane St.  
BROOKLYN—9 Wiloughby St.

David Grimes Duplex \$49.50

The master set of radio. No storage batteries required. INSTALLED FREE. . . . . without accessories

Latest 5 Tube Set  
Straight Line Frequency Condensers  
Give you twice the selectivity on low wave lengths. Complete with tubes, batteries, speakers and aerial equipment. . . . . complete

Installed in Your Home  
Radiola Superheterodyne  
The famous R.C.A. 6 tube portable. No aerial required. FREE HOME DEMONSTRATION. . . . . minus accessories

OUR SPECIAL PRICE. \$11.95

We are authorized Dealer for Jewett Superspeaker

OPEN EVENINGS

## For the best RESISTANCE COUPLED AMP R

Resistors, Couplers, Grid Leaks and Mounts, look for the Vebly Display Booth 16 at the RADIO WORLD'S FAIR 258 Field Artillery Armory Sept. 14th to 19th VEBLY RADIO COMPANY 47-51 Morris Ave., Newark, N. J.

## SAFETY FOR RADIO AND HOME DEMANDS A BRACH vacuum Lightning Arrester

**VARY & CO., INC.**  
171 Washington St., Near Cortlandt St.  
**CABINETS**  
All Styles—All Sizes—All Prices  
The largest stock of Cabinets in New York. The Cabinet you want is here.

## You Can Cover the New England Radio Market Through New England's ONE Dominant Newspaper

*This is the date*

1925 OCTOBER 1925

Sun. Mon. Tue. Wed. Thu. Fri. Sat.

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

### The Territory

The territory of the Boston Post is New England, "Where Broadcasting Began," the home of 17 Broadcast stations of 100 watts power and over, the home of the FIRST radio show. New England is the birthplace of radio; radio was developed in this territory.

### Possibilities in New England

New England has 1,751,813 families (latest U. S. Census). There are 1,750,000 automobiles registered in this prosperous territory, the per capita bank balance is \$375. Yet there are only 250,000 radio sets in New England. There are more than a million families who are radio prospects if YOUR sales message is delivered to them in the correct manner.

### The Boston Radio Show

The second largest radio show in America, held in the country's second largest exposition hall. The Boston Post Radio Show Section is ALWAYS the year's GREATEST NEW ENGLAND RADIO PUBLICATION. This year it will be bigger and better than ever.

### The Medium

The circulation of the Boston Post is 372,872 daily — 359,336 Sunday (Net Paid). There is a Boston Post sold for every three out of four homes within the Greater Boston Shopping Zone; for every second home in Massachusetts, every second home in New Hampshire, every third in Maine and every fourth in Vermont.

The Boston Post published 93,869 MORE lines of radio advertising last year than the second Boston paper.

During the first eight months of this year the Post published MORE radio advertising than any TWO Boston papers COMBINED, leading the second paper by 95,101 lines. Analysis of schedules now being drawn up indicates that the Post will finish 1925 with a LEAD of close to 200,000 lines in RADIO ADVERTISING.

The Boston Post publishes the most complete radio programme daily of any newspaper in the United States and maintains its own testing laboratory. The Post's Technical Editor is an instructor in the Massachusetts Institute of Technology. POST radio news is ACCURATE.

Every Radio Fan In  
New England Will Read  
The

**Boston Post**

**A**

**I**

The Fifth Annual Boston Radio Show will open on October 12—the start of the radio "season." The alert radio manufacturer will take advantage of The Boston Post RADIO SHOW SECTION to boost HIS season in New England with a smashing message, an appeal which The BOSTON POST will carry into the homes of hundreds of thousands of prospective purchasers.

Forms close on October 9 for this 1925 Radio Section—early copy will mean "better position"

**Order Your Space Now  
Get Your Copy In Early**

*You will have a radio season of regret if you are not listed in  
"The Boston Post Radio Show Section for 1925"*

SPECIAL REPRESENTATIVES: Kelly-Smith Co., New York and Chicago

OLT

A B

PATTERN 140

NEW 2 in. single and double reading instruments for mounting on receiving sets. Tests accurately condition of batteries.

Descriptive Literature sent free on request.

Complete Line Displayed at  
Radio World's Fair,  
Booth 14, Section A  
Factory Representative

John M. Forshay  
52 Vesey St., N. Y. C. Cort. 4134

## RAJAH Solderless Snap Terminals

For Panel—Ground and Battery Connections.

Instantaneous in Operation—Positive Contact

The Base Stud is tapped and furnished with 8-32 screw and washer. It fits all "B" batteries with screw posts.

Used on TUNGAR—RECTIGON—PHILCO—EXIDE.

Terminal Complete, either style. . . . . 15c  
Extra Base Studs. . . . . 5c

**Rajah Auto Supply Company**  
Bloomfield, New Jersey.

## At the Radio Show

You will be interested in the Edison Radio Power Unit Exhibit—Grand Central Palace; September 12th to 19th.

Make it a point to visit Booth 117-125. Edison Radio Batteries are the long-life, steel-alkaline batteries that outlast four or five of any other type. Edison Batteries are notable for clear reception and odorless trouble-free performance.

**is Radio B ies**

Radio Department  
**Edison Storage Battery Co.**  
Orange, N. J.  
New York Office: 247 West 35th St.



**TO-DAY**

<b>WJZ—NEW YORK CITY—455</b>	<b>WOO—PHILADELPHIA—508</b>	<b>WJY—NEW YORK CITY—405</b>	<b>WOR—NEWARK—405</b>	<b>WHN—NEW YORK CITY—361</b>	<b>WBZ—SPRINGFIELD, MASS.—333</b>
10 a. m.—Woman's hour.	4:45 p. m.—Grand organ; trumpet.	7:30 p. m.—Ambassador Trio.	8:45, 7:15, 7:45 a. m.—Gym classes.	2:15-3:15 p. m.—Musical program.	7 p. m.—Dinner concert.
11 a. m.—News service.	7:30 p. m.—Dinner music.	8:15 p. m.—Zoological Society series.	2:30 p. m.—Frances Pehl, pianist.	3:45 p. m.—Richard Hittler's Orchestra.	9 p. m.—Herbert Boardman, organist.
1 p. m.—Meyer Davis's music.	8 p. m.—Strand Theater program.	8:30 p. m.—Georgia Minstrel Boys.	2:45 p. m.—Judy Huggins, Melba.		

**WBZ—SPRINGFIELD, MA**  
p. m.—Dinner concert,  
p. m.—Herbert Boardman,

W. Copple—Plaza Orchestra.  
m.—Exposition Orchestra.  
WCTE—WORCESTER—268  
a. m.—Radio call; music.  
m.—Harrison's August  
m.—Story teller; scores  
n.—Concert.  
WCAP—WASHINGTON—469  
a. m.—Health exercises.  
m.—Organ recital.  
p. m.—Wardman Park Trio.  
p. m.—Dance.  
WKDA—PITTSBURGH—309  
p. m.—Scores.  
p. m.—Mandolin Sextet.

## SATURDAY

WEAF—NEW YORK CITY—492  
5 a. m.—Health exercises.  
m.—Rickett's Dance Orchestra.  
n.—Dinner music.  
p.—"Old New York City."

**SATURDAY**

m.—Allan Harris, banjoist.  
 m.—Rafael Padilla, guitar.  
 m.—Crescent Male Quartet.  
 m.—Raul Panlagua, pianist.  
 m.—Crescent Male Quartet.  
 m.—United States Band.  
 p. m.—Pattison Cornets, barytone.  
 m.—Parnassus Trio.  
 p. m.—Pattison Cornets, barytone.  
 p. m.—Parnassus Trio.  
 m.—Vincent Lopez's Orchestra.  
**WED.—NEW YORK CITY—455**  
 10:20, 10:25 p. m.—News.  
 8, 10, 12:25 p. m.—News.  
 m.—Scores and racing (half-hourly).  
 m.—Market reports.  
 m.—Financial Summary.  
 m.—Nathan's Orchestra.  
 m.—Josephine Evans, contralto.  
 m.—Scores; racing results.  
 m.—U. S. Army Night.  
 m.—Josephine Knetch's Orchestra.  
**WGBS—NEW YORK CITY—316**  
 m.—Timely Talks with Terese.

m.—Kludis, solo.  
 m.—Fashion Quiz, Mme. Hall  
 m.—Scripture Reading.  
 m.—Marie Harris, soprano.  
 m.—Rhea Benoit, pianist.  
 m.—Arthur Hoffman's Serenades.  
 m.—Dick Konte's Coffee Club.  
 m.—Spanish Lesson.  
 m.—Dick Konte's Ukelele Club.  
 m.—Uncle Geesbe.  
 m.—"The Dulcimerians."  
 m.—Sarah Sommers, whistler.  
 m.—"The Dulcimerians."  
 m.—Sonya Miller, soprano, Ukelele  
 m.—Florence Donovan, soprano; Anna  
 m.—violin.  
 m.—Caroline Coppola, fustist.  
 m.—Dr. Carl Tannert, Elsie Brigham,  
 Jerry Seifert.  
 m.—The Wagon Theater program.  
 m.—Luncheon entertainment.  
 m.—Trío.  
 m.—Radio industry Hour.

**FRIDAY**

- m.—Sports forecast.
- m.—Studio program.
- m.—Sports results.
- m.—Commerce of the day.
- m.—Fairy Tale Period.
- m.—Studio program.
- m.—Oldtime songs.
- m.—Morton Gould, pianist.
- m.—Concert orchestra.
- m.—Morton Plaut, Series.
- m.—Studio feature.
- m.—Mother Stoner's Series.
- m.—Morton Plaut, Series.
- m.—DX Howl Hour; dance 6-7 p.m.

RA.—NEW YORK CITY—526

- m.—Dance program; Police Alarms.
- m.—Baseball results.
- m.—Herman Olit, barytone.
- m.—R. W. R. rec. m.
- m.—Max Wechsel, violinist.
- m.—Flurence Milligan, soprano.
- m.—Police Quartet.
- m.—Song Recital.
- m.—Police alarms; weather.

**FIFTH-NEW YORK CITY—273**  
Sunnybrook Orchestra.  
m.—Bert Leland, conductor.  
Baseball scores (w/ hourly).  
m.—Montana Ramblers.  
m.—Clarence Causo, Glee Club.  
m.—Jack Rafferty, recitations.  
m.—Francine Hyde, soprano.  
m.—Harold B. Smith, orchestra.  
Southern Serenaders.  
m.—Bronx program.

**SIXTH-NEW YORK CITY—233**  
Program from "The Show."  
Dora Siegal, violinist.  
m.—Elizabeth Blauvelt, soprano.  
Reginald Stuerck, pianista.

**NINTH-NEW YORK—NEW YORK CITY**  
Oleott Vail's String Ensemble.  
m.—Radio World's Fair.  
Oleott Vail's String Ensemble.  
The Amphions.  
m.—Ukelele Bob MacDonald.  
Asbury Dance Orchestra.  
m.—Eugene J. O'Connell, orchestra.

**STATION ISLAND, N. Y.—244**

Alfred Ehrenberg, musical saw.  
 m.-L. L. Egan, baritone, soprano  
 m.-Bible questions and answers.  
 m.-Soprano and musical saw.  
 Wm. J. Egan, baritone, soprano  
 m.-RICHMOND HILL, N. Y.—316  
 m.-Musical program.  
 Night—8 o'clock, music.  
 RICHMOND HILL, N. Y.—236  
 m.-Armand De Cécure, songs.  
 m.-Joe Zimmerman, pianist.  
 Wm. J. Egan, baritone, soprano  
 5:7-45 a. m.—Gym class.  
 m.-Mrs. Ermoloff, soprano; WILLIAMSBURG  
 m.-Al Wilson's Playmates.  
 m.—"Words Often Mispronounced."  
 Mrs. S. E. Erwin, piano.  
 m.—"Sports," Bill Watney.  
 m.—Zit's Orchestra.  
 Robt. Ballin, Oscar Reace, piano  
 m.—Mischa Goodman, violinist.  
 m.—Robt. Ballin, Oscar Reace, piano  
 m.—Archie Slater's Orchestra.

m.—WRW Orchest  
WGR BUFFALO-

-Sofie Christiansen, soprano.  
 -Marianne Sereni.  
 -Hartley Joy Boya  
**WGFC—NEWARK—252**  
 -Cassidy Reese  
 -Andy Rasaf, visiting kid.  
 -Michaela Trifiro  
 -Charles waltz Bernard Kees-  
 banjolela  
 -Riordan, barytone.  
 -Indianan's Orchestra.  
**VFI—PHILADELPHIA—895**  
 -The orchestra  
 -Zapp Zither Players; talk.  
 -Roof garden broadcast.  
 -Music.  
**LIT—PHILADELPHIA—395**  
 -Organ recital; orchestra.  
 -Recital.  
 -Dance music.  
**VFI—PHILADELPHIA—608**  
 -Grippe.  
 -Address by Ellis Gimbel; con-  
 -ference.  
 -wn Theater; tea room orchestra;  
 -interview; University of Penn-  
 -sylvania.  
**WGY—SCHENECTADY—380**  
 -Program from Temple Both-  
 -am.  
 -Dance program.



**NEW "PODELL" SPEAKER**

Size 22 in. Large Size 33 in. \$10.50

Complete Ready to Assemble.

Enormous Power.

Hangs on wall or stands on table.

Patent device eliminates dead end of cone, giving freedom from all distortion, remarkable volume and clarity. Brand new. Used only in Podell speaker. Combined with Podell unit gives unequalled for. beatable combination. HEAR OUR DEMONSTRATION before buying. Open until 10 P. M. every night for Christmas shoppers.

FULLY GUARANTEED MAIL ORDERS FILLED PROMPTLY

**PETER PODELL CO., INC.**

ROOM 428, FISK BLDG. New York City (57th St. & 4th Ave.) Phone Columbus 1593

**Trade Notes**

Walter Nusbaum, head of the Walshall Radio Stores, has leased the entire fifth floor of the building at 233 Spring street for use as administration offices and various other departments, including receiving and shipping, set repair and set service. It is understood also that his plans call for the establishment later of a retail store on the premises.

The Yorkville Radio Company at 147 East Eighty-sixth street has reorganized its service department, which will be headed by G. F. Petry. Mr. Petry was formerly with the Wilson Research Laboratories and the Radio Dealers Supply Company.

Pat Kiley, Eastern district sales manager for Herbert H. Frost, Inc., and Runzel-Lenz Electric Manufacturing Company, returned to his office, 30 Church street, New York city, Wednesday, December 7, after extended visits to the Frost factory at Elkhart, Ind., and the Runzel-Lenz factory at Chicago. Several new items have been developed by N. C. Schellenger, chief engineer of Herbert H. Frost, Inc., which, it is expected, will be placed upon the market very shortly.

Arthur D. Lord of the De Forest Company was elected president of the R. P. A. Laboratories, Inc., at a meeting of the directors of that organization in New York on December 15.

Louis Mandel of Metro Electric Company of Chicago was elected vice-president and E. A. Tracey of the Northern Manufacturing Company was elected treasurer of the laboratories.

Mac Weisberg, manager of the purchasing department for the Model Radio Stores, has announced his engagement to Miss Hannah Boxer. Miss Boxer has been Mr. Weisberg's secretary for several years.

**Radio Parts Designed to Please Eyes**

By JOHN M. SENNOTT.

THE appearance of radio shop windows is gradually changing and becoming more colorful, due less to the Christmas season than might at first be supposed. Spots of color intrigue the curiosity and upon closer examination prove to be the heretofore prosaically colored but important inner parts of a set. Sockets that have been made solid black for years suddenly appear in bright red and black, and coils can be purchased in whatever color happens to suit the buyer's temperament. Colored hook-up wire is, of course, no novelty and in this case the colors play an important part in tracing out circuits, but even here the varieties of color have increased and any tint or shade may be secured.

The radio industry has reached the stage where it can turn its attention to pleasing the eye while appealing to the good judgment of the buyer of parts. Of course, this has been done to a certain extent with the external appearances of a set, but until a very recent date all that one asked of the interior of a set was in the line of performance. Now that the superior manufacture of parts insures performance, the manufacturers realize that the next demand of the public will be for attractively finished parts.

**Trend of Public's Mind.**

This decision requires no mind reading on the part of the manufacturers; they have very concrete examples of the public's trend of mind. When doffed its swaddling clothes and became a public commodity the old sets consisting of separate boxes containing respectively R. F., detector and audio units, soon became obsolete. You may remember what an amazing appearance some of these old timers presented, with binding posts located conspicuously on the front panel and innumerable controls much in evidence. Of course, all sets were not built in separate

sections, but they were practically unanimous in their superabundance of knobs, dials and doigjers. Sets rapidly evolved over a period of a few years into the present day set that causes you to look twice before finding any controls.

Cabinets have ceased to be merely boxes and troop forth from factories savoring of every type of design from Egyptian, Renaissance and Gothic, to Duncan Phyfe and modern skyscraper. You can have cozy little cabinets to fit your favorite nook, or imposing consoles to make the neighbors swoon with envy.

**Speakers Have Changed.**

Speakers have changed enormously. Gone are the unsightly horns, to be replaced by the much more presentable cones and more recently the built in exponential horn which we do not see but which overwhelms us with its volume and clarity. In the cone speakers overzealous manufacturers have in many cases gone to the other extreme and perpetrated many monstrosities of over-decoration, many times to the detriment of the performance of the speaker. Fortunately, this is not a drawback to most of the other parts of a set.

There is still room for beautification in the "innards" of receivers. Some parts, such as variable condensers, must of necessity surrender more or less to purely utilitarian design, but there remain by-pass condensers, transformers, chokes, etc., which could have more attractive coverings without sacrificing efficiency. This seems parloring of parts may serve no practical purpose, but it sure adds to the enjoyment of owning a set. If your auto was just a motor on wheels and your home a furnace surrounded by four walls and covered by a roof, you wouldn't take much pride in them, and then you might think of yourself as dressed in flour sacks, which would probably serve the purpose as well as your tailored clothes, but would you enjoy it? Personally, I'm rooting for the manufacturers who are going to the trouble to doll up their products.

# HEINS & BOLET

168 CORTLANDT ST.

**Western Electric**

540 A. W. Speakers

Plenty In Stock \$21.50

**Radiola No. 100A**

SPEAKERS \$24.75

**GEM**

Standard Quality Type 201A Detector and Amplifier, UV and UX 199

**MARKO**

in stock STORAGE BATTERY 18 MONTHS GUARANTEE

**Abox**

"A" BATTERY ELIMINATOR IN STOCK

Also new four volt model for Radiola sets

**SANDAR JUNIOR**

MODEL NO. 21

\$16.50

Radio's Outstanding Speaker Value

**Westinghouse Rectox**

Trickle Charger

Built on a wholly new principle—no acids or bulbs—nothing to break, wear out or replace. \$11.50.

**TIMMONS**

NEW

CONCERT GRAND CONE SPEAKER

\$30

**WILLARD STORAGE**

100 AMP. BATTERIES

\$7.19 RUBBER CASE

**Balkite** A & B ELIMINATORS \$32.50 135 VOLTS....

**THORDARSON R-171**

Parts-Complete Including Raytheon R. H. Tubes \$22.75

**Henry-Lyford**

A Quality Receiver Complete Parts in Stock, Exactly as Specified. Set on Demonstration. SPECIAL

Listen to a demonstration of the famous LION CONE AC 21 \$25

For better AMPLION reproduction

**Farrand OVAL**

SENIOR \$32.50 JUNIOR \$16.50

Making the Best BETTER!

**Peerless**

REPRODUCER

Ask for a Demonstration

**NOW! Make Your Set Electric**

With Majestic "A" and "B" Electric Power Units

**ADVANCE B BATTERIES**

Listed by the U.S. Government as standard

100 Amp. \$2.65 45 Amp. \$1.45 35 Amp. \$1.35

MAIL ORDERS FILLED

**Tungar**

Trickle Chargers, with Bulb \$5.85

**Tungar** 2 Amp. with Bulb \$8.39

**Any Set Sterling Powered is an A. C. Set!**

**KUPROX REPLACEMENT UNIT**

Eliminates the acid jar in trickle chargers. Needs no watering or attention. 1-amp. charging rate

Fits any standard make charger. Complete \$4.50

**The Ideal Gift**

**RACE** \$12.50

THE Electric Pickup

**EC TUBES**

THE Electric Pickup

**We Have All Types In Stock**

**WIRELESS EGERT**

THE OLDEST RADIO HOUSE DOWNTOWN

179 GREENWICH ST. TEL. CORT 2085-5275

**Last Minute Christmas Specials**

**WILLARD STORAGE "A"** 100 Amp. \$8.75

**BRACH CONTROLIT** 1.95

**WESTERN ELECTRIC** V. T. L. TUBES 65c

**EAGLE TUBES** Type 201A 65c

**KOLSTER** FREED EISEMANN **FADA** **REBE** Completely equipped sets at reasonable prices. Installed by our own men.

**QUALITY PARTS** Made by HAMMARLUND KARAS & J. ACME GENERAL RADIO THORDARSON SAMSON SILVER-MARSHALL AMERICAN CARDWELL

**SHORT WAVE** Receiving and Transmitting All Sizes & Types of TRANSMITTING CONDENSERS Stromberg-Carlson 1/2 Mid. 600 Volt 25c

**Buy the New GENERAL RADIO PUSH PULL AMPLIFIER** For quality with a "KICK"

**WARD-LEONARD RESISTANCES**

**KUPROX "A" ELIMINATOR** No Bulbs - No Liquids - No Noise

**SANDAR SENIOR** MODEL NO. 25

Low in price High in quality

**Westinghouse Rectox** Trickle Charger

Built on a wholly new principle—no acids or bulbs—nothing to break, wear out or replace. \$11.50.

Listen to a demonstration of the famous LION CONE AC 21 \$25

For better AMPLION reproduction

**YORKVILLE RADIO COMPANY**

147 EAST 86th ST., COR. LEX. AVE. NEXT TO UNITED CIGAR STORE  
PHONE SACRAMENTO 8100-1-2 OPEN FROM 8:30 A. M. TO 11 P. M.

**To Your Merrier Christmas!**

SHOP TO-DAY—CLOSED MONDAY

After featuring the largest advertisement ever run by any ONE radio store, we follow up this week with STILL GREATER CHRISTMAS VALUES.

**RAYTHEON BH TUBES** \$1.95

Authorized Dealer

**Stromberg-Carlson** ALL ELECTRIC RECEIVER

With the new Stromberg-Carlson No. 10 Cone Speaker. All other models up to \$1245 in stock.

COMPLETE \$335

**PHILCO** "A" and "B" Eliminator 6-150 VOLTS ALTERNATING CURRENT SEaled CARTONS FACTORY GUARANTEED No. 686. List Price \$35.50 OUR PRICE COMPLETE \$19.95

**PHILCO** "A" and "B" Eliminator 6-180 VOLTS ALTERNATING CURRENT SEaled CARTONS FACTORY GUARANTEED No. 686. List Price \$35.50 OUR PRICE COMPLETE \$23.49

**PHILCO** "A" and "B" Eliminator 6-150 VOLTS ALTERNATING CURRENT SEaled CARTONS FACTORY GUARANTEED No. 386. List Price \$27.50 OUR PRICE COMPLETE \$28.97

**PHILCO** "A" ELIMINATOR Only 20 on Sale. List Price \$35 \$11.49

**BASCO** 150-180 VOLT "B" ELIMINATOR AND RAYTHEON TUBE \$15.95

**PHILCO** "B" ELIMINATOR 180 VOLTS SEaled CARTONS FACTORY GUARANTEED \$14.95

**ACME** E-4 "B" ELIMINATOR with RAYTHEON TUBE \$17.95

**STERLING** "B" ELIMINATOR LESS TUBE \$10.99

**BALKITE** 6-135 VOLT "A" and "B" ELIMINATOR \$29.95

**ACME** 5 Amp. Charger, \$8.95 2 Amp. Charger, 5.95

**EXIDE** New "A" and "B" ELIMINATOR LIST \$35 \$55.49

**WARD-LEONARD** D. C. TRICKLE CHARGER \$4.79

**BALKITE** "A" ELIMINATOR LIST \$35 \$14.95

**WARD-LEONARD** ABOX "A-B-C" D.C. ELIMINATOR \$55.00

Many other nationally known Eliminator, too numerous to list here, are on sale today and all next week.

**STROMBERG-CARLSON** NO. 10 FILTERS \$3.50

**Authorized Dealer**

**Radiola** Immediate Delivery

The season's most popular receiver. Hear it and be convinced. Price, test accessories..... \$130

Authorized Dealer

**Zeuthen** This is Model 11—The New 1928 Zeuthen.

One of the world's finest. Renowned for tone quality and distance. Easy payments Model 11-E, All Electric.....\$175

Authorized Dealer

**FADA Radio** IMMEDIATE DELIVERY

The famous Fada Special. The name is yours. Guaranteed for complete satisfaction.

Authorized Dealer

**KOLSTER** ALL MODELS IN STOCK

We highly recommend this set for one who wants to make a moderate investment in a good radio set.

**Authorized Dealer**

**General Radio** Factory Built Push Pull Amplifier \$17.49

**GENUINE GRADEON MAGNETIC PICK-UP** \$3.25

**NAALD MIDGET CONE SPEAKER** \$1.29

**Benjamin** 201A SOCKETS 27c

**AMPER-ITES** 52c

**Timmons** Amplifiers \$11.95

Remlor Condensers 2 in Line \$7.99

**MASTER** 45 Volt "B" Batteries 99c

**Authorized Dealer**

**SCHICKERLING RADIO TUBES**

UX 201A, 6 Volt—1/4 Amp. Amplifier and Detector 85c

Detector SX 200 List 2.50	SX1000 Pwr. Detector List 6.00	SX500 Radio Frequency Detector List 2.50
\$1.15	\$2.15	\$1.15
Amplifier SX 112 Pwr. List 6.50	SX1000 Pwr. Detector List 6.00	SX171 Pwr. Amplifier List 5.00
\$2.45	\$2.25	\$2.35

**Authorized Dealer**

**STEWART** 100 Ampere Rubber Case \$5.29

**EVEREADY** 120 Ampere 50 on sale \$6.99

**Exide ALPHA MARKO** Always in Stock

**Authorized Dealer**

**BETTER "B" BATTERIES**

Large 45 Volt 45 Volt Heavy Duty \$1.95 \$2.95

**ALPHA B BATTERIES** Meter tested in your presence \$1.95 \$2.95

MAIL ORDERS FILLED

**Authorized Dealer**

**The REBE SYNCHROPHASE**

Made by the pioneer radio manufacturer. A set you can depend upon. This is the popular new Model 7.

HEAR IT DEMONSTRATED

Authorized Dealer

**Farrand** ELECTRIC RECEIVER

Finest tone combined with electric operation. Made by the makers of Farrand Speakers. Price, with tubes FARRAND CONSOLE Complete \$350

HEAR IT TO-DAY AT YORKVILLE

**Authorized Dealer**

**Farrand NEW OVAL** JUNIOR MODEL 20 \$16.50

HEAR IT TO-DAY AT YORKVILLE

**Authorized Dealer**

**Benjamin** New Red Top UX Sockets 38c

**Kolster** Consoler \$12.95

**Federal** Phones \$1.19

**MUSIC MASTER** Transformers 59c



# The Sun's Daily Broadcasting Programs for the Week End

## TO-DAY

Meters, Left. Kilocycles, Right.

7:00 P. M.—Children's Christmas program.  
7:30 P. M.—Police alarms.  
7:35 P. M.—Double Quartet.  
8:15 P. M.—Harmony Trumpeters.  
8:30 P. M.—"Christmas Greetings," Mayor James J. Walker.  
8:45 P. M.—Harmony Trumpeters.  
9:00 P. M.—"Dickens's Christmas Carols," Harriette Weems.  
9:20 P. M.—Herman Newman, pianist.  
9:35 P. M.—Police alarms.  
9:40 P. M.—Christmas greetings from WNYC.

492—WEAF—610  
12:00 Noon—Christmas carols.  
12:15 P. M.—St. Paul's Church carols.  
1:30 P. M.—Palais D'Or Orchestra.  
2:30 P. M.—Hofbrau Orchestra.  
3:00 P. M.—Parnassus Trio.  
4:00 P. M.—Manhattan Trio.  
4:30 P. M.—Cresley Orchestra.  
5:00 P. M.—Leslie Davis, chimes.  
5:00 P. M.—Scott's Orchestra.  
6:00 P. M.—Waldorf-Astoria Orchestra.  
7:00 P. M.—South Sea Islanders.  
7:30 P. M.—The High Jinks.  
9:00 P. M.—Pascinating Fiddling.  
9:30 P. M.—The Tunes of the Troupe.  
10:00 P. M.—A Christmas Carol.  
10:30 P. M.—Dr. Cadman's Christmas carol concert.

454—WJZ—600  
12:00 Noon—Luncheon music.  
1:00 P. M.—Yoeng's Orchestra.  
2:00 P. M.—Trinity Church chimes.  
2:30 P. M.—Children's carol services.  
3:30 P. M.—Studio program.  
4:15 P. M.—Roxanne Williams, singer.  
4:30 P. M.—Venetian Gondoliers.  
5:30 P. M.—Studio program.  
6:00 P. M.—Friedman's Orchestra.  
6:55 P. M.—Summary of programs.  
7:00 P. M.—Astor Orchestra.  
8:00 P. M.—RCA Hour, New York Symphony.  
9:00 P. M.—Philco Hour.  
10:00 P. M.—Keystone Duo with Bal-ladeers.  
10:30 P. M.—Dorothy Howe and string trio.  
11:00 P. M.—Slumber music.  
12:05 A. M.—Midnight mass from Shrine of the Sacred Heart.

422—WOR—710  
2:30 P. M.—Esther Jaffe, cellist; Gertrude Bartel, pianist.  
3:00 P. M.—Christmas carols.  
3:30 P. M.—Roseland Orchestra.  
4:00 P. M.—Villa Venice Orchestra.  
6:15 P. M.—Shelton ensemble.  
6:30 P. M.—Jutuk—the Eskimo.  
6:35 P. M.—Don Bruton, tenor.  
6:50 P. M.—Shelton ensemble.  
7:00 P. M.—Villa Venice Orchestra.  
8:00 P. M.—Shelton ensemble.  
8:15 P. M.—"Old Xmas."  
8:30 P. M.—Bamberger Little Sym-phony.  
10:00 P. M.—Christmas Eve in Grange Hall.  
11:00 P. M.—Carr's Orchestra.  
11:30 P. M.—Ye Christmas Carol.

395—WHI—700  
12:00 Noon—Women's hour.  
1:00 P. M.—Varsity Collegians.  
2:00 P. M.—Studio broadcast.  
3:00 P. M.—The Soudanians.  
4:00 P. M.—Level Chime Ensemble.  
5:00 P. M.—Artistic review.  
6:00 P. M.—Sterling Trio.  
9:30 P. M.—Week-enders.

370—WMCA—810  
11:00 A. M.—Beauty talks.  
12:00 Noon—Where to go to-night.  
12:30 P. M.—Luncheon hints.  
1:00 P. M.—Littmann's.  
2:00 P. M.—Financial advice.  
3:00 P. M.—Sarnoff's Boulevardiers.  
3:30 P. M.—Equitable Melodians.  
4:00 P. M.—Selbert Fursters.  
4:30 P. M.—Littmann's Entertainers.  
5:00 P. M.—Deutch Bros. Early Birds.  
5:30 P. M.—Bartol Orchestra.  
8:00 P. M.—Christmas carols.  
8:30 P. M.—Mae Sims, songs.  
8:55 P. M.—Bearingby readings.  
9:00 P. M.—Ridgewood Grove houts.  
11:00 P. M.—McAlpin Orchestra.  
11:30 P. M.—Sport chat.  
11:40 P. M.—McAlpin Orchestra.

370—WLWI—810  
6:00 P. M.—Edwin Brown, barytone; studio ensemble.  
6:45 P. M.—"Christmas Stories," Al-fred Young.  
7:00 P. M.—Adrian da Silva, tenor.  
7:30 P. M.—Theatrical Review.  
7:45 P. M.—Popular Air.  
12:00 Midnight—Midnight Mass.  
349—WGBS—860  
1:30 P. M.—Scripture Reading.  
1:35 P. M.—Elizabeth Haupt, con-tracto.  
1:45 P. M.—Sidney Smith, tenor.  
2:05 P. M.—Elizabeth Haupt, con-tracto.  
2:20 P. M.—Sidney Smith, tenor.  
2:25 P. M.—Harry Harrison, "Clown of the Air."  
2:45 P. M.—Rose Jones, pianist.  
3:00 P. M.—Tang's Orchestra.  
6:00 P. M.—Uncle Geesbe.  
8:00 P. M.—Vanderbilt Trio.  
11:30 P. M.—The Night Before Christ-mas.

326—WPCB—920  
4:00 P. M.—Musical program.  
4:15 P. M.—Arlie Carroll, pianist.  
4:30 P. M.—Harandranath Maitra, "Reincarnation."  
5:45 P. M.—Spanish lessons.  
6:00 P. M.—Bert Lowe.  
6:30 P. M.—Chineland Orchestra.  
10:00 P. M.—Mickey Addie, songs.  
10:15 P. M.—Fred Ehrenberg.  
10:30 P. M.—Lillian Trotter, pianist.  
10:40 P. M.—Pioti and Hardy.  
10:50 P. M.—Clack and Miller.  
11:00 P. M.—Russell Herd, composer.

36—WKNY—920  
11:00 A. M.—Shelton Ensemble.  
11:30 A. M.—Harandranath Maitra, "Reincarnation."  
11:45 P. M.—Shaw and Rosenthal.  
11:55 P. M.—Spanish lessons.  
12:00 P. M.—Bert Lowe.  
12:30 P. M.—Chineland Orchestra.  
10:00 P. M.—Mickey Addie, songs.  
10:15 P. M.—Fred Ehrenberg.  
10:30 P. M.—Lillian Trotter, pianist.  
10:40 P. M.—Pioti and Hardy.  
10:50 P. M.—Clack and Miller.  
11:00 P. M.—Russell Herd, composer.

11:15 A. M.—Christmas songs for Chil-dren.  
11:30 A. M.—Shoppers' guide.  
12:05 P. M.—Joe Davis, songs.  
12:20 P. M.—Marjorie Rickers, songs.  
12:35 P. M.—Eddie Jarvis, songs.  
12:50 P. M.—Piano recital.  
7:00 P. M.—Yoeng's Orchestra.  
7:30 P. M.—Dickens's Christmas Carols.  
7:45 P. M.—Hazel Kirk, violinist.  
8:00 P. M.—Guild Singers.  
8:35 P. M.—German Christmas carols.  
9:00 P. M.—Anne Marentze, soprano; Virginia Pickling, contralto.  
9:15 P. M.—Vincent Bach, trumpeter.  
9:30 P. M.—Male quartet.  
9:45 P. M.—Ralph Cristman, pianist.

309—WABC—970  
1:00 P. M.—Barclay ensemble.  
7:30 P. M.—Program summary.  
7:31 P. M.—King's Orchestra.  
8:30 P. M.—Barclay Orchestra.  
9:00 P. M.—Mayflower Orchestra.  
10:01 P. M.—Waldorf-Astoria Orches-tra.

294—WGL—1020  
10:15 A. M.—Brunswick hour.  
11:15 A. M.—School review.  
2:00 P. M.—Al Canavial, mandolin.  
2:15 P. M.—General hints.  
2:30 P. M.—Rebecca Brookmeyer, pianist.  
2:45 P. M.—Henrietta Scarpato, so-prano.  
3:00 P. M.—Arlie Carroll, pianist.  
3:15 P. M.—Bamboo Inn Orchestra.  
6:00 P. M.—Sport talk.  
6:30 P. M.—Chamber and music trio.  
6:45 P. M.—Yolande Langworthy, con-tracto.

268—WGCP—1120  
3:30 P. M.—Cooperative program.  
4:00 P. M.—Joy hour.  
4:00 P. M.—Christmas carols.  
10:45 P. M.—Paramount trio.  
11:00 P. M.—Studio program.  
268—WAAM—1120  
12:35 P. M.—Luncheon music.  
9:00 P. M.—Organ recital.  
246—WAAT—1220  
10:30 A. M.—Housewives program.  
12:00 Noon—Children's program.  
6:00 P. M.—Dinner music.  
6:45 P. M.—Sport talk.  
7:00 P. M.—Union City Four.  
7:30 P. M.—Electric ferries.  
7:40 P. M.—Christmas carols.  
8:00 P. M.—Piano masters.  
8:30 P. M.—Edith Von der Lieth, so-prano.  
8:45 P. M.—Walter O'Callaghan, bary-tone.

246—WEVD—1220  
1:00 P. M.—Anna Worth, soprano.  
1:15 P. M.—George Rael, bass.  
1:30 P. M.—Anna Worth, soprano.  
1:45 P. M.—George Rael, bass.  
2:00 P. M.—Michel Ingeman, pianist.  
2:15 P. M.—Robert Yurran, barytone.  
2:30 P. M.—Michel Ingeman, pianist.  
2:45 P. M.—Robert Yurran, barytone.  
3:00 P. M.—Bob and Ben Linder.  
3:30 P. M.—Elsie Duffield, soprano.  
3:45 P. M.—C. Clark, Spirituals.  
4:00 P. M.—Mary Abbott, "The Pur-pose of Christmas."  
4:15 P. M.—Walter Plock, barytone.  
4:30 P. M.—Elsie Duffield, soprano.  
4:45 P. M.—Walter Plock, barytone.  
5:00 P. M.—Rustal Vagabond Orches-tra.

9:00 P. M.—Joyce Roberts, imper-sonations.  
9:20 P. M.—Allister Coleman, "La-bor Look at the Week."  
9:35 P. M.—Elsie Restell, Lieder-singer.  
9:50 P. M.—Dr. A. Slaten, "The Meaning of Christmas."  
10:05 P. M.—Robert McClelland, tenor.  
10:20 P. M.—Anna Curtis, "The Quak-ers, Peace and Good Will."  
10:30 P. M.—Nelda, discuse.  
10:45 P. M.—Lydia Mason, pianist.  
11:00 P. M.—Variety hour.  
236—WMSG—1270  
1:00 P. M.—Salvation Army Children's Party.

316—KDKA—890  
5:55 P. M.—Theatrical calendar.  
6:00 P. M.—Ridgewood Grove houts.  
7:00 P. M.—U. of P. address.  
7:15 P. M.—Radio Club meeting.  
7:30 P. M.—Concert.  
8:00 P. M.—R. C. A. program.  
9:00 P. M.—Philco Hour.  
333—WBZ—900  
6:30 P. M.—Morey's Orchestra.  
6:55 P. M.—Santa Claus.  
7:30 P. M.—Concorde Quartet.  
8:30 P. M.—Musical program.  
8:45 P. M.—Christmas party.  
10:05 P. M.—Musical program.  
11:00 P. M.—Staller Orchestra.

337—WCAU—890  
12:30 P. M.—Luncheon music.  
5:00 P. M.—This and That Revue.  
6:30 P. M.—Golden Dragon Orchestra.  
2:05 P. M.—Elizabeth Haupt, con-tracto.  
2:20 P. M.—Sidney Smith, tenor.  
2:25 P. M.—Harry Harrison, "Clown of the Air."  
2:45 P. M.—Rose Jones, pianist.  
3:00 P. M.—Tang's Orchestra.  
6:00 P. M.—Uncle Geesbe.  
8:00 P. M.—Vanderbilt Trio.  
11:30 P. M.—The Night Before Christ-mas.

326—WPCB—920  
4:00 P. M.—Musical program.  
4:15 P. M.—Arlie Carroll, pianist.  
4:30 P. M.—Harandranath Maitra, "Reincarnation."  
5:45 P. M.—Spanish lessons.  
6:00 P. M.—Bert Lowe.  
6:30 P. M.—Chineland Orchestra.  
10:00 P. M.—Mickey Addie, songs.  
10:15 P. M.—Fred Ehrenberg.  
10:30 P. M.—Lillian Trotter, pianist.  
10:40 P. M.—Pioti and Hardy.  
10:50 P. M.—Clack and Miller.  
11:00 P. M.—Russell Herd, composer.

36—WKNY—920  
11:00 A. M.—Shelton Ensemble.  
11:30 A. M.—Harandranath Maitra, "Reincarnation."  
11:45 P. M.—Shaw and Rosenthal.  
11:55 P. M.—Spanish lessons.  
12:00 P. M.—Bert Lowe.  
12:30 P. M.—Chineland Orchestra.  
10:00 P. M.—Mickey Addie, songs.  
10:15 P. M.—Fred Ehrenberg.  
10:30 P. M.—Lillian Trotter, pianist.  
10:40 P. M.—Pioti and Hardy.  
10:50 P. M.—Clack and Miller.  
11:00 P. M.—Russell Herd, composer.

380—WGY—790  
12:00 Noon—Christmas carols.  
6:00 P. M.—Sacred Claus.  
6:30 P. M.—Dinner music.  
7:30 P. M.—High Jinks.  
10:30 P. M.—Musical program.  
11:00 P. M.—Dance orchestra.  
276—WHAM—1080  
6:45 P. M.—Dinner music.  
7:30 P. M.—Two-piano recital.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Philco hour.  
10:04 P. M.—Organ recital.  
11:05 P. M.—Barrett's Orchestra.

265—WICC—1130  
9:00 A. M.—Morning Glory hour.  
12:00 Noon—Luncheon music.  
484—WJAR—620  
12:00 Noon—Christmas carols.  
12:15 P. M.—Christmas services.  
12:30 P. M.—No-Kiank Pathfinder.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Providence Christmas Eve civic celebration.  
10:00 P. M.—Christmas Eve program.

405—WLIT—740  
12:00 Noon—Organ recital.  
12:20 P. M.—Book review.  
12:30 P. M.—Symphonic Orchestra.  
2:00 P. M.—Arcadia Orchestra.  
2:30 P. M.—Hofbrau Orchestra.  
4:30 P. M.—Molhawk hour.  
5:30 P. M.—Children's hour.  
7:30 P. M.—Sylvania Orchestra.

461—WNAC—650  
11:35 A. M.—Organ recital.  
12:00 Noon—Colonial concert.  
12:30 P. M.—Sveche of the Air.  
1:00 P. M.—Klayman's Orchestra.  
1:30 P. M.—Luncheon concert.  
2:00 P. M.—Service program.  
4:00 P. M.—Dok's Sinfonians.  
5:00 P. M.—Le Paradis Band.  
6:00 P. M.—Scout Campfire.  
6:30 P. M.—Stevens's Orchestra.  
7:00 P. M.—Dok's Sinfonians.  
7:30 P. M.—Better business talk.  
7:40 P. M.—Lady of the Ivorys.  
7:50 P. M.—"New England History," Willard DeLue.

8:00 P. M.—Karl service.  
9:00 P. M.—Pearl's Orchestra.  
9:30 P. M.—Community Christmas Sing.  
9:30 P. M.—Le Paradis Band.  
11:05 P. M.—Community Christmas Sing.  
349—WOO—860  
11:00 A. M.—Organ recital.  
12:00 Noon—Luncheon music.  
5:15 P. M.—Organ recital.  
7:30 P. M.—Children's half hour.  
273—WFG—1100  
6:45 P. M.—Organ recital.  
7:05 P. M.—Dinner music.  
9:00 P. M.—Norman Brokenshire.  
9:30 P. M.—Concert.  
10:00 P. M.—Studio program.  
10:30 P. M.—Casino Orchestra.  
11:00 P. M.—Christmas carols.  
11:40 P. M.—Solemn midnight mass.

317—WTAG—580  
12:25 P. M.—Chester Gaylord, pianist.  
7:30 P. M.—Bancroft Orchestra.  
8:00 P. M.—RCA hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Bancroft Orchestra.  
535—WTIC—560  
6:30 P. M.—Dinner music.  
6:45 P. M.—Theatrical review.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Philo hour.  
10:00 P. M.—Bancroft Orchestra.  
500—WFAA—600  
6:30 P. M.—Story hour.  
6:30 P. M.—Musical units.  
10:00 P. M.—James Woods, tenor.  
10:30 P. M.—Jack Horn, cellist; Mar-garet Horn, pianist.  
12:00 Midnight—Baker Orchestra.  
12:30 A. M.—Theater features.

409—WRC—640  
12:30 P. M.—Waldorf-Astoria Orches-tra.  
2:30 P. M.—Organ recital.  
6:00 P. M.—Waldorf-Astoria Orches-tra.  
7:00 P. M.—Bible talk.  
7:15 P. M.—Mayflower Orchestra.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Palais d'Or Orchestra.  
10:30 P. M.—Christmas program.  
11:45 P. M.—Concert.  
448—WMAQ—670  
12:00 P. M.—Topsy-turvy time.  
7:00 P. M.—Organ recital.  
7:30 P. M.—Dinner concert.  
9:00 P. M.—Radio poetique.  
9:30 P. M.—Song cycle.  
10:15 P. M.—Chicago Theater revue.  
11:00 P. M.—Christmas program.  
1:00 P. M.—Philco hour.  
10:00 P. M.—Palais d'Or Orchestra.  
10:30 P. M.—Christmas program.  
11:45 P. M.—Concert.

337—WVSM—880  
7:00 P. M.—Bedtime story.  
7:15 P. M.—Concert.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Palais d'Or Orchestra.  
11:00 P. M.—Miller's Orchestra.  
10:00 P. M.—Barn dance.  
384—KGO—780  
10:15 P. M.—Sport talk.  
11:00 P. M.—R. C. A. hour.  
12:00 Midnight—Philco hour.  
1:00 A. M.—N. B. C. program.  
2:00 A. M.—St. Francis Orchestra.  
326—KOA—920  
12:00 Midnight—Dance orchestra.  
422—KPO—710  
12:00 Midnight—N. B. C. program.  
384—KTBS—780  
9:00 P. M.—Musical.  
9:30 P. M.—Christmas carols.  
10:00 P. M.—Dance frolic.  
526—KYW—570  
7:00 P. M.—Bedtime story.  
7:30 P. M.—Dinner concert.  
8:00 P. M.—RCA hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Congress carnival.  
11:30 P. M.—Kentucky Serenaders.

405—WCCO—740  
7:15 P. M.—Dinner concert.  
8:00 P. M.—Philco hour.  
9:00 P. M.—Fireside Philosophies.  
10:15 P. M.—Minneapolis Symphony Orchestra.  
11:15 P. M.—Long's Orchestra.  
730—WDAF—570  
8:00 P. M.—High Jinks.  
9:20 P. M.—Christmas carols.  
12:00 Noon—Capitol Symphony Orches-tra.  
2:00 P. M.—Interdenominational Church services.

12:45 A. M.—Night Hawk

## ARTISTS WHO HELP ENLIVEN THE ETHER THIS COMING WEEK.



THEODORE GRANIK—WGBS. CECILIA HANSEN—WOR



PHILCO PLAYERS—WJZ



MARGARET ILLINGTON—WEAF



ATWATER KENT QUARTET—WEAF

416—WGN—720  
7:10 to 11:40 P. M.—Musical program.

416—WLIT—740  
8:30 P. M.—Drake Ensemble.  
12:00 Midnight—The Hoodlums.  
10:00 P. M.—Drake Orchestra.  
428—WLW—700  
6:00 P. M.—Santa Claus.  
10:00 P. M.—Theatrical reports.  
7:00 P. M.—Smith-Kasson Orchestra.  
8:00 P. M.—R. C. A. program.  
9:00 P. M.—Philco hour.  
11:00 P. M.—Thies's Orchestra.

448—WMAQ—670  
12:30 P. M.—Waldorf-Astoria Orches-tra.  
2:30 P. M.—Organ recital.  
6:00 P. M.—Waldorf-Astoria Orches-tra.  
7:00 P. M.—Bible talk.  
7:15 P. M.—Mayflower Orchestra.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Palais d'Or Orchestra.  
10:30 P. M.—Christmas program.  
11:45 P. M.—Concert.

337—WVSM—880  
7:00 P. M.—Bedtime story.  
7:15 P. M.—Concert.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Palais d'Or Orchestra.  
11:00 P. M.—Miller's Orchestra.  
10:00 P. M.—Barn dance.

384—KGO—780  
10:15 P. M.—Sport talk.  
11:00 P. M.—R. C. A. hour.  
12:00 Midnight—Philco hour.  
1:00 A. M.—N. B. C. program.  
2:00 A. M.—St. Francis Orchestra.  
326—KOA—920  
12:00 Midnight—Dance orchestra.  
422—KPO—710  
12:00 Midnight—N. B. C. program.  
384—KTBS—780  
9:00 P. M.—Musical.  
9:30 P. M.—Christmas carols.  
10:00 P. M.—Dance frolic.  
526—KYW—570  
7:00 P. M.—Bedtime story.  
7:30 P. M.—Dinner concert.  
8:00 P. M.—RCA hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Congress carnival.  
11:30 P. M.—Kentucky Serenaders.

405—WCCO—740  
7:15 P. M.—Dinner concert.  
8:00 P. M.—Philco hour.  
9:00 P. M.—Fireside Philosophies.  
10:15 P. M.—Minneapolis Symphony Orchestra.  
11:15 P. M.—Long's Orchestra.

416—WGN—720  
7:10 to 11:40 P. M.—Musical program.

416—WLIT—740  
8:30 P. M.—Drake Ensemble.  
12:00 Midnight—The Hoodlums.  
10:00 P. M.—Drake Orchestra.  
428—WLW—700  
6:00 P. M.—Santa Claus.  
10:00 P. M.—Theatrical reports.  
7:00 P. M.—Smith-Kasson Orchestra.  
8:00 P. M.—R. C. A. program.  
9:00 P. M.—Philco hour.  
11:00 P. M.—Thies's Orchestra.

448—WMAQ—670  
12:30 P. M.—Waldorf-Astoria Orches-tra.  
2:30 P. M.—Organ recital.  
6:00 P. M.—Waldorf-Astoria Orches-tra.  
7:00 P. M.—Bible talk.  
7:15 P. M.—Mayflower Orchestra.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Palais d'Or Orchestra.  
10:30 P. M.—Christmas program.  
11:45 P. M.—Concert.

337—WVSM—880  
7:00 P. M.—Bedtime story.  
7:15 P. M.—Concert.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Palais d'Or Orchestra.  
11:00 P. M.—Miller's Orchestra.  
10:00 P. M.—Barn dance.

384—KGO—780  
10:15 P. M.—Sport talk.  
11:00 P. M.—R. C. A. hour.  
12:00 Midnight—Philco hour.  
1:00 A. M.—N. B. C. program.  
2:00 A. M.—St. Francis Orchestra.  
326—KOA—920  
12:00 Midnight—Dance orchestra.  
422—KPO—710  
12:00 Midnight—N. B. C. program.  
384—KTBS—780  
9:00 P. M.—Musical.  
9:30 P. M.—Christmas carols.  
10:00 P. M.—Dance frolic.  
526—KYW—570  
7:00 P. M.—Bedtime story.  
7:30 P. M.—Dinner concert.  
8:00 P. M.—RCA hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Congress carnival.  
11:30 P. M.—Kentucky Serenaders.

405—WCCO—740  
7:15 P. M.—Dinner concert.  
8:00 P. M.—Philco hour.  
9:00 P. M.—Fireside Philosophies.  
10:15 P. M.—Minneapolis Symphony Orchestra.  
11:15 P. M.—Long's Orchestra.

416—WGN—720  
7:10 to 11:40 P. M.—Musical program.

416—WLIT—740  
8:30 P. M.—Drake Ensemble.  
12:00 Midnight—The Hoodlums.  
10:00 P. M.—Drake Orchestra.  
428—WLW—700  
6:00 P. M.—Santa Claus.  
10:00 P. M.—Theatrical reports.  
7:00 P. M.—Smith-Kasson Orchestra.  
8:00 P. M.—R. C. A. program.  
9:00 P. M.—Philco hour.  
11:00 P. M.—Thies's Orchestra.

448—WMAQ—670  
12:30 P. M.—Waldorf-Astoria Orches-tra.  
2:30 P. M.—Organ recital.  
6:00 P. M.—Waldorf-Astoria Orches-tra.  
7:00 P. M.—Bible talk.  
7:15 P. M.—Mayflower Orchestra.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Palais d'Or Orchestra.  
10:30 P. M.—Christmas program.  
11:45 P. M.—Concert.

337—WVSM—880  
7:00 P. M.—Bedtime story.  
7:15 P. M.—Concert.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Palais d'Or Orchestra.  
11:00 P. M.—Miller's Orchestra.  
10:00 P. M.—Barn dance.

384—KGO—780  
10:15 P. M.—Sport talk.  
11:00 P. M.—R. C. A. hour.  
12:00 Midnight—Philco hour.  
1:00 A. M.—N. B. C. program.  
2:00 A. M.—St. Francis Orchestra.  
326—KOA—920  
12:00 Midnight—Dance orchestra.  
422—KPO—710  
12:00 Midnight—N. B. C. program.  
384—KTBS—780  
9:00 P. M.—Musical.  
9:30 P. M.—Christmas carols.  
10:00 P. M.—Dance frolic.  
526—KYW—570  
7:00 P. M.—Bedtime story.  
7:30 P. M.—Dinner concert.  
8:00 P. M.—RCA hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Congress carnival.  
11:30 P. M.—Kentucky Serenaders.

405—WCCO—740  
7:15 P. M.—Dinner concert.  
8:00 P. M.—Philco hour.  
9:00 P. M.—Fireside Philosophies.  
10:15 P. M.—Minneapolis Symphony Orchestra.  
11:15 P. M.—Long's Orchestra.

416—WGN—720  
7:10 to 11:40 P. M.—Musical program.

416—WLIT—740  
8:30 P. M.—Drake Ensemble.  
12:00 Midnight—The Hoodlums.  
10:00 P. M.—Drake Orchestra.  
428—WLW—700  
6:00 P. M.—Santa Claus.  
10:00 P. M.—Theatrical reports.  
7:00 P. M.—Smith-Kasson Orchestra.  
8:00 P. M.—R. C. A. program.  
9:00 P. M.—Philco hour.  
11:00 P. M.—Thies's Orchestra.

448—WMAQ—670  
12:30 P. M.—Waldorf-Astoria Orches-tra.  
2:30 P. M.—Organ recital.  
6:00 P. M.—Waldorf-Astoria Orches-tra.  
7:00 P. M.—Bible talk.  
7:15 P. M.—Mayflower Orchestra.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Palais d'Or Orchestra.  
10:30 P. M.—Christmas program.  
11:45 P. M.—Concert.

337—WVSM—880  
7:00 P. M.—Bedtime story.  
7:15 P. M.—Concert.  
8:00 P. M.—R. C. A. hour.  
9:00 P. M.—Philco hour.  
10:00 P. M.—Palais d'Or Orchestra.  
11:00 P. M.—Miller's Orchestra.  
10:00 P. M.—Barn dance.

384—KGO—780  
10:15 P. M.—Sport talk.  
11:00 P. M.—R. C. A. hour.  
12:00 Midnight—Philco hour.  
1:00 A. M.—N. B. C. program.  
2:00 A. M.—St. Francis Orchestra.  
326—KOA—920  
12:00 Midnight—Dance orchestra.  
422—KPO—710  
12:00 Midnight—N. B. C. program.  
384—KTBS—780  
9:00 P. M.—Musical.  
9:30 P. M.—Christmas carols.  
10:00 P. M.—Dance frolic.  
526—KYW—570  
7:00 P. M.—Bedtime story.  
7:30 P. M.—Dinner concert.  
8:00 P. M.—R



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TEL. NEVINS 5630



**Merry Christmas**

BROOKLYN STORE

**111 FLATBUSH AVENUE**

TEL. NEVINS 3177

**ALGONQUIN**

SHIP MODEL  
CONE SPEAKER

Beautiful Antique  
Polychromed  
Bronze finish  
with striking ship-  
model superim-  
posed.

Special

**8.95** ★ List \$30.00



**RECREATIONAL MAKE IT A**



# STERINGS

# 1927

# RADIO XMAS

**SON**

Duo-Control, encoased in beautiful table model console. Exceptional tone, guaranteed.

**39.95**

**HOUSE** ★

**PHILCO TRICKLE CHARGER**

\$4.95

\$35 Balkite "B" Elm. 135 Volts

**\$15.95**

**Exide**

6 VOLT STORAGE "A" BATTERY

**7.59**

GUARANTEED

**BURGESS**

LARGE 45 VOLT "B" BATTERY

**\$2.13**

List \$3.75

**Stromber Carlson AUDIO TRANS. ★**

**\$2.95**

NEW HAMMAR-LUND DRUM DIAL

**\$3.69**

**SALE! RADIO SENSATION—SALE!**

**GENUINE Cunningham RADIO TUBES**

**CX-301A**

LIMIT 5 TUBES TO A CUSTOMER. NO DEALERS SUPPLIED. QUANTITY LIMITED.

**88c**

★ **WESTERN ELECTRIC**

Radio Tubes Super-Power VT-1

**SPECIAL 69c**

3 FOR \$2.00

**SCHLICKING 4TH ELEMENT RADIO TUBES**

UX 201A—¼ Amp. Amplifier and Detector ★ **85c**

List \$1.75

**YOUR NEXT SET—BREMER-TULLY**

100% ELECTRIC RADIO USES THE NEW A. C. TUBES

**BEAUTY—QUALITY—TONE**

**TERMS**

As Low as **\$1.50**

A Week

Everything Desired in Radio is Part of the BREMER-TULLY. Now on Demonstration at Modell's.

**Be There with BT**

**RADIOCEIVE N A - A L D**

GIANT CONE KIT MIDGET CONE SPEAKER

**\$4.95 ★ \$1.29**

**Sterling** Power Units

make any set on A. C. SET

AUTOMATIC, by the touch of a single switch, service free, and long lived. Used with your good old tubes they will prove reliable for tone quality and distance—and they last. Have A.C. radio, but don't experience. Have Sterling A.C. power and be sure.

Exact regulation, Dependable

**NEW! Electric**

**FREED EISEMANN RADIO**

**MARKO**

STORAGE BATTERY

In Stock

**A Liberal Allowance**

will be given on any Speaker you wish to trade in for a brand new

**Pathe**

Illuminated Cone Loud Speaker

Cathedral Model, **\$32.50**

**WESTINGHOUSE RECTOX**

TRICKLE CHARGER 2 RATE CHARGE NOW IN STOCK

**MAJESTIC**

A & B Power Units make any radio set electric

Both units now on demonstration. Absolutely dry.

No. Acid. No Hum. No Bother.

**HERE'S the REAL A Eliminator General Instrument**

**PERMANENT**

**See It!**

**TIMMONS**

**NEW**

**\$30**

CONCERT GRAND CONE SPEAKER

**Lion Cone "25"**

**AMPLION**

For better reproduction

**Farrand OVAL**

SENIOR **\$2.50**

JUNIOR **\$1.60**

Making the Best BETTER!



### PANELS

**\* TUBING AND RODS \***  
FORMICA, BAKELITE AND HARD RUBBER—Standard or Special Sizes

**Cut While You Wait**  
Shielding Case and all special work. All Popular Circuit Panels in Stock. Mail Orders Promptly Filled.

**UNITED RADIO MFG. CO.**  
191 Greenwich Street (N. Fulton)  
TEL. CORTLANDT 4888  
OPEN ALL DAY ON SATURDAYS

**Gold Seal Issues New Radio Tube Handbook**

Presenting in convenient form much information not readily available elsewhere about the newer types of radio tubes and their use, a thirty-two-page booklet on "How to Get the Best Results From Your Radio Tubes" has just been published by the Gold Seal Electrical Company, Inc., manufacturers of Gold Seal tubes.

It gives a clear account of the function of radio tubes in simple language and tells how the newer type tubes were developed to meet present day conditions in broadcasting.

**Weil Appointed Advertising Manager of Freshman**

After being actively associated with radio from the advertising agency standpoint for over five years, Paul S. Weil has accepted an offer from the Charles Freshman Company, Inc., to assume charge of their advertising and sales promotion activities beginning January 1.

For over four years Mr. Weil was associated with Frank Kiernan & Co. and for the last year and one-half with Albert Frank & Co., New York advertising agencies.

### A. C. Sets Meet With Public Favor

**T**HE trend in radio receivers is toward the A. C. tube-operated type. The demand has been growing steadily since the announcements were made in newspapers a few years ago that the A. C. or alternating current tubes had been made for specially designed receivers and all experiments had shown their operation to be of such a high standard that their adoption by the public was only a question of manufacturing facilities of licensed makers of radio receivers.

A. C. operated receivers mark an epochal achievement in the radio industry. It is now possible to own a radio receiver that requires no attention after the plug at the end of a wire cable is attached to the electric light socket and aerial and ground wires are attached. Alternating current in the home, such as is utilized for lighting, and power for electrical apparatus, is now used as the source of supply for heating the filaments of the 226 type tubes and also the power tube, 171 type, in the last audio socket, and heat for the detector tube, UY-227, which, incidentally, are used in the new Crosley A. C. Bandbox receiver. In using the alternating current - a separate power unit of small size is furnished and by its use there is no further need of A, B or C batteries. The large outlet for the new A. C. radio receivers is to be found in cities, for there electricity is supplied to thousands of homes. Those who have never owned a radio set are especially susceptible to this new type of receiving equipment and dealers throughout the country are reporting heavy sales.

It is not so much the fact that the newcomers in the ranks of set owners want to purchase the newest type apparatus but the knowledge of the ever ready equipment without further thought of upkeep, such as the care of batteries, on their part.

There will always be a demand for the battery type of receiver, however, especially from the rural districts, where there are still 11,000,000 homes that do not have the advantage of electricity supplied to them. For them the battery type of receiver must fill their needs. Owners of receivers where there is no electricity are somewhat at a disadvantage, for the batteries must be carried to places that are at great distances for recharging. Some cases have been known where the owner of automobiles would charge one battery while operating their machines in the daytime, such as farmers, and replace the auto battery with the one used for the radio set when the latter had become discharged of its energy. In the use of dry cell equipment it is also necessary to travel or send for replacements, and often this is necessary when some special broadcast program is desired to be heard.

### New Year's Eve Services From Trinity Church

The New Year's eve services of Trinity Church will be broadcast direct from the church through WJZ at 11:15 o'clock, Saturday evening, December 31.

The services, which will extend until 12:30 o'clock New Year's morning, will include an address by the Rev. C. R. Stetson and the singing of carols and New Year's hymns by the Trinity Church Choir and the congregation.

## GREENHUTS

NEW YORK CITY  
6 WARREN ST. N. W. Cor. Broadway  
"Selling Radio Since 1919."  
Store Hours: 8 A.M. to 7:00 P.M.

Open ALL DAY MONDAY for Late Shoppers

**Day-Fan** 5 Tube Set, With Built-in Speaker Extra. 19.95  
Reg. \$29

**AMRAD Electric** 5 Tube Set, ACIDS, WATER, NO BATTERIES, EXCUSES. Simply plug into light socket. A true electric set; not merely electrified. 39.95  
Reg. \$49

**FADA Radio** Perfect Neutrodyne—Built for lasting service, unsurpassed performance. Brings what you want when wanted. Permanent satisfaction. \$29.95  
Reg. \$39.95

MAIL ORDERS promptly filled. Send money order, include postage. No C.O.D. Send 25¢ for price list or information.

**GROSLY** No. 6-68 Tube 19.95  
Reg. \$29.95

\$30 Crosley 5 Tube 5-30 Set... \$24.95  
\$38 Crosley 5 Tube 5-30... 19.95  
"Bandbox" equipped complete... 64.95  
\$88 Crosley 6 Tube 85 Console... 34.95  
\$88 Crosley 6 Tube 90 Console... 39.95  
\$32 Crosley Music Console Speaker... 11.95

**GROSLY** 29.95  
H. F. L. 75, 5 Tube, Reg. \$98  
"Console and Speaker."

**Model 26** 56.95  
Reg. \$75

**radiola 6 TUBE** Super-Heterodyne Tubes Extra  
T. R. F. Set, Reg. \$60-5 tube 9.99  
MODEL 26 56.95  
Reg. \$75

**deForest** 99c  
Reg. \$15

**Complete Loud Speaker** 1.49  
Reg. \$15

**Nationally Advertised Adjustable Speaker** 2.99  
Reg. \$25

**MAJESTIC** 1.99  
Reg. \$25

**Victor Cone** 7.95  
Reg. \$35

**4.75**  
Reg. \$12.50

**Aero Loop...** 2.95  
Admiral Cab. Sp. 3.95  
Atlas Cab. Sp. 3.95  
\$42.50 Amplifier Sp. 19.95  
\$8 Utah Sp. Unit 2.95  
Utah Cone Sp. 5.95  
Crosley Cone Sp. 6.95  
Bristol Speaker, 2.95  
Radio Lamp 1.55

**MAJESTIC** 4.59  
Reg. \$12.50

**7 1/2 Amp. Charger** 3.95  
Reg. \$12.50

**UNITRON** 14.95  
Reg. \$12.50

**3 Speed Trickle Charger** 2.95  
Reg. \$12.50

**TUNGAR** 6.95  
Reg. \$12.50

**Trickle Charger** 3.49

**Balkite** 3.49

# The Year's Greatest SALE at City Radio Stores

224 E. Fordham Rd.  
Opposite Keith's Fordham

110 WEST 42nd ST.  
East of Broadway—All Subways

63 CORTLANDT ST.  
Formerly Kenwood Radio

42 Cortlandt St.  
Opposite Brill Brothers

NEWARK BRANCH: 183 Market Street (at the "Four Corners")  
CLOSING THE YEAR WITH THE GREATEST VALUES WE EVER OFFERED DURING 1927

All Five City Radio Stores OPEN EVENINGS.

**RESCO** Storage Battery Rubber Cased 5.95  
ACME 2 1/2 Amp. Charger List 12.50 5.95

**ACME** K3 Speaker List 16.00 6.95  
GENERAL ELECTRIC Output Transf. List 13.50 1.95

**ACME** K3 Speaker List 16.00 6.95  
GENERAL ELECTRIC Output Transf. List 13.50 1.95

**ADROIT** Soldering Irons 95c  
G. R. P. 36 inch Cone Kits 9.95

**ADROIT** Soldering Irons 95c  
G. R. P. 36 inch Cone Kits 9.95

**ADROIT** Soldering Irons 95c  
G. R. P. 36 inch Cone Kits 9.95

**ADROIT** Soldering Irons 95c  
G. R. P. 36 inch Cone Kits 9.95

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G. R. P. 36 inch Cone Kits 9.95

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**ADROIT** Soldering Irons 95c  
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G. R. P. 36 inch Cone Kits 9.95

**ADROIT** Soldering Irons 95c  
G. R. P. 36 inch Cone Kits 9.95

**ACME** for amplification E-4 B POWER SUPPLY 180 VOLTS 4 VOLTAGES List 35.00 LESS TUBE 14.95

**HEDGEHOG** TRANSFORMERS 3 to 1-5 to 4 1.69  
AERO-LOOP AERIAL 2.19  
FIXED COND. 1-25 .1 .25

**FRESHMAN MASTERPIECE** 5 Tube T. R. F. Set. SPECIALLY PRICED 29.50

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**Balkite** "K" Trickle CHARGER 3.69  
LIST 7.50

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**ACME** K2 SPEAKER List 38.00 16.95  
Original Sealed Cartons.

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Original Sealed Cartons.

**THORDARSON** R 200 Trans. 4.19  
Original Boxes

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## 6th AVE RADIO SHOP Inc.

745 SIXTH AVENUE NEAR 42nd ST.

Wholesale & Retail Our Policy Telephone Bryant 2971

WE ARE NOT CONNECTED WITH ANY OTHER STORE

**STERLING "B"** ELIMINATORS R. T. 41 LIST \$22.00 SPECIAL \$10.89

**WHEELAN** CONES Special \$2.49  
ENSCO CONE KITS COMPLETE \$5.95

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ENSCO CONE



## CANTOR CABINET CO.

171 WASHINGTON ST. NEAR  
TEL. CORTLANDT 7865

Original Hammarlund-Roberts Hi-Q. CABINETS, for new 6 Tube Set

12 1/2 in. \$7.50

Tables

The New Famous CORBETT CABINET for new Hi-Q 6

36 x 15 \$6.50

32 x 15 \$4.75

CABINETS

Two-DECKER CONSOLES

The Famous DAVIS Orthophonic CONSOLE

Up to 30 in. deep VERY LOW!

RADIOLA 17 TABLES

32 x 14 1/2 \$29.50

WALNUT FINISH

Original Crates

11.50

With compartment for R.C.A. 200A Speaker

Full PIANO HINGE 10 inch Deep All Sizes

This Table Has Been Selling for \$15 Elsewhere Limited Quantity at this low price \$8.50

Radio Furniture of Character

### Rider Prepares Service For Amateur Experimenters

In step with the modern trend of disseminating accurate technical information for the guidance of interested radio fans the Aerovox Wireless Corporation has published the first of a regular series of bi-monthly releases containing accurate technical information covering the various phases of radio.

This four-page booklet contains data useful to the average radio fan. It shows a popular push-pull audio amplifier suitable for either A. C. or D. C. operation; technical discussion about dielectrics of condensers; the significance of "temperature coefficient"; a means of obtaining a variable plate voltage from a fixed B battery eliminator, and other interesting information.

Get it  
**ELLIOTT'S**  
RADIO DEPARTMENT  
59 CORTLANDT ST.  
S. W. COR. OF GREENWICH ST.  
AND SAVE

## Not All Good Programs Come From Locals

Veteran DX Fan Steps Out and Proves It.

By W. H. MORRIS.

WEDNESDAY, Dec. 14.—Here we are again! How did you like the first installment of the first batch of letters.

Have been asked about what kind of a set we use out here. Well, there are several hooked up all the time and ready to go. A Resonance is dialed to WJZ—never changed. A one-tube Carborundum hook-up is used only on WEAF. Another loop set is dialed to WOR and never changed. An original Paragon six is still doing duty for DX. A Victrola is dialed to KFI and very seldom changed. We use "The Everyman's Four" for DX and the kick that it has for four tubes is a plenty. Several slight changes have been made from the original hook-up which made quite some difference in our estimation and the last change that was made was to install a 222 tube. Quite some fussing in doing the shielding but the "5 & 10" helped us a lot until the special shielding arrives from out West.

Dial readings are carefully noted and particularly those signals that as yet have failed to come through and those dial readings are tuned in nightly. For nearly two hours to-night a small-powered station on the West coast was monkeyed with. Its dial readings were noted some time ago but to-night they came in better than ever, only to be buried out by static and ship code. It's a pretty little K station and we hope that some day we can tell you who it really is. We have heard part of its call letters but not enough to satisfy us. That station as others with a faint whistle coming through will be watched carefully every night.

We listened to WJZ sending out Christmas greetings to Baffin Land and it was mighty interesting. We hope those away up North received all that was being told them. Chicago and Southern stations are coming in fine to-night and one could spend an entire evening listening to just one of them. Away up North a fine program comes from Calgary, Canada. Have not heard them of late, but their programs are always good even when it is far below zero up there. KFI helps to fill in the late gap on a Saturday night, as does WHO, with dance music.

SUNDAY, Dec. 18.—We all went to church to-night in various parts of the country and listened to portions of very interesting sermons, choirs, soloists and organ selections. Counting them all up, we attended fourteen services. WJZ, with a band of music helping to convert souls, splendid oratory and organ selections was indeed interesting. Southern stations came in very well—particularly WJAX. WLS with an Indian instructor to Boy Scouts gave a very interesting talk. PWX seems to have one chance of a lifetime, and that is on Sunday nights. Their program came in very clear, loud and distinct. West coast stations were coming in poorly so we switched to WBAP and they entertained us with the "Seven Aces" until bedtime.

MONDAY, Dec. 19.—A fine cold night out but static is going to be bad for DX and our four-tube set is on a yagalon-shy a 222 tube, which seems to be scarcer than hens' teeth. Started way down the scale for a starter. Tuned in on something that started us for a long DX shot. They more tubes we fit the further away we knew the station must be. Listened intently to a sports writer's opinion and when he finished we were informed that it was WERS. Fine for a starter and time out. Next we listened to a man talking about Rollins College and what they did there, &c. We knew that Rollins College was in Winter Park, Fla., and naturally we had an idea that it was the Winter Park station. After the speaker finished we were informed that Dr. Hamilton Holt, president of the Rollins College, had just given the talk from WMSG. Twice fooled.

So we switched away up the dials and listened to the "Joy Boal" and Indian songs from KYW. Then to Dallas, Tex., where a Southern band was booming out in grand style. Coming in like a Chicago station, we listened to several

THURSDAY, Dec. 15.—Read today where "engineers" reported to the Radio Commission their findings on heterodynes. Wonder what kind of a college course it takes for one to be proficient in heterodynes? At WFAA a band is playing "To a Wild Rose" and along comes a spark code dispatch that nearly ruined our speaker. "Sugar" and "Dream Kisses," banjo selections, being fondled from WBBM. Miss Emma Kaufman, a soprano with a beautiful voice, is hitting the high notes from WSM. The Capitol should install her with its gang.

Mabel Ackerman from KMOX is doing very nicely. And they have organs down South too. WJNC is playing "My Souvenir." WHAM from the Camera City is producing a program well worth listening to. Just ran across a small local advertising a "Coil Tenna." Must be something to attach to a loud speaker for French programs?

WJKS on a heterodyne is shipping "Drowsy Waters" through the sleet and rain. WAWA of Fort Wayne, Ind., playing "Indiana." KFH with a dance orchestra that the corn belt should be delighted with. "Wait Till the Sun Shines, Nellie," a recent (?) hit on Broadway, is just being heard from KOIL. WDAX and frolicsome Night Hawks are sure busy. Hank and his gang from the Crazy Quilt Studio at WBBM are keeping awake all the ice bound sailors in the Great Lakes. KFI is coming fine through the static to-night. KHJ was faintly heard. KGO with a high class program. Canadian and Southern stations all tuned in excellently. A very, very fine barytone from WHO is singing "When Day is Done," so I guess we will call it a day too.

FRIDAY, Dec. 16.—It was demonstrated to-night that with a real good set WCLF could be tuned in with plenty of volume and clarity while WEAF is operating. However, our time was taken up to-night by a high priced set that has a record at home to be a wave wrecker. Anywhere, anything, anytime and that sort of stuff and two operators at 10:54 P. M. in relief. WAIU up to 10:54 P. M. was the first call letters that were heard beyond our locals. Later on WJAX came out of the speaker and a few Chicago stations. The home of the set is but a few blocks away from our antenna and I have been invited there some night when the set is right to listen in.

After the party left KFI was tuned in on my own set.

SATURDAY, Dec. 17.—To-day

# STEWARTS

66 CORTLANDT STREET

PHONE CORTLANDT 1107

168 Greenwich Street

OPEN DAILY AND SATURDAY UNTIL 10 P. M.

MERRY XMAS

LAST MINUTE RADIO SPECIALS FOR CHRISTMAS EVE!

See Our Windows for Real Big Values, Limited Space Prevents Us From Showing All Here.

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### FREED-EISEMANN CONE SPEAKER

\$7.45

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THE NEW ALGONQUIN SPEAKER

An unusual Shilling Model Speaker Full of Moisture Proof.

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### WESTERN ELECTRIC Radio Tubes

SUPER POWER—VT-1

Same as 201A

These tubes are equal to, if not better than, any radio tubes listed at \$5.00 to-day, or for which you paid \$12.00 a short time ago. As detectors and amplifiers they are hard to beat.

GUARANTEED.

69c

3 for \$2.00

Mail Orders filled. Include postage.

### MAGNAVOX RADIO SET

6 TUBES 1 CONTROL MAHOGANY CONSOLE

Complete with specially built-in Foda Speaker; never such value; probably never again.

Mail orders \$34.95

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### SCHICKERLING RADIO TUBES

1/4 AMP. DETECTOR AND AMPLIFIER

85c

The only 4-Element Tube in the world. Sold with bonded guarantee.

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UX 213 \$1.95

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### EAGLE WESTINGHOUSE "A & B" SOCKET POWER

\$29.95

Mail Orders \$30.50

A Complete "A & B" Eliminator of National Reputation.

### NEW! Electric FREED-EISEMANN RADIO

KUPROX TRICKLE CHARGERS

Absolutely dry... require no watering or attention

In Stock Replacement Unit \$4.50

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Guaranteed Rubber Case, Fully Charged

A Typical Stewart Value

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make any radio set electric

Both units now on demonstration. Absolutely dry. No Acid. No Hum. No Bother.

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For Constant "A" Power Without Attention

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with the Westinghouse Rectox Unit

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### ABOX "A" BATTERY ELIMINATOR

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We Have All Types In Stock

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Permanent, automatic dry trickle charger and power control, using Westinghouse RECTOX

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### Thordarson R-200 Transformer

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AUTOMATIC, by the touch of a single switch, service free, and long lived. Used with your good old tubes they will prove reliable for tone quality and distance—and they last. Have A.C. radio, but don't experiment. Have Sterling A. C. power and be sure

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2 RATE CHARGE NOW IN STOCK

### Lion Cone "25"

For better reproduction

### AMPLION



## Completing the New Henry-Lyford

(Continued from Third Page.)  
switch terminal on the modulator which is nearest the top of the front panel.

Now we will wire up the C bias connections. Join the coil jacks No. 3 and No. 4 together and run this same wire over to the right hand terminal of bypass condenser No. 1; continue this same wire to the lug near it marked "F." This connection will supply the bias for the self-tuned transformer. Connect another wire on the right-hand terminal of bypass condenser No. 1 and run it up to the lug which is connected to the rotary plates or frame of the antenna tuning condenser. Continue this wire to the No. 9 coil jack and then over to the lug which represents the rotary plates of the next tuning condenser. From here it continues on to the next lug of the last tuning condenser and ends up at the No. 13 coil jack.

Solder the lug under the antenna binding post to the coil jack lug No. 1. Then solder the lug under the ground binding post to coil jack lug No. 2. Run a wire from coil jack No. 5 up to the left-hand lug of the .001 Sangamo. From the other lug on the .001 condenser run a wire through the hole in the subpanel directly over the stationary plates of the balance condenser and solder it to the lug. Push a wire through the hole in the subpanel directly over the rotary plates of the balance condenser and solder to it. The other end of this wire should be soldered to the lower right terminal of tube socket No. 1. At this time solder the lug "P" to this same terminal. Next solder a short wire to the lower left terminal of tube socket No. 2 and solder the other end to the lug "G." Connect a short wire from the lug on coil jack No. 6 and join the other end of it to the lower left terminal of tube socket No. 1.

Connect a wire to the lower right terminal of tube socket No. 2 and run it over to the No. 7 coil jack lug. Solder a wire to the No. 10 coil jack and continue it to the lower left terminal of socket No. 3. From the lower right terminal of socket No. 3 run a wire to the No. 11 coil jack lug. Connect a short wire from the lower right terminal of socket No. 4 to the lug of coil jack No. 14.

Push a wire through the hole in the subpanel just to the left of tube socket No. 1 and fasten the end of it to the stationary plates of the condenser directly above it. In a like manner connect a wire to the lower left terminal of tube socket No. 3, push it through the subpanel up to the stationary plates of the second tuning condenser. Join another wire to the lower right terminal of socket No. 4, run it through the hole in the subpanel provided to the stationary plates of the third tuning condenser.

Solder a wire to the left terminal of bypass condenser No. 2 and run it to the soldering lug labeled "B," and from here continue on to the lower left or "F" terminal of the left audio transformer, as shown in the picture wiring diagram. From some convenient point along this same wire run another wire to the lug on coil jack No. 8, continuing this same wire over to the lower contacts on the Carter variable resistance. The other terminal on the Carter resistance should now be connected to coil jack No. 12.

To the upper right terminal of tube socket No. 4 solder a wire and run it to the upper lug on the Sangamo .002 condenser, continuing this same wire on to the lower right hole in the subpanel directly over the "P" terminal of the right or first audio transformer, through this hole and to the binding post. Solder a wire to the lower terminal of bypass condenser No. 5 and run it down to and through the hole in the subpanel, finally connecting it to the "F" post of this transformer. Now connect a short wire from the lower right terminal of socket No. 5 and join it to the "G" post of the transformer to the right of it by means of the hole in the subpanel.

To the upper right terminal of tube socket No. 5 solder a wire and run it away over to the left to the "P" terminal of the left transformer, which is the upper left hole in the subpanel.

Join the right-hand Carter tip jack to the lower terminal of bypass con-

wire to the lower left terminal of the No. 6 socket and run it up to the "G" post on the left audio transformer. Join the lower terminal of bypass condenser No. 3 to the "F" post on the left audio transformer.

Connect up the volume control in the following manner. Run a wire from the lower terminal of bypass condenser No. 5 and run it through the right-hand hole in the subpanel (below the 4 ohm resistor) and connect it to the No. 2 terminal of the centralab modulator. In a similar manner join the No. 1 terminal of the modulator to the lower right terminal of the No. 5 tube socket.

Now take out the four machine screws holding the lugs P, B, G and F in place. Slip the B-2 transformer in its proper position at this time, as the wiring is complete except for the cable. Be sure that the B-2 is inserted so that the "P" and "G" terminals are nearest the tube sockets.

### Cable Connections.

The proper location for each wire of the battery cable is shown on the picture wiring diagram by capital letters. Below is a list of the colors of the cable and connections to the A, B and C batteries:

Y.—Yellow, A plus, B minus.  
Y. B.—Yellow and black, A minus C plus.

M. W.—Maroon and white, 22½ or 45 B plus det.

M.—Maroon, 90 B plus.

R.—Red, max. B plus (135 v. for 112 or 112-A; 180 v. for 171 or 171-A).

G.—Green, C minus 1½ v.

G. M.—Green and maroon, C minus 4½ v.

G. R.—Green and red, C minus (9 v. for 112 or 112-A; 40½ v. for 171 or 171-A).

Having soldered on the battery cable we are ready to put on the knobs and dials on the front panel.

With the shaft of the balance control turned as far to the left as possible put on the knob and tighten the setscrew so

## By-Products of Radio

(Continued from Second Page.)

covered it in an airplane flying above that mobile spectacle. He used a short wave transmitter to send out the description of what he saw, and a receiving room in the control room picked it up and passed it on. The air was bumpy that day and the poor engineer was violently seasick, but he kept his description going just the same.

The R. C. men who covered the opening of the Holland Tunnel had a busy time. They had to cover the ceremonies at both ends, while the central control synchronized and filled in the gaps. Then there is the adventure of the engineer catching a Philharmonic concert, whose two radio lines and one phone line went completely out ten minutes before the program began. He managed to get to the control board over the regular telephone line and used it successfully for more than two hours, all the time expecting to have the operator interrupt and demand another nickel.

Cases of fortitude and endurance are those of an R. C. man who stuck to his post although a waiter had knocked over a pitcher of ice water which cascaded over him, and that of another who for a long program held his amplifier in his lap while with his hands he kept in connection two broken wires which he had not time to hook up otherwise. Advance tests and spare equipment help to insure against a break in a program, but the remote control engineers must be ready for the unforeseen and do their best to keep the program coming through with that regularity which the public has grown to expect from broadcasters as it does from railroads.

So if it rains one minute before an open air band concert and your program comes through just the same you will know that the R. C. man has done a Minnesota shift with his equipment to wherever the band has gone to get under cover. If the church service to which you are listening is heard smoothly and in good tone you will know that the R. C. man has been busy at his mixer and has

that the arrow points directly to the left. Turn the shaft of the volume control to the left and place the knob on the shaft so that its arrow points to the left. This is the "off" position for all the filaments. On the Carter 10,000 ohm resistance adjust the shaft so that the contact is in the position shown as "X" on the picture wiring diagram. When in this position put on the knob and point the arrow directly at the detector coil. This is approximately the working position of this control.

The last thing to do is to mount the drum dial and couple up the condensers to it by means of the nine-inch rods. First of all place the two small bakelite vernier disks in their retainers, which are supported by the drum plate. The smallest amount of oil will help for smoother running. If they bind a little sand them down a little with a fine grade of sandpaper.

Now push one of the nine-inch rods through the bearing hole of the antenna tuning condenser. Continue sliding until it goes through the special bearing in the drum plate and stop when the rod protrudes about five-eighths of an inch beyond the inside nut of the special bearing. Hold the shaft in this position slide on the proper dial on this shaft (look at the dial from the front to see that the numbers are not upside down) and then fasten it securely to the shaft by means of pliers on the knurled cap on the dial near the plate. It will be noticed now that the dial and shaft will rotate freely but the rotary plates on the antenna condenser still do not move. This is correct, and at this time (being that the condenser is lined up with the special bearing) we can tighten down securely the two machine screws holding this condenser to the subpanel.

Do not tighten down the setscrew which couples the shaft to the variable condenser plates until later. If it happens that the dial does not turn smoothly apply a very small amount of graphite only to the gears of the small vernier.

his one each for the organ and echo organ. If the report of a football game you are hearing falters but carries on you will know that the R. C. man has stoutly defended some part of his equipment against a rooster whose team has just made a touchdown.

Such is the task of that important link in the radio chain, the remote control engineer. And he doesn't care if the broadcast he must make is tricky and hard. For that gives him a chance to show what he can do.

### Tube Filaments.

After the wide publicity given to the great value of thoriated tungsten filaments it seems amazing to the radio fan to look over the various tubes these days. Some of them have filaments made of ordinary nichrome wire used in heating devices. These have the Wehnelt coating of strontium and barium oxides, somewhat like the old WD tubes which used coated platinum wire. Some engineers say that iron wire would be as good as nichrome in this type of filament. With the A. C. tubes at least one manufacturer uses a heavy carbon filament for the indirect heating of the cathode, and advertises this feature to show the ruggedness of his design. A carbon cored wire has long been suggested for use with oxide coatings.—R. C.

### Our Common Enemy.

Static is the curse of every radio fan. After paying a few hundred dollars for the latest equipment he finds that the old crackle sounds just as badly as on a ten-cent store set. It is a real shock to him to know that money can't buy immunity, and it's all the worse now that the Bureau of Standards seems to have given up hope. Only a short while ago Dr. L. W. Austin stated that static would probably never be eliminated. But it has been found to be somewhat directional. You receive most of your trouble from the north or south, east or west. If you can find out which way these disagreeable waves cut in and then

Remember, a very small amount will do the trick.

The other half is now mounted in the same way. Push the shaft through the end condenser and keep it going until it is flush with the inside of the drum plate. Now hold the dial in position and push the rod through the bearing hole of the drum disk. Holding the drum disk in position, keep pushing the rod through until it just goes into the other drum the least bit. This is correct when the end of the rod has gone through the end condenser and rests one and one-quarter inches away from the nearest bearing of the end condenser.

The purpose of pushing the rod through and into the second drum slightly is to help in lining up the two drum disks. With pliers tighten the drum to the shaft. Now rotate this side of the drum until smooth action is secured. It may be possible that when one side of the drum is rotated the other side turns also. This may be due to having the rod go too deeply into the other drum. A little oil here helps a good deal and perhaps the rod needs sanding to make the end slightly smaller than the drum bearing hole. Have patience in this little detail and your efforts will be rewarded by having a drum dial that is really smooth in action.

The Hammarlund flexible coupling is now placed on the end of the rod so that the setscrews will no more than engage the rod. Now slide through a regular condenser shaft (supplied with each condenser) until it also engages the collar of the coupling and sufficient for the setscrews to hold. Now tighten the setscrews in the collar and also those machine screws which hold down these two condensers to the subpanel, as both are now in alignment. The next step is to attach the front plate on the dial. Due to the fact that either drum may be moved slightly from side to side (the setscrews on the condensers are not screwed down yet) and the plate may be twisted either way a happy medium will be found when both drums will turn 180 degrees without touching the front plate. When the correct position is found set the single condenser at maximum capacity (plates fully interleaved) and then place the number 100 on the dial opposite the pointer. Now tighten the setscrew on the condenser. The rotary plates will now turn with the drum. In the same manner place the other two condensers in maximum capacity position and with the drum adjusted to 100 tighten down the setscrews on both variable condensers. Both condensers should now rotate with the right-hand drum. By setting both drums to read approximately the same numbers and by placing the thumb midway between both drums the action will be that of a single control set.

### Testing.

The receiver is now ready for its try-out. Connect up the battery cable properly, place the three coils in their respective sockets and connect a good cone such as a Timmons or Western Electric to the Carter tip jacks. Five —OIA tubes are placed in the first five positions and a power tube, preferably a —71-A, should go in the sixth socket or in the socket directly to the right of the left audio transformer when looking at the receiver from the front.

After connecting both aerial and ground set the balance control so that the arrow points about straight up and turn on the set by giving the volume control a twist. After tuning in a station if it is found that the set oscillates adjust the Carter resistance until the set works and sounds the best.

Keep in mind that the most desirable position for the Carter control is just before the critical unstable position.

It may be possible that the two tuned circuits controlled by the two gang condensers are not in resonance. This is rectified by either loosening the coupling or loosening the setscrew on the right-hand condenser. For most accurate adjustment a weak signal should be tuned in and then with the hand on the rotary plates adjust the end condenser for maximum signal strength, keeping the other two dials in resonance with the incoming signal. After this is done once again tighten the setscrew on coupling.

## Maxim Urged as Head of Commission

WITH three members of the Federal Radio Commission unconfirmed by Congress and the vacancy created by the death of Rear Admiral W. H. G. Bullard yet to be filled, official Washington is addressing its attention to nominees for the unoccupied chairmanship and any possible vacancies caused by the refusal of the Senate to confirm present appointees. Discussions of the subject in the national capital are in agreement that the new chairman should be preeminently a radio man. In the last month a score or more of names have been proposed, with only one, that of Hiram Percy Maxim, standing out as possessing all the necessary qualifications. Both radio experts and politicians believe that Mr. Maxim would qualify in the strictest sense of the word, and that his appointment would be acceptable to the large public interests to be served by the Federal Radio Commission.

The name Hiram Percy Maxim, insists radio gossip in Washington, is synonymous with radio progress in this country. As president of the American Radio Relay League, Mr. Maxim has for many years, in a manner, been chairman of the nucleus or backbone of radio in the United States—the promoter and director of the interests of the approximately 17,000 radio amateurs. He has been at the helm of experimental radio from the time a decade or more ago when it was considered no mean achievement for two amateurs to talk across the street, to the present moment, when amateurs in this country exchange messages with amateurs in Australia, more than half way around the earth.

### Familiar With Problems.

Mr. Maxim, contend those sponsoring his name as a nominee for the Federal Radio Commission, is familiar with the problems of broadcasting—for what is amateur radio but broadcasting in the international Morse telegraph code? Mr. Maxim has attended the National Radio Conferences held in Washington and he has the confidence of Secretary of Commerce Herbert Hoover, at whose behest the national gatherings of radio men were convened. This esteem is mutual, for Mr. Maxim told this writer that Mr. Hoover has largely been responsible for the preservation of the rights of amateur radio.

However, contends Washington radio rumor, the appointment of Mr. Maxim would not involve the attachment of strings to his decisions. The Department of Commerce nor the so-called powerful commercial interests of radio, it is argued, would be without political levers in demanding special privileges. For in serving 17,000 radio experimenters in the past he has represented a cross section of interests, political and otherwise, of the entire United States.

Friends in Washington and elsewhere who are advancing his name in this connection are generous in their praise of his qualities as a leader and radio technician, a combination needed on the Federal Radio Commission to solidify its membership into a working unit, active in the solution of the pressing radio problems.

The backers of Mr. Maxim have evidently lost sight of the fact that all places on the Radio Commission have been filled with the exception of the vacancy caused by Admiral Bullard's death. This member must come from the district embracing Pennsylvania and adjoining States. There is a possibility, as some have pointed out, that those in favor of Mr. Maxim may be under the impression that O. H. Caldwell, present appointee from the northeastern district, will resign if the Senate refuses to confirm him, thus leaving the way open to another candidate. Whether or not the members of the commission or the President is supposed to select the chairman has been a much argued question, but it is assumed that if the members themselves agreed on their chief the President would abide by their decision, since it has been his belief that radio listeners want relief and not politics.

When asked for a few words con-

# Why are you Merry This Christmas?

Nothing varies so as our reasons for happiness. One person's joy is often another's sorrow—

PERHAPS that longed-for roadster is finally to become a reality \*\*\*

OR the "big deal" did go thru and the New Year will find you comfortably fixed \*\*\*

MAYBE you have made an advantageous "change," offering brighter prospects than you had ever dreamed of \*\*\*

THEN again it may be the new electric radio playing so beautifully alongside your Christmas tree \*\*\*

EACH and every one, besides a thousand other reasons, will be responsible for some one's Merry Christmas.

Would it interest you—  
why this is

Walthal's Merriest Christmas?

BECAUSE we have to the best of our ability served over half a million radio folk during the past year\*\*\*

BECAUSE we have placed in their keeping nearly 3,000,000 dollars in quality radio merchandise\*\*\*

BECAUSE we have more radio customers than any radio, department or musical store in the world\*\*\*

BECAUSE the year 1927 witnessed the birth of our 5th and 6th new stores, in Yonkers and the Bronx, besides our massive 25,000 square foot warehouse on Spring street.

BECAUSE we are about to open our seventh great store\*\*\*

BECAUSE the strict adherence to our policy of "Radio Insurance" has won the confidence of the radio public.

BECAUSE we look toward the coming year of 1928 as the greatest in our history.

May your  
Holidays  
Be Joyful  
and 1928  
Bountiful.  
Signed W. H. N.

This advertisement is published both to wish our many friends and customers a Merry Christmas, as well as to inform them of our growth and progress, which permits us to better serve them.



The Home of Radio Insurance  
**WALTHAL'S**  
Radio Retailer of Greater New York





# The Radio Amateur's Part In the MacMillan Expedition

The "Ham" Is as Old as Wireless; Using Limited Power for Transmitting Many Distant Records Have Been Made; Telegraph Code Used

WHO is this radio amateur? Everybody who reads newspapers has been introduced to him this summer by the line, in virtually every news dispatch about the MacMillan Arctic expedition, which said, "this message was transmitted through amateur station—operated by —."

Some nights he was in Cedar Rapids, Iowa; then again he would be at South Manchester, Conn.; he ranged from Portland, Ore., to Portland, Me., and he showed up in Australia and in England.

The great majority of the messages given out by the National Geographic Society, and many of those made public by the Navy Department, depended upon these amateurs.

From coast to coast, and from the Gulf to Canada, radio amateurs have been working long hours into the night, taking thousands of words in news dispatches, and also personal messages, and doing it as a gift of service. For the amateur's only recompense is a lively and enduring affection for his hobby, "ham radio," and a desire to contribute further to the radio science he has done so much to develop.

One of the amateurs who has been most successful in "getting" WNP, (meaning the wireless station aboard the expedition's flagship, the Bowdoin) is a 15-year-old schoolboy who took his vacation money to go to Wiscasset, Maine, and interview John Reinartz about short wave sending and receiving. Another is a well-to-do tobacco planter. A third is a successful business man who burns the midnight tubes as his hobby.

## Amateur as Old as Radio

Amateur radio is as old as radio itself. In the days of the spark transmitter there were a host of enthusiasts striving mightily, with comparatively inferior equipment, to converse with their fellows in nearby towns. There gradually grew up a camaraderie of accomplishment. These transmitting amateurs were able to converse with each other from town to town by means of the special telegraphic code evolved for radio.

As the discoveries of scientists, at work in laboratories, and of amateurs, at work in their radio shacks, stretched out the distance over which it was possible to converse, there was born the idea of finding a station between two others that were unable to communicate directly with each other and make of the half-way station a relay point.

The development of this idea was the development of the American Radio Relay League. Enthusiastic amateurs banded together to furnish relay service to their fellow amateurs and to the public. As the years passed on and the apparatus used in transmitting and receiving units became more efficient this need for relaying became less acute. With this change came another.

## Development of Relay Idea

Amateur radio stations were added to the equipment of vessels that had never before considered carrying radio; portable, low-powered amateur stations became a necessity for expeditions to odd corners of the world where other means of communication were limited.

These stations away from civilization and the homeland, because of varying conditions, were not always able to talk with one specified station at home. Thus once more the relaying of messages became a matter of prime importance to the transmitting amateur.

Transmitting over great distances and with low power that makes verbal communication difficult, the radio amateur uses telegraphic code, similar to that used by wire lines. In stead of the familiar clicks of the land line there is a steady flow of short and long buzzes—dots and dashes—and as the evening wears on and morning approaches the radio amateur has before him long "messages" that no other method of communication could bring in so rapidly.

## Amateur Like Explorer

When plans were being developed for the present MacMillan expedition officials of the National Geographic Society wanted a reliable method of carrying on daily communication between the expedition and the United States. A survey of the possibilities showed that dependence might be placed on this amateur—who, much like the explorer, was willing to work long hours and endure discomfort for the love of the "game."

Amateurs in America successfully talk with Argentina, with Indo-China, with Japan, with New Zealand, with Australia and with England.

If such men were available and were able to carry on nightly conversations over such prodigious distances, they were the men with whom the expedition must make its arrangements. Short waves and low power were the logical methods of communicating from the Far North. Governmental regulation had given the amateur the short-wave bands where his skill and experiments developed a host of new radio theories. The necessity of keeping a hobby within reasonable financial bounds precluded the use of high power.

## Reinartz Chosen for Operator

With those facts in mind, officers of the National Geographic Society and of the American Radio Relay League worked out plans with John L. Reinartz, operator of the Bowdoin and one of the outstanding exponents of the new short-wave theories. It was decided that member stations of the American Radio Relay League in the United States and Canada—or other countries, if necessary—would act as receiving stations for all of the news and scientific information sent back to this country by the expedition. At the same time messages between members of the expedition and their families and friends in the United States would be handled by the amateur radio stations.

This plan has worked without interruption throughout the stay of the expedition in the far north. Daily schedules have been maintained. News dispatches have been handled with a speed that would delight the most critical editor, and personal messages have kept the morale of the exploring party and of the families at home at a higher pitch than was ever possible under old conditions.

From the standpoint of getting news home the radio accomplishments are ideal. On a recent occasion, when the airplanes of the expedition started out on an exploration trip at 10:47 in the morning, word was sent out from the Bowdoin at 11:03 that the planes had just started on a three-hour run.

## Collins Makes Speed Record

Received by A. A. Collins, Radio Station 9CXX, at Cedar Rapids, Iowa, the dispatch was relayed to the headquarters of the National Geographic Society in Washington at 11:56 and immediately released to the various news service that cover the country. So great was the speed with which the entire transaction was accomplished that many papers were on the streets of this country with the news before the airplanes had returned to their station with the schooner Bowdoin.

A number of remarkable feats in radio were accomplished in the course of the summer. Long-distance relays were handled in record time, extremely long distance reception was recorded and many stations maintained daily schedules over a considerable number of days at a time.

## Two-Way Distance Record

Bruce Stone, of San Jose, Calif., owner and operator of Station GMM, succeeded in carrying on two-way communication with the expedition when it was off the coast of Greenland, making a distance record for two-way work. The record of greatest distance covered by a message from the explorers goes to several dispatches copied by L. H. O'Meara, of Gisborne, New Zealand. O'Meara was unable to make two-way work of it, however, due to the extreme distance.

Other members of the American Radio Relay League, who are recorded as contributing to this remarkable distance work are: L. Eldon Smith, of Whittier, Calif.; R. Bartholomew, of Porto Rico; J. W. Newman, of Mobile, Ala., and John Banzola, of St. Petersburg, Fla.

One set of messages covered a unique path, but succeeded in making

the journey within a day. The expedition stations established contact with J. A. Partridge, of London, owner of British amateur radio station 2KF. Partridge took a sheaf of messages and immediately relayed them to D. H. Sarkisian, of West New York, N. J. From Sarkisian's station to the headquarters of the National Geographic Society in Washington was but a trifle after that.

## Others on Honor Roll

Others sharing honors with A. A. Collins, of Cedar Rapids, Iowa, are Donald C. S. Comstock, of East Hartford, Conn.; E. H. Pinney, of South Manchester, Conn.; A. W. Everest, of Pittsfield, Mass.; E. H. Koeper, of Elmhurst Manor, N. Y.; E. B. Duvall, of Milwaukee, Wis.; and Fred Link, of York, Pa. Comstock and Pinney, as friends and neighbors of John Reinartz, operator on the Bowdoin, whose home is also in South Manchester, hold enviable records for getting messages through from the Northland and returning answers at the same sitting.

Throughout the time when the expedition was out of touch with all other kinds of communication, daily news dispatches, messages to and from the members of the party, and routine naval messages have had free way on the short-wave transmitters and receivers of the transmitting radio amateurs in every country where clarity of reception was possible.

## Listeners' League To Be Organized

A nation-wide gathering of radio listeners is planned by the Listeners' League of the American Radio Foundation during the coming winter, in a city yet to be chosen, at which representatives of the various state and local councils of the league will discuss radio problems which affect owners of receiving sets. Election of these representatives will take place in the fall, following the enrollment of the listeners. It is expected that at least 100,000 of the listeners will be enrolled during September, which will be marked by intense activity by local members of the league.

A communication from Arthur R. Tucker, acting president of the foundation, tells of the plans for the organization of the councils which already have taken shape. "There are many problems in radio broadcasting and reception which can be solved best by the listeners," says Mr. Tucker. "All radio interests agree that the organization of the listeners is something greatly to be desired, but until this work was begun by the foundation the task was regarded as too large for any existing organization to tackle."

"A careful record is being kept of the first persons to join the Listeners' League in each state, and in each city, and special honors will be paid them later, at the first national gathering of listeners."

"Directions for forming the local councils and the state councils will be supplied on request. Election of permanent officers will be held throughout the country simultaneously, on ballots provided by the foundation. The assistance of governors, mayors, broadcasting stations, chambers of commerce, local radio clubs, civic organizations and of radio dealers is being enlisted. The foundation will be represented at many of the radio shows to be held this fall. Inquiries are welcomed, as well as suggestions from radio listeners. "Detailed policies of the league will be determined by the members themselves at the first big gathering."

## Voice Heard Around World

Mrs. La Rue Nelson, soprano whose voice when broadcast by WFAA in Dallas, Texas, was heard in Glasgow, Scotland, is scheduled on the program at WEAF on Tuesday, at 4 p. m. She won the Texas Federation of Music Clubs contest for young professionals in 1923, and is at present the director of the choir in the Central Congregational Church in Dallas. Her voice has been described by critics as one of remarkable clarity and exceptional range coupled with an intelligent understanding of music.

Theresa Ferrentino, a young pianist who was a former pupil of Morris Lichtman, and of the Master Institute of United Arts, will also be at WEAF on Tuesday. The remainder of the afternoon program at WEAF will be given by the Women's League of the United Synagogue of America. A talk illustrated by vocal selections rendered by Mrs. Leopold Rich, soprano, will be given by Mrs. Leo M. Abrahams on the "Music of Israel."

**Lady Radio Listeners of WGY To Be Woman's Club Members**  
All women within hearing distance of WGY may consider themselves non-resident, non-dues-paying members of the Schenectady Woman's Club, as this organization, the first of its kind to broadcast a comprehensive program, will offer weekly special talks and musical entertainments during the fall and winter months.

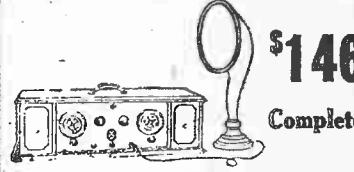
Every department in the Schenectady Woman's Club is offering at least one afternoon program especially for the non-resident radio membership, and the whole is under the direction of the radio committee of the club, of which Mrs. W. D. Bearce is chairman.

The program is especially noteworthy for the variety of the subjects discussed. There will be talks on club work, individual political responsibility, conservation, home hygiene, psychology in child discipline, home economics, philanthropy, parliamentary law, national characteristics of the drama of to-day, etc. The entertainments will include a program of Scandinavian music, drama, reading, two-piano recital, piano recital, violin recital and programs by the club chorus.

A feature of the Schenectady Woman's Club programs will be a series of six lessons in home hygiene and the care of the sick by Miss Anna McGee, R. N., chairman of the public health committee of the club and a member of the Schenectady County Chapter of the American Red Cross. These lessons are built up from "Red Cross Classes in the Home Care of the Sick" and they are given with the consent of the American Red Cross for the first time by radio. The information given by Miss McGee should enable the woman in the home to cope with sickness when no nurse is available. Questions written to Miss McGee on the subject of home hygiene will be answered by her.

The program will begin Tuesday, September 29, and will continue weekly until April 21.

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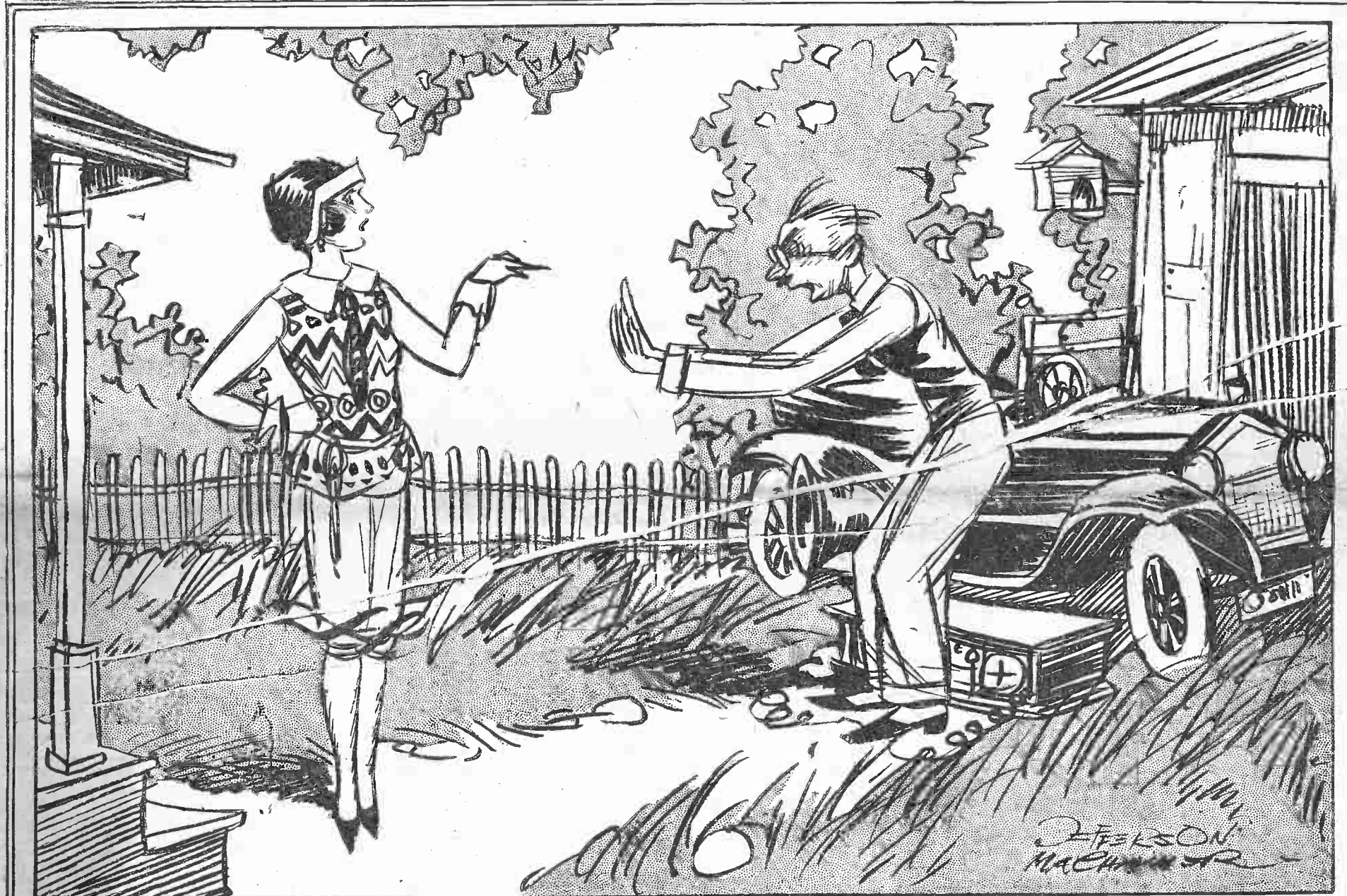
# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

SECTION SIX SUNDAY, SEPTEMBER 6, 1925 12 PAGES

## And I Learned About Radio From Him

The Amateur's Wife Tries to Operate the Family Flivver, but Is Persuaded by Hubby to Take Up Radio as Less Dangerous

By LILLIAN DICKSON



"Flivver and radio may not be closely related, but they were hubby's favorite pets and he would as soon think of letting you lay violent hands on one as on the other."

THE trouble with men is that they know everything. Of course, there are lots of other things the matter with them, too, but that's the main difficulty. A feminist, or maybe she was just a sort of Mrs. Josh Billings, recently remarked that "men hez got the most brains, but women hez the most sense." Women, though, are seldom satisfied to let well enough alone. They want to have the most brains, too, and they create considerable unpleasantness by their efforts to shine.

My advice to all young wives, and to old ones as well, if they haven't already found it out for themselves, is to be as smart as you like, but never to try to learn anything from your husband. I know whereof I speak. I have just had some lessons in tuning the family radio.

I hadn't intended to learn to tune the radio. It all happened indirectly as a result of my desire to run the family Ford. Now, a flivver and a radio set may not be closely related, but these two were by virtue of the fact that they were hubby's favorite pets. He would as soon think of letting you lay violent hands on one as on the other.

Hubby knew his own particular Ford like a book. He could distinguish its bark from the smorts of other equally decrepit flivvers. Some wags say that all Fords

look alike. This is because they have never really been well acquainted with a flivver. Every Ford owner recognizes something about his own little Lizzie that distinguishes her from all the others. It's like a facial expression or a wart on the nose. I can't explain it, but it's there.

## Hubby Knew His Flivver

Anyway, as I was saying, hubby understood Lizzie. He could tell that she needed water when she hiccupped and that she wanted gas when she spluttered. Now and then I have heard him absently mutter, "Whoa, Liz," as he put on the brake.

Lizzie may have been near and dear, but she spent many evenings alone and neglected in the barn when hubby acquired his new radio set. He counted the world well lost as long as he could sit turning the dials of his new toy and listening enraptured to the music that was wafted to him. This gave me my inspiration. Perhaps now it would not seem quite such a sacrilege to suggest that I run the car.

Hubby was hardly enthusiastic, however, but by appealing to his manhood and his sense of humor and the general gameness of the whole male sex, I managed to get him to consent, and every evening for a week we sought the quiet of back roads in the gloaming and hubby initiated me into the mysteries of starting

and stopping, and backing, and turning, and putting on the brakes, and taking off the reverse, and swearing at the valves and all the things every thoroughgoing motorist ought to know. By the end of the week I had attained a large vocabulary of profanity and the painful knowledge that hubby's respect for my intelligence was not all that I might wish.

The following Sunday morning we drove up to the neighborhood garage to replenish the supply of oil and gas. It was there hubby got the big idea. "The trouble with your driving," he said, "is that you can't do anything unless somebody is sitting right beside you and saying 'do this, do that.' Now the thing for you to do is to go ahead and drive. You know enough theory. Do you suppose you could drive home now without any instructions?"

I gulped, and through my head flashed the amazing rigamarole of putting on the spark and turning on the gas etc., etc., and I said proudly that, of course, I could.

## The Author Drives the Ford

Our start was great. For a block or two along the main highway we ran neatly. I even turned the corner into our own little side road without disaster. Then came Waterloo. The road leads down a steep hill with a sharp turn at the bot-

tom. I started blithely for the hill—then came misgiving. What did one do on a hill? I began to frame some suitable questions.

"What," said I to hubby, giving Lizzie a little more gas as a display of confidence, "should I do when we get to the hill? Should I turn off the gas, or give it more spark, or step on the brake, or all three?"

In my anxiety, I turned my attention from the wheel for a moment and Lizzie lurched dizzily toward a tree. She was just about to make a girlish effort to climb it when I saw our danger and straightened her out again, but in the struggle the answer was lost and the next moment we were skimming rapidly down the hill. Perhaps "skimming" isn't exactly the right word. It ought to be swooping or dashing. Anyway I realized just how an aviator feels when his plane takes a sudden nose dive. Lizzie gave a splendid imitation of one. I could hear hubby yelling "brakes," but it was too late. Already we were approaching that sharp corner and all my energies were bent on making Lizzie turn properly and go on toward home instead of landing ignominiously in the neighbor's front yard.

Lizzie turned with a gallant snort, or

Continued on page five



## Notes on the Prevention of Oscillation in R. F. Sets

**A Variable High Resistance May Be Shunted by a Large Condenser and Connect In the B Battery Lead to Control a Set**

By Harry J. Marx

RESISTANCES are an inseparable factor in all electrical circuits. It may not be there in the form of a rheostat, potentiometer or other piece of resistance apparatus, but every part of the circuit, whether it is just copper wire connections, condensers, coils or any other unit, has some resistance value. It may be great or small, as the case may be, but it exists, and is a factor in the circuit. Copper wire is a good conductor, meaning its resistance is low, while a non-conductor simply means something that has a very high resistance.

Present-day radio apparatus is so designed as to reduce as far as practical all resistance in the tuned circuits.

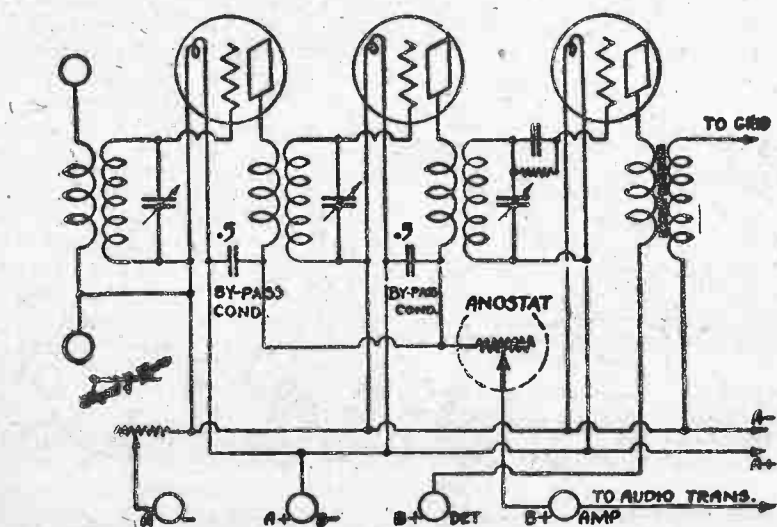
### Oscillation

This elimination of surplus resistance permits much sharper tuning and, therefore, improves selectivity. But in radio frequency circuits it multiplies the tendency of tubes to go into oscillation, producing the assortment of squeals, howls and whistles which not only come out of the loud speaker, but back up and go out in the air to play havoc with the neighbors' reception.

The old and incorrect practice was to add a potentiometer in the secondary circuit of the radio frequency stages. This was equivalent to replacing the resistance back into the apparatus. It reduced the oscillation

primary coils of the radio frequency transformers and the B battery to prevent oscillation by reducing the plate voltage on the radio frequency tubes. Now, by connecting a 1/2 MFD condenser between the B terminal of the primary on the radio frequency transformers and the filament terminal of the tubes, this artificial resistance can be shunted out of the tuned circuit. This condenser closes the plate circuit to the filament of the tube for the radio frequency currents. In other words, on account of the condenser these currents do not have to pass through the resistance—hence the resistance does not affect the tuning and selectivity.

This variable resistance provides a means of reducing the plate voltage and therefore controls oscillation. This means of controlling oscillation



tendency, but it likewise killed the selectivity that was desired and in addition materially reduced the volume. Resistance should not be added where it becomes an integral part of the radio frequency circuits.

The fundamental cause of oscillation is due to a great extent to the amount of voltage across the plate circuit. If this voltage is controlled so that it can be adjusted to a value just below the point where oscillation starts then radio frequency amplification can be used to full advantage. But this control must not be such as to add resistance in the tuned circuits.

### Plate Voltage Control

Oscillation can be effectively prevented if a variable resistance is connected in series between the plate or

was first utilized commercially by E. F. Andrews in the Deresnayne receiver.

Engineers have now developed the use of this by-passed plate circuit resistance as a volume control, as well as an oscillation control. This is done by using an extremely high variable resistance having a maximum value of several megohms. The circuit is just the same as for the control of oscillation. The first part of the resistance can be used for oscillation control, and the high resistance part for controlling volume. Volume can thus be adjusted without the slightest distortion, and with great saving in B battery current.

A combination control which may be used for this purpose is known as the "anostat."

### Model Homes Include Radio Set as Part of Furnishings

Architects are now including a place in the home for radio receiving apparatus. Outlets for loud speakers are placed in various parts of the house. No home is truly modern unless it contains a radio receiver. Many home owners have made alterations so as to have radio apparatus in a convenient place—some are in music rooms.

Builders and realtors utilizing "model" homes as a sales stimulus to attract buyers, realize the importance of radio and have included a set in the furnishings of the house. A model home was recently opened for inspection in Syracuse, N. Y., with a receiver in a pretty Gothic arched nook, called "the radio room." This room formed a part of a spacious center hall on the second floor.

Concealed wiring makes it possible to install radio receivers in such a way that they are just as beautiful to look at as the finest pieces of furniture. Wiring also makes it possible to put jacks in various rooms so that a receiver in one part of the house may be used to operate one or more musicboxes, or loud speakers.

Newly built hotels are including apparatus as an important part of their service to guests, with a master receiver and several speakers for use in rooms when the guests desire to be entertained or hear the news.—Crosley Radio Weekly.

### 5th Sesquicentennial Radio Exposition Is Announced

As a result of arrangements just concluded between Colonel C. B. Collier, director general of the Sesquicentennial International Exposition, to be held in Philadelphia from June to September next year, and H. S. Bolster, director of the American Radio Exposition Company, which has sponsored during the last four years the outstanding series of national radio expositions given annually in the United States, plans for a mammoth radio educational exhibit at the Philadelphia exposition have been announced. Mr. Bolster, whose successful conduct of the annual national radio expositions has made him an outstanding figure in the radio industry, has undertaken to bring about the united participation of the entire radio industry in the sesquicentennial exposition, which is expected to attract more than 60,000,000 visitors. Leading radio manufacturers have already reserved space at the exposition.

### Dr. Watson Little to Talk On the Great Dane

Dog lovers who have followed Dr. George Watson Little's series of animal talks from WOR with interest, may expect to hear the veterinarian speaking on the "Great Dane" from WOR next Monday evening.

## How Radio Aided Sir Thomas Lipton Win a Boat Race

How Sir Thomas Lipton with his famous Shamrock defeated King George of England and the equally famous Britannia in England's greatest regatta of 1925, largely through the use of radio—one of the best unwritten stories of the year—was made known yesterday by Bernays Johnson, American wireless engineer and inventor, who has just returned from abroad in order to display new devices at the Radio World's Fair.

The race took place off Bournemouth and the Shamrock won easily, because the other contestants hauled down their sails in the fear of a sudden storm.

Listening on a super-heterodyne receiver, on board the Shamrock, to broadcast reports of the regatta, Mr. Johnson told Sir Thomas that the atmospheric disturbances seemed dying out. "Don't haul down the sails," he suggested, "for the storm is passing over and won't reach the harbor."

Sir Thomas and his captain were skeptical. A hundred yards away, on the King's cutter, the crew was preparing for the anticipated "blow."

"I'll stake my reputation on it," Johnson persisted. "Wait a while. The air is clearing."

Sir Thomas, it is stated, laughed, and to the amusement of his veteran captain insisted that full sail be maintained, with the result that the Shamrock was soon two miles ahead of the others. And as Johnson maintained, the sun soon appeared, and then it was too late for the other vessels to put on full sail again.

"It was a tight situation for me to be in," said Mr. Johnson, in telling the story in his apartment, 300 Central Park West. "But I was certain that the sudden elimination of static meant that the storm was over. And yet storm signals were coming over by radio for ships farthest out."

The regatta took place on August 17, and Mr. Johnson was amazed that the report of the circumstance had not reached the United States.

### Composer-Pianist at WOR

Willard Robison, composer-pianist and rated a leader among the unique and original popular artists produced in recent years, is the opening attraction of the WOR Monday evening program, when he will present several original songs, none of which follow the set formulas of harmony.

Mr. Robison, in the opinion of Paul Whiteman, is one of the most important figures in the development of new and original jazz ideas, and he is known to thousands of radio listeners as "The Voice of the South." He has lived for many years in the South and knows thoroughly the true quality of native Negro music, especially the spirituals. As a pianist Robison is thought by many to be phenomenal. He is left-handed and has developed a supernatural power for that hand in piano playing. Paul Whiteman heard Robison's Deep River Orchestra in Kansas City playing some of Robison's own compositions and was so impressed by their originality and fascinating quality of rhythm that he persuaded Mr. Robison to join the Whiteman organization in New York.

## NOW'S the time!

Start now to learn a profitable profession. The Radio Institute of America (conducted by RCA) offers courses which qualify for the U. S. Government Commercial or Amateur Radio License. Expert instruction. Day and evening classes. Also courses for radio dealers, jobbers and salesmen. Fall sessions start soon. For further information call or write

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## RADIO SHOW NUMBER

OF THE

Herald Tribune

## RADIO MAGAZINE

The Herald Tribune, realizing from the start the importance of radio and the interest which it holds in the minds of the public, publishes the only Sunday Radio Magazine in New York. In keeping with the policy of giving its readers all the news in the radio field, the Herald Tribune will issue a special "Radio Show Number" next Sunday, September 13th.

This "Radio Show Number" will contain special articles written by experts, news stories of the exhibits at both radio shows, illustrations of various apparatus on exhibition, as well as the regular features for which the Herald Tribune Radio Magazine is noted. You will also find the announcements of the leading radio manufacturers and dealers in this special number of the

## RADIO MAGAZINE

NEXT SUNDAY

The Herald Tribune has prominent booths at both Radio Shows. You are invited to make them your headquarters during your visit.

# Information on the Construction of a Simple Loud Speaker Controlling Device

This Unit May Be Used in Connection With Any Radio Receiver Employing an Amplifier

By A. DINSDALE

Member Radio Society of Great Britain

THE majority of B. C. L.'s have progressed beyond the stage where they crave for noise. The modern listener is no longer content to have his loud-speaker signals so loud that they can be heard a mile away. All he requires in the way of volume is just sufficient to fill the room in which he and his family are sitting.

He has become critical about the quality of his reception, and, having tired of DX hunting, desires only to obtain the most faithful possible reproduction of the program being broadcast by his local station. This is all to the good, not only from the standpoint of those who have to suffer, or enjoy the output of the loud speaker, but also for the benefit of the art of broadcasting.

Much has been written on the subject of the elimination of distortion in broadcast receivers and much useful information given as to how the quality of loud speaker reception can be improved. The advent of the paper cone loud speaker has also tended in the same direction, but still there are a few receivers and loud speakers which will not bear further improvement.

This is due to a large extent to the fact that very few persons possess more than one loud speaker, and to ask it to reproduce equally well anything from a soprano solo to a complicated orchestral rendering is asking the impossible at the present stage of development.

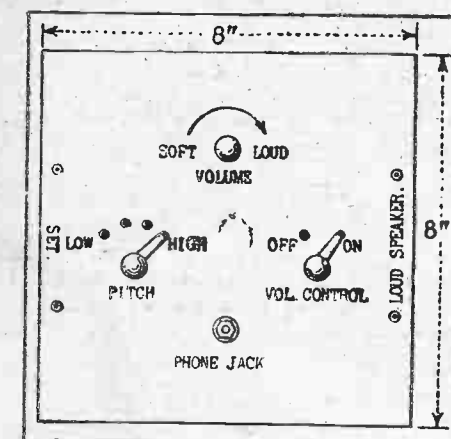
This is more or less well recognized and many corrective devices have been recommended for the remedying of various faults in reproduction. The difficulty in this respect is that no single combination of correctives will successfully handle all classes of music.

### Effects of Correctives

For example, if capacity is shunted across the loud speaker terminals for the purpose of tuning down a soprano's high C to prevent blasting, diaphragm rattle or tinniness of tone this combination will, if left undisturbed, cause severe muffling effects when the local basso profundo comes on the air.

To improve the tone of his performance it may be necessary to cut out all capacity and introduce instead a choke, more or less high in value.

Having gone through one or two such experiences, altering the set each time,



A suggested panel layout for the controlling unit

the B. C. L. will usually decide to split the difference and connect up both choke and capacity across his loud speaker windings. The values of these he will adjust until the reproduction is uniformly fair over the entire range of musical productions to which he usually listens.

Having done that he will probably be envious into buying a new type of loud speaker, with different characteristics, and have all his work to do over again.

Another difficulty met with by users of multi-tube sets is that of controlling the volume to just the right degree. Between one A. F. stage and another there is usually too great a change, so the only thing to do is first to get the signal too loud and then try to cut it down by dulling the filament of the last stage, or of the detector tube, or detuning the set somewhat.

All these methods are inefficient and prevent the user getting the best out of

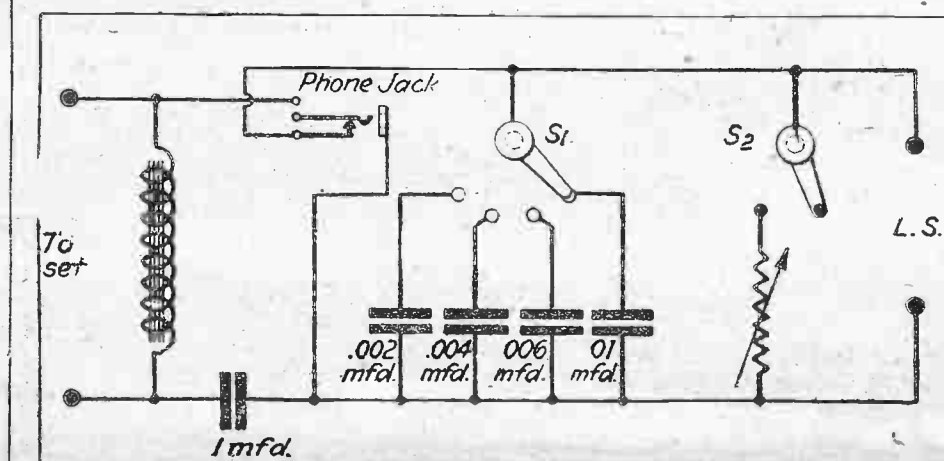
his outfit. Tubes do not operate at their highest efficiency if the filaments are dulled beyond a certain point, and detuning generally causes trouble from interference.

Having reached this stage it is apparent that what the critical B. C. L. requires is a separate variable control unit, such as is about to be described.

### Circuit Arrangement

The circuit diagram of the arrangement is shown in Fig. 1, from which it will be seen that the unit consists of an iron core choke, a selection of capacities of different values and a variable resistance, all connected across the loud-speaker terminals, with the exception of the Fig. 1 condenser, which is connected in series.

This series condenser confers upon the unit a further advantage, that of isolating the fine wire windings of the loud speaker from the plate current of the tubes. This plate current, in the case of multi-tube sets, perhaps employing a small power



The wiring diagram of the controlling unit herein described

tube in the last stage, is very considerable and may put a severe strain, not only on the windings, but also on the diaphragm, which, before any signal arrives at all, will be subject to a considerable pull.

Under such conditions a peak load, caused by a sudden violent burst of static or a very strong signal, may quite conceivably burn out the speaker windings. With the arrangement, shown in Fig. 1, the steady plate current is carried by the choke, but the high value of the condenser insures the free passage of all audio-frequency currents.

A further advantage of avoiding the passage through the speaker windings of the plate current is that frying or breathing noises, caused by small irregularities of current flow, are obviated and a quieter background results.

The phone jack is provided so that head phones can be conveniently inserted at a moment's notice, the operation of inserting the phone plug simultaneously cutting out the loud speaker. Such an arrangement facilitates tuning and the picking up of distant stations when these are desired.

## A High Powered British Broadcaster

Continued from preceding page

metal case. The anode input to the drive oscillator is about eight kilowatts, which is supplied to the magnifier, but this permits of securing the necessary magnifier grid excitation with a very loose coupling, resulting in negligible reaction back on the drive and consequent freedom from frequency variation with variation of magnifier input.

The magnifier unit is formed of four water-cooled rectifier tubes and three water-cooled oscillatory tubes of the same type as the drive. The oscillatory tubes are capable of dealing with an input of thirty kilowatts at 10,000 volts, and in this station are normally operated at 10,000 volts, with a plate current of 2.5 amperes. The filament input is the same for all the water-cooled valves used—namely, one kilowatt each at 20 volts 50 amperes. The oscillatory circuit of the magnifier consists of an inductance

of stranded cable and a shielded air condenser. The grids of the magnifier are excited inductively from the drive circuit, the direct grid current required being about 300 milliamperes for the three valves. The grid circuit includes an anti-reaction coil which is inductively coupled to the plate inductance in such a manner that the internal valve capacity coupling is neutralized, so that it is not possible for the valves to operate as a self-oscillator if the drive excitation is removed. This adjustment is an important factor in securing stability of working and constancy of wave length. The closed oscillatory circuit of the magnifier is inductively coupled to the aerial tuning inductance, which is of the same stranded cable as the closed circuit coil.

The modulator unit consists of four

By moving switch S1 over the four contact studs any of the condensers shown can be connected across the loud speaker and the pitch of the reproduction altered to suit the listener's taste.

By means of the switch S2 the variable resistance may be put in circuit for the purpose of cutting down volume. This resistance may very conveniently be a variable plate resistance, as sold for resistance capacity coupled amplifiers, with a maximum value around 100,000 ohms.

The condensers may be of any high-grade type, but the flat type, fitting into end clips, are more convenient if obtainable, for then it is an easy matter to change them if the values shown in Fig. 1 do not quite suit the reader's outfit.

### Panel Lay-Out

Some enthusiasts may prefer to mount all the control apparatus on the panel and baseboard of the latest set they happen to be designing when they read this, but as the presence of knobs and

switch points on the tuning panel is generally looked upon with disfavor directions will be given for making up the apparatus in a separate unit.

A further advantage of doing so is that such a unit may then be used in conjunction with any receiver, and if the receiver is not situated in the same room as the loud speaker the control unit may be located near the speaker and within easy range of the listener.

In Fig. 2 is shown a suggested panel lay-out which will be found both convenient and pleasing in appearance. Suggestions for the panel engraving are also given. Fig. 3 shows the corresponding baseboard lay-out.

The choke employed should have a high impedance or a loss in signal strength will be experienced. There are various suitable chokes on the market. The secondary of an old Ford coil will be found to do very well, or almost any similar high impedance iron core coil, such as the primary of a bell-ringing transformer or the secondary of an A. F. transformer. Most experimenters will be sure to find something suitable in the junk heap.

Some readers of more fastidious tastes may wonder why the choke is not made variable as well as the capacity. The chief reason for this is that to obtain or arrange a choke having suitable tapings is not always a simple matter, and to have the capacity variable is usually sufficient.

If there should happen to be any discrepancy in the value of the choke chosen, so that it is just not quite suitable for some particular musical rendering, correction can be applied by means of capacity. However, in the position shown, the choke acts more in the role of a filter for the plate current. Its value is not at all critical so long as it has sufficient impedance to avoid a weakening of signals. Its presence does have an effect on the quality of reproduction, but the main controlling factor is the condenser bank.

However, there is no objection to making the choke variable, if this can be conveniently arranged, and many experimenters may like to do this. In this event it will be necessary to make provision on the panel for another rotary switch, with contact studs connected to different values of choke.

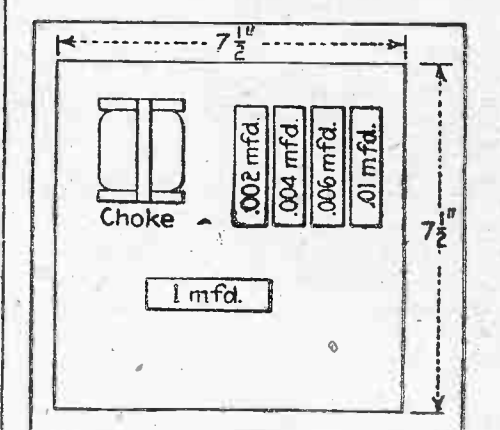
### Operating the Unit

To operate the unit connect the A. F. output (phone binding posts or jack) of the receiver to the terminals marked "set" in Fig. 2, and connect the loud speaker to the two terminals on the opposite side of the panel. If desired jacks can be substituted for the terminals in each case.

There is no reason why the control instrument should not be made portable, flexible electric light cord being used for the connections to it, so that wherever the receiver and speaker may be located the controller may be placed beside the listener, so that he can at all times adjust it to suit different items on the program.

With regard to the values of the condensers, the values shown in the figures are merely suggestions. Individual experimenters may find it necessary to change these values somewhat, according to the characteristics of the loud speaker in use. For this reason it is better to have condensers of a type which are readily interchangeable, so that the best values can be determined quickly and conveniently.

It will not take the experimenter long



How the parts of the unit may be arranged

to find out that almost every single item of a broadcast program will require a different value of capacity for best reproduction. Speech, for example, will be most clearly received with one value, a solo with another, and instrumental music with another.

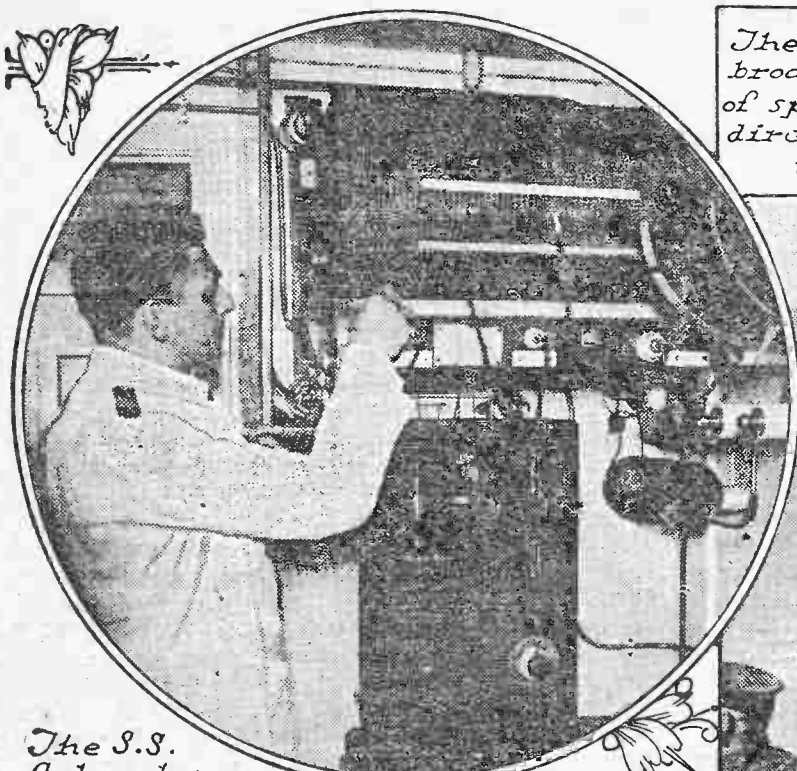
The volume control will also be found to be most useful. It frequently happens that when a receiver is set to give just the right volume for loud orchestral music, when the announcer comes on the air his voice is not nearly so loud, and, unless the receiver adjustment is altered, it may be difficult to understand what he says.

With a unit such as has been described ready to hand, all these delicate readjustments so dear to the fastidious listener can be made at a moment's notice, without leaving the comfort of one's chair, thus adding considerably to the enjoyment of the program.

Continued on page nine

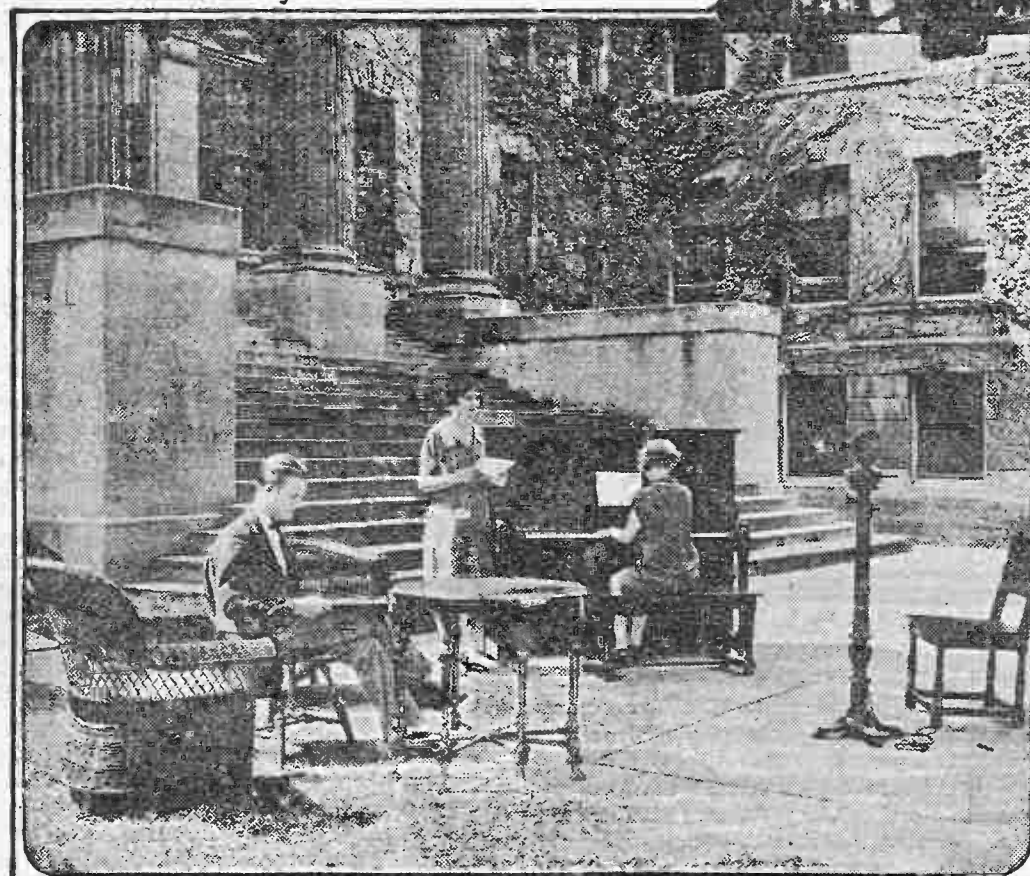


# Up-to-the-Minute News of Radio in Pictures

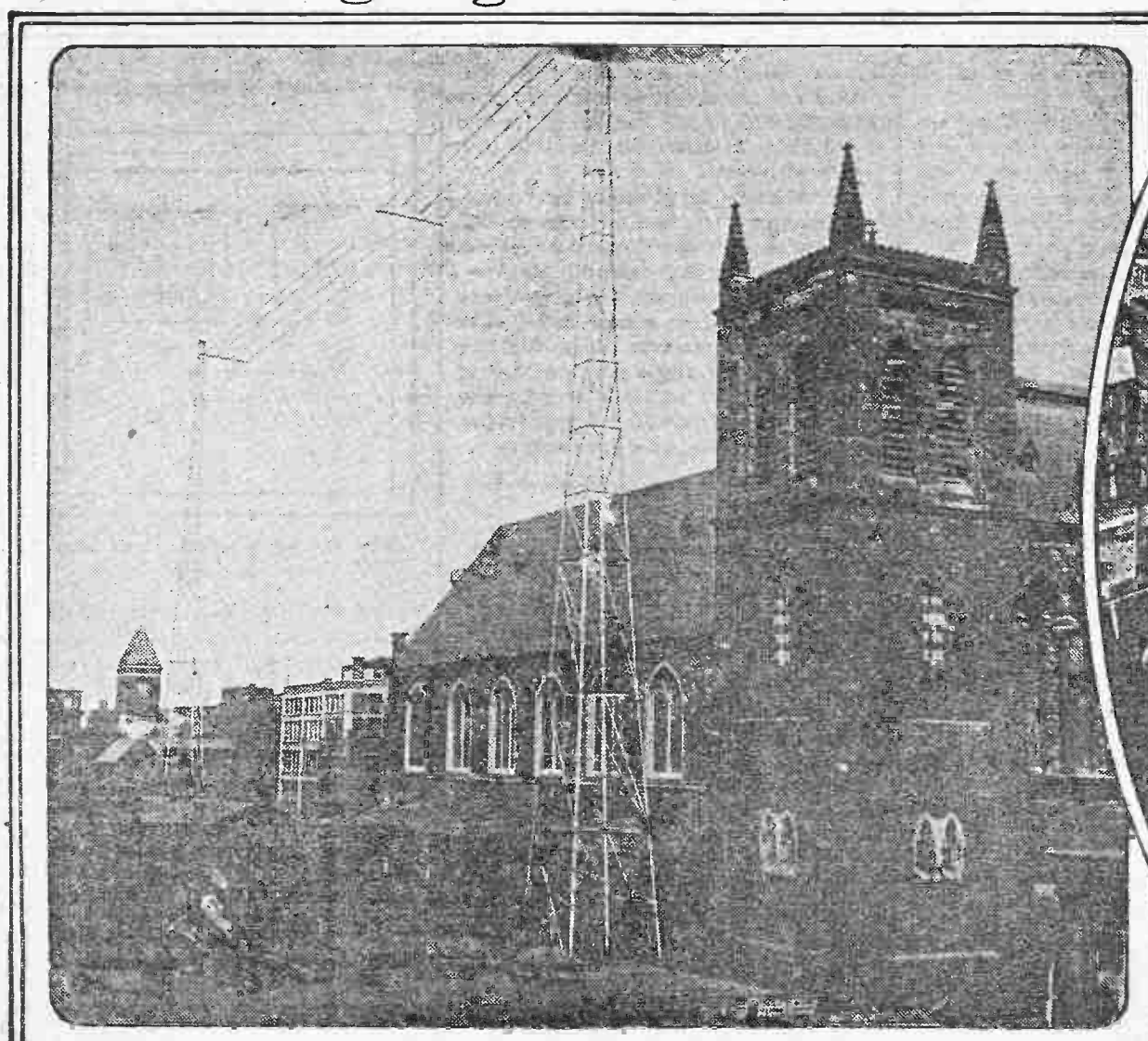


The "Radio Yacht" broadcasts reports of speed boat races direct from scene through WAHG.

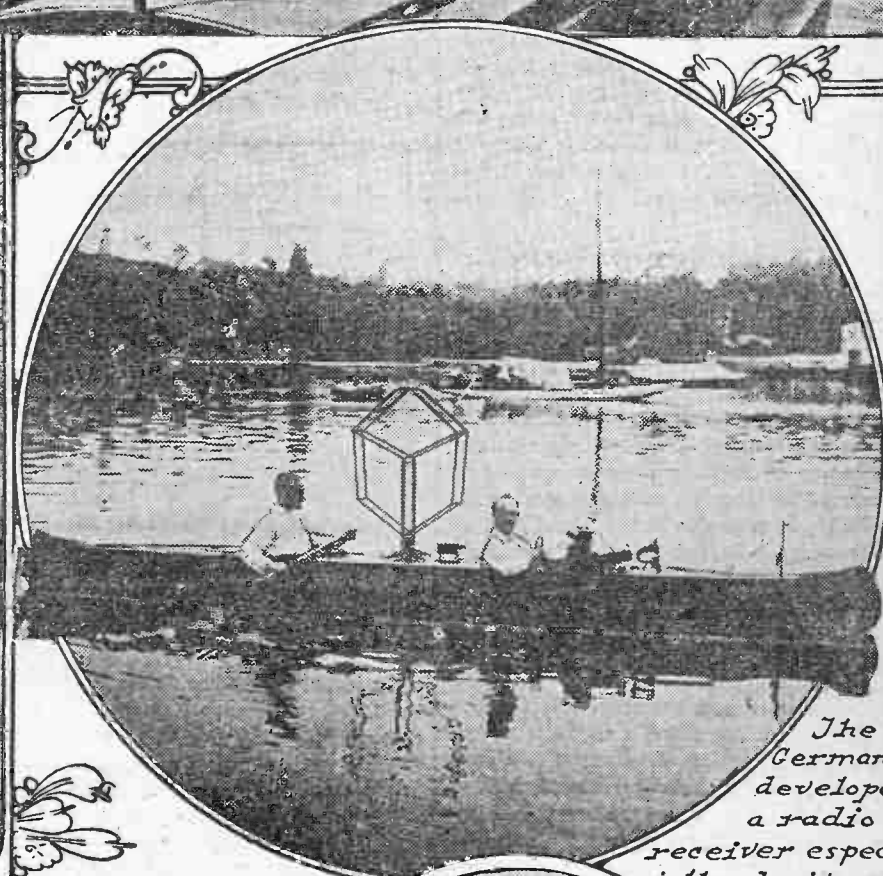
The S.S. Columbus conducts tests with two-way ship to shore radiophone communication.



Outdoor broadcasting is being successfully accomplished at WSUL.



The aerial of the Paulist Fathers' new radio station to be opened September 24.



The Germans develop a radio receiver especially designed for use on water.



Dr. A.H. Taylor talks to Mrs. Millan daily through the Navy's station, Washington D.C.

## A New High Power British Broadcasting Station

Continued from page three.

water-cooled rectifying tubes and six water-cooled modulators. The modulating valves are similar in size and appearance to the oscillators, but have a much more open grid mesh, with a low amplification factor. The modulator is worked with plate voltage and current equal to that of the magnifier, the current being adjusted by the setting of the grid negative voltage. For normal working this setting is between 1,200 and 1,300 volts negative, thus a large grid sweep is possible during modulation without running into grid current. The grid negative voltage is obtained from a dry cell battery, and as no current is taken from the battery this source is quite satisfactory.

The smoothing circuits for a set of this size present a formidable problem, as the permissible ripple is very small for high quality broadcast telephony, and the smoothing units are necessarily somewhat bulky and costly. The condensers for the smoothing system consist of zinc plates with glass dielectric, oil immersed in porcelain containers. The total capacity used on each half of the circuit is approximately 3.5 microfarads and the inductance about sixteen henrys. The smoothing inductances are closed iron core chokes placed in oil tanks. Each choke contains about five hundredweight of iron, and there are eight of these in all.

The submodulator unit consists of one air-cooled tube, operated from the same

high tension source as the main modulator and coupled by resistance and capacity to the grids of the modulator tubes. The grid of the submodulator is in turn coupled also by resistance and capacity to the sub-submodulator, which is a block of four special tubes supplied by a 400-volt accumulator battery and with accumulator heated filaments. The usual land line amplifiers are situated in a separate is an unusually high ratio of the power room removed as far as possible from the high frequency apparatus, and are adaptable for amplifying either the audio frequency currents coming over the land lines or those from the microphone in the local studio.

The arrangements made for water cooling the tubes' anodes is worthy of attention. As the anodes are at high potential it is necessary to insulate the tube water jackets from the main supply of water. This is accomplished by running the water both in and out of the jackets through spraying nozzles. The water spray forms an almost perfect insulator and therefore no loss is sustained by leakage. The cooling water is stored in a concrete lined pond holding about 5,000 gallons and is pumped from there up to a tank in the roof, falling by gravity through the tube jackets back to the pond. The rate of flow is adjusted to allow one gallon per

minute through each valve jacket, and under these conditions the water leaving the valves is only increased in temperature a few degrees. As it is important to use cooling water free from lime or other ingredients capable of forming a deposit on the anodes, rain water is utilized and arrangements are made to drain water from the roof into the storage pond, a rainfall of one inch giving about 1,000 gallons to the pond.

The control of the whole apparatus, including operation of the running machinery, is effected at a control table in a corner of the transmitting room. Should the engineer on duty notice anything wrong, he can switch off everything by pushing one button.

Daventry was opened officially on July 27, and in this connection it will perhaps be of interest to give the broadcast program given at the official opening ceremony:

7:30 p. m.—The recital of a poem specially written for the occasion by Alfred Noyes.  
The Right Hon. Lord Gairford, P. C., chairman of the British Broadcasting Company, introduced the Right Hon. Sir William Mitchell-Thomson, Bart. K. B. E., M. P., the Postmaster General of Great Britain.  
His Majesty's Postmaster General formally declared the station open.  
A short announcement regarding the construction and equipment of the station was given.  
His Worship the Mayor of Daventry, Councillor J. H. Johnson, spoke shortly on Daventry and its antiquity.

Program from the studio in London was then received through loud speakers and was as follows:

8:00 p. m.—The 2-LO Military Band.  
Conducted by Dan Godfrey Jr.  
March, Pomp and Circumstances.....Elgar  
Come, Sweet Morning.....Arr. A. L.  
Don't Come In, Sir, Please.....Cyril Scott  
Kate Wister, soprano.  
Song of the Road.....Geoffrey Stanton  
King Charles.....Norman Allin, bass.  
Sarabande et Tambourin.....Leclair  
Daisy Kennedy, violin solo.  
Moment Musical.....Schubert-Kreiser  
The Fountain.....Schumann

In conclusion, the author would like to voice a few points on the future of high power broadcasting stations.

Undoubtedly, Daventry will be followed by similar stations in the various countries, which will help to establish intercommunication between the nations.

High power broadcasting is having very careful study here and it is understood that in the very near future a station of considerable power will be opened in the neighborhood of New York City.

One of the great benefits of super-power broadcasting is the overriding of static due to the increased signal strength; fading is also another factor which will be reduced.

There is one last point, however, which will require careful government legislation, that is, the prevention of too many stations being erected in any one zone, for, unless there is some control of this nature, there will result chaotic jamming and "beating" of signals.

## Germans Shaping Facilities For Exchange of Programs

Germany Will Have Twenty Broadcasting Stations by the End of 1925, Says Dr. Hans Bredow; Radio Fans Pay Two Marks a Month

"HELLO America!" Thus the long arm of radio hurled the voice of our English cousins across the briny deep and ushered in the first feeble attempt at international broadcasting. It was a startled American public that tuned into a subsequent program originating in London and distinctly caught the peal of the famous Big Ben Chimes. This, indeed, was a remarkable achievement, but those of us who are fortunate enough to live in this age of scientific wonders are becoming accustomed to such history-making events.

The reaction of the public to this experiment was so favorable that engineers decided that a program of development should be initiated for the purpose of determining the technical feasibility of establishing a regular trans-oceanic broadcasting service. A series of statistical observations on trans-Atlantic radio signals followed and radio facilities on both shores are now in the course of construction. Wave lengths, power, and receiving facilities, based on the outcome of these engineering tests, and our knowledge of etheric conditions, are being decided upon with a view to inaugurating an international broadcast.

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Dr. Hans Bredow

power of one of our broadcasting transmitters, so that it in turn can be well heard in America. Thereafter, at certain intervals, an "American Program," specially arranged for America, will be transmitted by this station, to be received and rebroadcast in the United States. The Radio Corporation also will prepare a "German Program," which will be received by the Reichspost and transmitted to the German broadcasting companies.

"In Germany we have seen, with the greatest admiration, the development of the American radio industry and how rapidly broadcasting spread out over your country. Just as with the telephone and the automobile, we see that all technical progress in America is utilized straightway on a large scale for radio. This is brought about by the technical sense of the American people and, furthermore, by their power to buy. In Germany only few are able to spend some hundred marks for a good radio set. The majority of the listeners must satisfy themselves with a simple crystal set. Therefore, the amount of business transacted on the radio market is so small that it is impossible for the German radio industry to keep up broadcasting stations at their own expense, and their programs free from charge, as in America. In Germany it was therefore necessary to organize the broadcasting service so that it would pay for itself. This was made possible by the German telegraphic law which stipulates that a special permission from the Reichspost is necessary for use of a radio transmitter or receiver. Therefore, whoever buys a receiver must declare it to the Reichspost and pay a monthly fee of two marks, which is collected by the postman.

"The Reichspost has erected a certain number of radio transmitters and nine companies located in Berlin, Munich, Hamburg, Leipzig, Munster, Frankfurt-am-Main, Stuttgart, Breslau, Koenigsberg, and bound by contracts with the Reichspost to transmit good programs. The com-

panies receive 60 per cent of the fees collected. With this money they must keep up their own transmitters and pay for the programs. The Reichspost receives 40 per cent of the fees.

"It appears, therefore, that the American people obtain their radio programs free of cost and that the Germans have to pay for theirs. However, this disadvantage has also a certain amount of advantage. The whole system is based upon the sound business principle of the equivalent of the production. The receipts of the companies depend upon the number of listeners; therefore the companies are interested in broadcasting a good and varied program, and in offering only what pleases the listeners. Furthermore, the companies are not compelled to rely for their income upon advertising, which, as a rule, the German listeners decline. The liability of the listeners to pay gives the right to a good program, therefore the companies are anxious to meet the wishes of the listeners. It is the intention of the government to create a committee who will supervise the broadcasting programs from the point of view of culture and aesthetics, and who will make certain that the listeners get their rights.

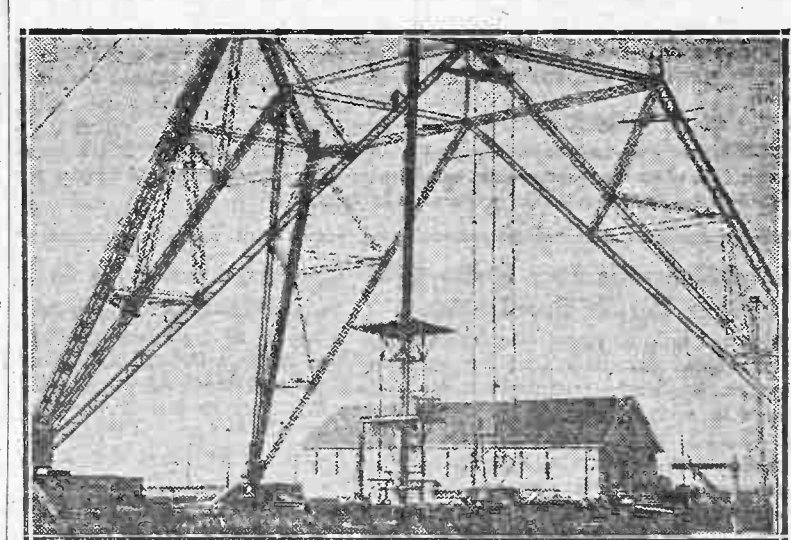
"Next to England, the development of broadcasting in Europe has been most rapid in Germany. In the coming month of October the German broadcasting service will be two years old, and will have one million listeners. Besides these there is certainly a big number of wireless pirates who are heavily punished when discovered.

"The government and the people consider broadcasting as an important item of civilization, and the press is generally friendly inclined towards it.

"The most prominent artists co-operate in the broadcasting services. The performances of the opera houses in Berlin, Munich and Frankfurt-am-Main are transmitted, and it is even possible, by a system of lines of communication, to broadcast every performance over the whole country.

"Special stress is laid upon education which is made possible by the co-operation of the best teachers. For this purpose, the nine German broadcasting companies have established special schools for national education.

"Furthermore, the broadcasting companies give the largest part of their surplus to the Reichs Rundfunkgesellschaft. This is a holding company which controls all broadcasting in Germany on uniform principles, and which takes care that the surplus of the single companies goes for the improvement of the broadcasting stations and for the development of radio technique."



Colossal antenna mast of Germany's biggest broadcasting station

## Radio Transmission Needs Outlined for Amateurs

Speaking on the subject of "Efficiency in Transmission" before the third national convention of the American Radio Relay League at the Edgewater Beach Hotel in Chicago, John H. Miller, electrical engineer in charge of radio instrument development for the Jewel Electrical Instrument Company, pointed out the needs for greater distance in radio transmission using much less power than is now the vogue.

Miller explained the methods in use for attaining distance and voiced the fear that continued use of high powered stations would remove much of the attraction from radio transmission. He pleaded for the use of highly efficient transmitters that might be operated on the most "miles per watt" basis.

The amateur radio enthusiasts

were told that if they wished to enter this new group on an equal basis, regardless of the individual transmitting apparatus, they might figure the watts as a total of filament and plate input.

To add interest to the proceedings Miller, on behalf of the Jewel company, announced a contest for all members of the American Radio Relay League in which stations would compete for the record of most "miles per watt." A twenty-one jewel watch with hand engraved case will be the prize for the member station winning the contest. One other condition is that the greatest distance must be attained at least three times during the year in which the contest runs.

To square up the edge of a panel or any other piece of bakelite, use a common wood plane that has been set finely.



# A Logical Discussion on the Transmission of Power by Radio

Experimenters Have Been Devoting a Great Deal of Their Time Trying to Solve This Problem

By KENNETH M. SWEZEY

RADIO has sprung unusually fast from technical obscurity to a popular utility, through broadcasting, and to many it seems to have reached its limit of perfection and usefulness. Transmitting stations have arisen in numbers sufficient to intermesh their waves in a blanket which covers every acre of the country. Receiving sets are so thick that their antennae spider-web the horizon line. The broadcast programs are in portions of the cycle above the reproach of the most fastidious. What more could one want? What more is possible?

In answer to those questions the echoes of a dozen unsolved problems assert themselves. How can static be eliminated? Who will pay for future broadcasting? When can the owner of a set be freed from technical worry? How can receiving set upkeep be minimized? How can distortion be done away with? What are the limiting factors of super-power?

## Important Question

The question of who will pay for broadcasting is an old one, and misleading. The people who use the sets, of course, always pay, no matter what distribution or collection system is used. It resolves itself to a question, rather, of how, by what specific means, will the expenses of broadcasting be paid. At present the sale of sets and parts, and of general merchandise through ethereal advertising, pays, but whether this is an ultimate solution is dubious.

As long as the number of broadcasting stations reads in three figures, and the number of radio manufacturers reads in four, there can hardly be a totally satisfactory distribution of toll. Taking tubes or batteries would not be fair, for who can say that the owner of a single tube set does not have all the services and advantages—in his way—that a broadcasting station could give to the owner of an 8-tube set? Government licensing would be no better, for there would be no way of honestly apportioning the collected money.

If there were but two or three manufacturers—and that is perfectly feasible if apparatus could be sufficiently developed so that it could be standardized—and four or five broadcasting stations for the entire country, the question of payment for broadcasting could be more satisfactorily met. Apparatus could be rented, like Bell telephones, or sold outright, like standard typewriters, and the user could at all times be sure of reliable maintenance service. The several broadcasters could afford to furnish the best of programs, for they would have a definite and continuous source of revenue.

## Distance Wave May Travel

Undoubtedly, with transmitting and receiving apparatus which we have immediately at hand, this could be accomplished with passable success. But the equipment would be expensive and tremendously limited. Super-power would have to be used at the transmitter, and the sensitivity of the receiving sets increased with the increase in distance. As the distance which a Hertz wave transmitter may cover varies approximately with the square of the power used, it is obvious that the wattage would have to exceed that now in use manifold. Unless the wave lengths that were used were widely separated, receiving sets within the vicinity of these powerful transmitters would be interfered with beyond remedy.

In true radio transmission it would seem to the writer that a goodly portion of the transmitted energy should be recoverable. In our present system it is almost a total loss. One could realize this more fully if all receiving sets had only crystals. From the most powerful of modern transmitters scarcely ever can a crystal set receive satisfactorily over more than a hundred miles. If it had not been for the invention of the vacuum tube detector, oscillator and amplifier the entire system would have been long ago pronounced a failure, or at least relegated to a limited commercial and ship-to-ship code service.

As it stands, the system is backwards. For all the power that is used in the six hundred or so transmitting stations of the country, at least twenty times as much is used in the aggregate of receiving sets. Perhaps this before has been overlooked but it stands out defiantly. Assuming that the six hundred stations broadcast with an average of 1,000 watts, and that two million tube receiving sets consume an average of 6 watts each—which is low, by the way—then a total of 600,000 watts would be propagated and a total of 12,000,000 watts be used to make it audible at the receivers.

## A Possible Solution

That fundamental weakness is responsible for the necessity of five and eight tube sets—those expensive white elephants which advanced fans must now have in order to meet certain particular requirements. If appreciable power could be conveyed to the receiving set a single tube, or even a crystal, could do the work of an eight-tube super-heterodyne; at the same time securing greater ease of control and less distortion. The works of a set then, would need not cost more than \$10 or \$15, and what upkeep expense there was would be chiefly for the actual broadcasting service.

The cost of bare maintenance of a three-tube set—tubes and battery cost—may amount to about \$30 a year. Multiply this by two million and we have the figure of \$60,000,000—just for keeping the tubes of the receiving sets lit. It has been said that a broadcasting station cannot keep going on less than \$10,000 a year. Some run as high as \$200,000. For the entire country the broadcasting upkeep costs must run above \$10,000,000 a year.

## The Radio Beginner's Series

Continued from page five

currents and drain a large B battery in no time. Even as it is, the UX-210 tube with 425 volts on the plate requires as normal operating voltage a grid battery of 35 volts to hold the plate current down to 22 milliamperes. This plate current is three or four times what the UX-301A takes on quarter the voltage without any C battery. The UX-210, even at 90 volts, has a normal operating grid voltage of 4.5 volts. The UX-120, a three-volt tube, with only 135 volts on the plate, requires a normal operating grid voltage of 22½ to keep the plate current down to 6.5 milliamperes. The UX-112 at 90 volts on the plate requires six volts on the grid. All three of the new tubes are C battery tubes, while on the present tubes in use the C battery is a refinement and economy measure much advocated, but not used by any great percentage of set owners.

## Reducing B Battery Current

Another way of securing amplification with a minimum of B battery drainage is the so-called "tone filter amplifier" in (1) of the figure. Here the coupling between the tubes is in the millions of ohms, variable leaks being used both for tube coupling and for grid leaks. Very low plate potential is used on the detector and, because of the tremendous resistance of the coupling, there is substantially no B bias on either of the next two tubes, but 90 volts on the last tube. The stopping condensers are .0005 mfd.

In place of either leaks, resistances, choke coils or transformers, the writer has frequently used and suggested coupling two tubes with a third tube, using the plate to filament resistance of the third tube as a coupling resistance, the diagram being shown at (2). Here we have a detector with one step of straight transformer-coupled audio. The first audio tube is coupled with the second audio tube through a tube placed between them as a resistor. This tube requires a separate A battery, as shown. It cannot be used with the same A battery as the

If but less than a single watt were available at the receiver no tubes would be needed, even for operating a loudspeaker. If energy could be transmitted efficiently a total of 2,000 kilowatts would suffice for all our present needs and could be sent from four super stations of 500, kilowatts each.

Then with the best of paid talent the annual cost of both the transmitting and receiving set upkeep could well stay below \$15,000,000.

But with our present system this is obviously impossible. The waves sent out are chiefly radiations, and because they are such the greatest part of their energy is irretrievably lost.

## Beam Transmitter

By concentrating the waves into a beam the recoverable energy is increased, but in the same degree the usefulness as a broadcast transmitter is decreased, for the area over which the waves may be intercepted is restricted.

It is this lack of power weakness that is also the main cause of static trouble. Atmospheric electricity will always be with us, and its nature is so closely allied to that of radio waves that it cannot be eliminated in any practical way so long as its intensity approaches and exceeds that of the impulses that are wanted. The only satisfactory solution to the problem seems to be in increasing the available power at the receiver.

The transmitter may be likened to a train announcer, who must send his voice across a noisy railroad terminal. The distinctness with which he can be heard in any part of the building depends solely upon the relative intensity of the voice waves and the noise waves at that particular point. The ones that are greatest always win.

Distortion, too, is due chiefly to a lack of antenna energy in the receiving set, for it comes through the inaccurate repeating of regeneration, through small differences in tube characteristics and through interstage transformers. If there was the energy available at the antenna that is now available at the output of the last tube the amplifier could be eliminated, and with it the distortion that it produces.

One often reads in the press the announcement that some one at last has found means to send power by radio. If it were true the industry of the world would be revolutionized. As facts stand, this has not as yet been practically accomplished. Lamps can be lit by the radiations of the ordinary transmitter over very short distances, but the efficiency is so extremely small that commercial promotion of the phenomenon would be ridiculous.

Nikola Tesla was the first to try to solve the problem, and if success is ever achieved it will doubtless be by his system, into which he has put so much tireless labor. Professor Helmholtz, Lord Kelvin and a number of able contemporaries believe the plan entirely feasible if apparatus could be developed to generate and control the proper kind and intensity of electricity. Tesla has long since done this, and the system seems only to await its application.

The system makes use not of radiation but of true conduction, substituting the earth itself for the wire. That the earth is a conductor is demonstrated by the fact of its extensive use as a telegraph return wire and as the ordinary radio ground connection. Tesla claims it to be a perfect conductor.

The average layman, and electrician as well, is so accustomed to using two wires to connect all his apparatus that he is likely to ask where the return wire is in Tesla's system. There is none, and for the reason that there need be none. By using alternating currents of proper frequency and correctly proportioning the circuits lamps may be lit and motors run by means of a single wire with no return.

This is easily demonstrable with the common Tesla resonant transformer or Tesla coil. A bank of lamps may be lit or wires melted by attaching one terminal to the coil and the other to an insulated capacity, such as a metal plate or sphere. The capacity serves as a sort of reservoir, which is filled and drained with the alternations of current.

## Pumping System

In his radio transmitter Tesla mounts a huge capacity, having ideal enveloping surfaces that prevent radiation, on top of a tower and starts up an electrical pumping system, pumping electricity into and out of the earth. The pressure distributes itself over the entire globe as though it were a sphere of but moderate dimensions, and by using receiving apparatus at different parts of the world, connected at one end to the earth and at the other to a similar but smaller capacity, the energy can be recovered with small loss. Distance need not be reckoned with any more than it need be reckoned in a wire circuit with negligible resistance.

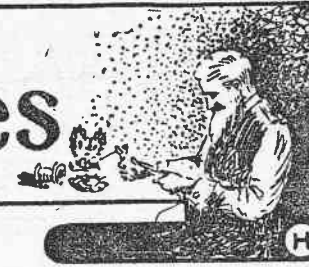
If Tesla's system works as well practically as it does theoretically its adaptation to broadcasting will go far toward relieving all those problems which were first suggested. It would permit of super-power transmission, with all of the good qualities and none of those that now put a limit to its effectiveness.

Notwithstanding the development of hundreds of new circuits, there has not been a single basic and radical improvement on our present radio system since De Forest invented the three-element vacuum tube. Props have been designed and both transmitting and receiving sets have been pushed to the limits of their capacity, but as for something really new it has yet to appear. The condition is a definite indication that the point of the flattening of the curve has been reached.



## The Radio Beginner's Series

By R. P. Clarkson  
(Copyright by the Author)



LAST week we started to discuss the different forms of audio frequency amplifiers, that is, the amplifiers that increase the volume of the detector output. It cannot be stated too strongly that this part of the set has nothing to do with radio. The same amplifier, properly arranged, will increase the volume of any sound. It is an electric magnifying device which takes the electric output of the detector tube and makes it great enough for the operation of a speaker. The same type of amplifier is used for speech amplification to make the deaf hear, to carry the words of an orator to the crowd, to announce trains in the subway and in railroad stations, and there is even an attachment for the ordinary telephone of the same type, used for the purpose of amplifying telephone conversation.

It is rather strange that sound amplification, the amplification of a sound as a sound, does not seem to have been accomplished in any case that the writer can recall, with the exception of the Helmholtz resonators for individual notes. We have sounding boards and sounding boxes (for tuning forks), but these are mechanical amplifiers. The present cone types of speakers resemble this type of amplifiers.

In place of a small vibrating body moving the air to make a sound, the small vibrator moves a light body with a large air surface, thus creating a larger air disturbance and more sound. For example, the vibration of the tuning fork is communicated mechanically by contact to the side of the sounding box which has many times the air contact which the fork possesses. That sets up a bigger air wave. In the ordinary speaker the diaphragm is very small and sets up a small air disturbance by itself. Put at the base of a horn which concentrates this air motion, there is a multitude of complicated actions, depending on the horn design. In the cone type of speaker the diaphragm is omitted, but, in effect, the action is as though the small diaphragm were connected to the cone and transmitting its vibration to the cone which has a larger surface. I say the diaphragm is omitted. It is not omitted. It is merely changed in its physical form and is now a vibrator, which is exactly what a diaphragm is anyway. The difference is that the diaphragm is shaped, not

merely to vibrate but also to communicate that vibration to the air. With the cone speaker, the cone is not the diaphragm but performs the function of communicating the vibrator movement to the air. The vibrator and the cone together take care of the action performed by an ordinary speaker diaphragm.

In an audio amplifier, there is a real increase in energy. There is really amplification. In no form of horn or speaker, except a battery speaker, commonly called a power speaker, is there any increase in energy by reason of speaker action. There is infinitely less energy in the sound given

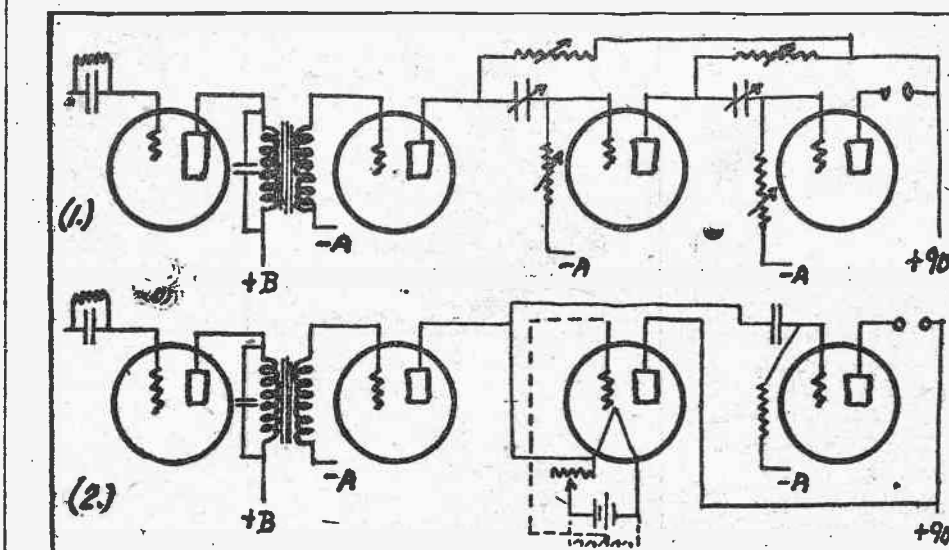
last tube, or at least what should be greater, is the B current variation. The fluctuation in B current is what operates the speaker and it is this fluctuation which operates the transformer. It is current fluctuation which is amplified, although the tube is a voltage amplifying device. Voltage variation must be impressed on the grid, but it is current fluctuation which causes the changes in voltage.

When current flows through a resistance or impedance, there is a voltage drop across that resistance or impedance. If the resistance or impedance remains con-

Remembering that it is the plate current fluctuation which counts, we can see that the actual amount of plate current which flows seems to have nothing to do with the amplification. It is just waste current. It does not induce any voltage in a transformer secondary. It might just as well not be there. It can be partly done away with by using sufficient C voltage on the grid. The higher the negative voltage bias on the grid of an amplifier the greater will be the impedance to plate current flow and, in general, there will be no decrease in the fluctuation of the current which does flow. In general there will be no decrease. This is not always a safe inference, for the reason that changing the grid bias of a tube shifts the point on the curve at which the tube is operating and may bring it to a point where the curve is not as steep; that is, where the tube is not so good an amplifier. In that case volume will be decreased. The remedy for that is to continue to use the C battery, but to increase the B battery voltage. Increasing the B battery voltage not only makes the curve steeper, but also shifts it sideways so that, for example, a point, which was over at zero grid bias is now at minus or minus 2 grid voltage. A good steep part of the curve which has been at positive 2 volts may now be at zero and with a little more increase in B voltage may be shifted over to negative where the C battery would let you take advantage of it.

You can rest assured that wherever a C battery is used you will save B battery current over what the same B voltage without C bias would normally give. It will also permit you to use higher B voltages and obtain more volume, using no more B current than with the lower B voltage and no grid bias. But you must adjust your B voltage pretty much to your grid bias if you use one, and by juggling the two obtain the steepest part of the curve of the tube, for greatest amplification. On the new tubes of the UX type the C battery will take on a very important relation because the tubes are of such low plate resistance that without grid bias they would use enormous plate

Continued on page eight



The wiring diagrams for the audio-frequency amplifiers referred to in the above article

out than there is in the electrical input. The efficiency of the speaker in many cases is less than one per cent and never more than just a few per cent. That is, for every unit of electrical energy input, there is a sound output of only one-fiftieth of a unit, more or less. This is true with a power speaker, but there is considerably more electrical energy put in than what comes from the last tube.

In the amplifier, the added energy comes from the B battery connected to the amplifying tubes. There is no more appreciable B battery current flow in the last tube than there is in the first. Frequently, if a C battery is used, the B current of the last tube is less than that of the first tube. What is greater in the

stant, the voltage-drop across it with varying current, varies exactly as the current varies. If the impedance changes as the current changes, the voltage does not vary with the current exactly. This is the case with a transformer. The impedance of a transformer winding does not remain constant, but changes, depending upon the frequency of current fluctuation. Not only that, but the secondary output voltage does not vary exactly with the primary current fluctuations unless the magnetic flux induced in the iron core by the primary current happens to fulfill certain conditions, among which is the fact that it must be very small per unit of cross section. This is one reason for the increase in the size of transformer cores.

## And I Learned About Radio From Him

Continued from first page

was it a guffaw? She turned and then, darn the thing, I forgot that she had to be straightened out again. Like an old war horse on a frolic, Lizzie made a complete semicircle, and started to mount the hill again. Her poor old lungs were not quite equal to the strain, however, and she stopped, gasping. I looked about for hubby and found him on his knees on the floor. I still maintain he was praying but he insists he was only trying to reach the brake.

Anyway, the following evening, when I suggested another driving lesson, hubby led me gently to the radio set.

"Here," said he, "is something you can try your mechanical tendencies on without risk of life and limb. Suppose you learn to tune the radio. It will be a comfort to you and perhaps encourage you to stay at home evenings instead of driving around in irresponsible flivvers."

Well, I have always been interested in seeing the funny little dials being turned to produce sweet music, so I consented.

Our receiver is a regenerative one. I don't know just what that means except that all the power that causes the music does not come out in sound. Some of it is fed back and amplified some more to make the music still louder, or perhaps to bring it from greater distances. This is all very well when you can manage it gently, but when you turn the dial too far or give the set too much gas, it acts like Lizzie, only, instead of snorting, it howls and squeals like the dickens. This is not only a source of annoyance to yourself but causes all the neighbors to use profane language when speaking of you.

Of course, hubby is very smart, but I have seen radio sets before, so when he suggested that I learn to tune, I just slammed in the plug and gave the right-hand dial a good, healthy twist. An un-

earthly yowl rent the air. Hubby yanked the plug out and executed some sort of war dance, rubbing his offended ears the while.

"Now," said he, "let's get the theory of this straight first. This right-hand dial is the thing you want to monkey with last. First, get your filaments lighted, then tune in your station, then amplify the output to the proper point."

All this sounded simple enough. It's like having somebody teach you to drive by saying, "Just jump in the car and go."

"Continue," I said, as respectfully as possible; "what's it all about?"

"The brightness of the tubes," went on the professor, "is controlled by the filament rheostat."

"The which?" I asked, blankly.

"The filament rheostat," he answered, pointing a little knob out to me.

I immediately seized it and gave it a good twist. The tubes lighted up fine, just as he said they would, but apparently this did not satisfy him.

"These tubes," he said reprovingly, "are used for radio reception. They are not supposed to furnish light to do your knitting by. The thing you want to learn about all these dials is to go slow. Just barely light the tubes; then, if results are not loud enough, turn the rheostat a little more. Having the tubes too bright only wastes battery current and does not give as good quality."

Accordingly I turned the rheostat back again to a point where the tubes hardly gave any light at all. "Now," I inquired, "where do we go from here?"

"The first two dials, those on the left-hand side, are used to tune in the station." I took one of them gently in each hand.

Remembering the instructions about going slow, I twisted them gently back and forth. First I twisted them toward each other and then I twisted them away from each other; then I turned them both in the same direction. Only a few faint squeals resulted. Then I tried twisting first one and then the other. Soon I had tuned in a soprano singing "Annie Laurie" and a bass barytone rendering "Rocked in the Cradle of the Deep." The effect was far from soothing. I seized the third dial and turned it forward in an effort to clarify matters. The air was filled with shrieks, howls, wails, barks and whistles. Then my instructor came to my rescue.

"Thank heaven," he said, "that nobody knows who is doing this. There are probably 1,000 radio listeners within a mile of here who feel like committing murder. Too much regeneration in a regenerative set is like too much gas to a flivver. It causes a lot of noise and annoyance, but no extra mileage."

"Now," he continued, "let us first turn this dial that does the amplifying down to zero." We did so.

"Next, let us get these first two dials down low and work them up little by little. Just turn them slowly from each little marking to the next very slowly and stop and listen after each little turn."

So we started way down at zero and slowly turned the dials together. Soon WJZ was heard faintly, but perfectly, and without interference.

"Now," said hubby triumphantly, "turn the third dial slowly until you get the proper degree of amplification."

I turned it and the voice of WJZ's announcer was drowned in a piercing scream.

"The noise," remarked hubby scarca-

tically, "is not caused by a murder that has just been committed at the studio. It is due to faulty tuning in your own receiver. I am sure radio listeners for several miles around are enjoying it as much as you are."

Properly squelched, I turned the dial back again and started it forward more gently. At last I had the trick. Perfect reproduction!

Then I started all over with my third dial at zero and the other two low down and brought them up slowly. Presto! Another station. It was so fascinating tuning in my own stations that I could have stayed up all night just gently twisting those magic dials.

I got good at it, too, after a few nights' practice. Even hubby said so, and when your husband says you are a good girl you are good! Why, I got the Coast the other evening, all unaided, and that isn't any fish story either. Moreover, there wasn't a squeal. I did it just by turning my dials the tiniest little bit at a time and listening after each little turn. My, but it's fun!

So the secret of tuning, and perhaps you can show how smart you are by showing it to your friends, is to go slow, throttle down the engine and just creep along. Have your tubes dim and save the current. Incidentally, the tubes will last longer, too. Keep the amplifier low down, because too much amplification means distortion, and turn your dials slowly. Perhaps you will surprise yourself by bringing in some new stations when you get this stunt.

I'm getting to be a real radio bug, now that I've got it, and hubby thinks I'm almost intelligent enough to learn to drive the flivver, and just as soon as he can get some more life insurance he is going to let me try again.



# The Herald Tribune Daily Broadcasting Programs for Week Ending September 12

## Daylight Saving Time

[illegible]



## Use of C Battery Doubles Average Life of B Batteries

The C battery is very often disregarded in wiring up radio receivers. Whenever this is done one of the most important parts of the entire receiver is omitted. Its true worth in the circuit is not generally appreciated, but the fact is that the C battery pays a greater dividend in money saved and satisfaction given than any other accessory or part of the receiving system. It increases the operating life of the B battery, it increases the amplification of each tube in the circuit, it makes possible the use of higher plate voltages, it increases the load-carrying capacity of the tubes, it greatly reduces distortion from overloading, and it improves the quality of the output of the receiver. And all these things the little C battery accomplishes without itself furnishing any appreciable current, so that all are practically obtained without cost.

From an economical point of view the greatest gain derived through the use of a C battery is in the increased life of the B battery. For the higher values of plate voltage and with the proper adjustment of the C battery voltage, the useful life of the B battery is practically doubled. Even with this increased life of the latter, a little C battery will outlive several sets of B batteries. But suppose that it will outlive only two sets of them. Then during the life of the C battery two sets of B batteries will have been saved. The cost of these saved B batteries might have been \$12, whereas the cost of the C battery which effected this saving might have been only 75 cents, a saving of \$11.25. Hence from this point of view alone it is decidedly worth while to include the C battery in the receiver.

But this is not the only advantage. The greater amplification per tube

will make the set more sensitive and will bring in more stations, and the increase in the load-carrying capacity of the tubes will give more volume without introducing noticeable distortion. This latter gain results in greatly improved quality of the output, and this is one of the most important advantages of using a C battery. Without the C battery the tubes will overload quickly and result in harsh quality in the loud speaker; with a correctly adjusted C battery and a sufficiently high plate voltage loud speaker volume of pure quality may be obtained.—R. A.

### Earl Little, Bass Soloist Of Trinity, in Short Recital

On Tuesday evening at 7 o'clock WEAF's audience will again hear a short recital given in its studio before the microphone by Earl C. Little, basso. Mr. Little, who will be accompanied by George B. Mead Jr., is the bass soloist of the famous old Trinity Church in New York City, which stands at the head of Wall Street, the financial center of America. This church is one of the historic spots of New York City and Bishop William T. Manning was formerly rector. In his second recital from WEAF Mr. Little will sing "Il Lacerato Spirito" by Verdi, "Tommy Lad" by Margetson and "Drink to Me Only With Thine Eyes," the old English song.

### Women's Symphony Orchestra to Broadcast for First Time

Beatrice Oliver's Little Symphony, with Ruth Kemper as director, will be heard in a radio concert for the first time through WEAF to-morrow evening, beginning at 8 o'clock. This orchestra represents a pioneer effort in the establishment of a symphony orchestra composed exclusively of women players. It is now completing its first season and the results of its work are considered to be phenomenally successful.

## Hoover Thanks All Who Gave Sets to Lighthousekeepers

In a letter addressed to members of the press, dated May 19, Herbert Hoover, Secretary of Commerce, expressed appreciation to those who aided in securing radio receiving apparatus for the Lighthouse Service.

Mr. Hoover's letter reads as follows: "So many people have taken such a friendly and helpful interest in securing radio sets for the Lighthouse Service that it is a distinct pleasure for me to report that we have received to date about 381 receiving sets and 100 telephone receivers (head sets)—enough to take care of all the remote and isolated stations.

"Mr. Putnam, Commissioner of Lighthouses, states that the men in the service who have received sets sincerely appreciate the kindness of the press in prevailing upon some of our generous citizens to make the donations which have so greatly improved their conditions.

"Letters coming in from the lighthouse keepers indicate that the sets which the department has been able to distribute thus far are working very satisfactorily. The keepers report that they are getting clearly and distinctly the words of prominent speakers, musical entertainment, good Sunday sermons and the like. One keeper in expressing appreciation described his radio as 'the most company of anything I have ever seen in the Lighthouse Service.'

"In addition to being entertaining, the keepers are making use of the sets in receiving important messages and in the reception of weather reports and time signals. When they become proficient in reading code, many of the sets may be of vital use in receiving urgent code messages.

"The whole plan has worked out

splendidly, due to the help of the press and the generosity of the public. I hope that those who have been responsible for this success will permit me to express my gratitude for their co-operation."

### Memorial Day Program in Eveready Hour on Tuesday

What is termed an "Episode Program" will be broadcast by the Eveready group during the Eveready Hour on Tuesday evening through WEAF, WEEL, WFI, WCAE, WGR, WWJ, WOC, KSD, WJAR, WCCO, WTAG, WGN, WTAM and WSAI.

This hour's program will be made up of the presentation of three or possibly four complete episodes which will be varied in their character. The first episode will be in recognition of Memorial Day to be observed a few days later. It will be built upon an episode such as T. R. Thompson's little sketch concerning the dark days of the Civil War and presenting the musical picture of the outposts of the Union and Confederate armies late at night. The Eveready group will give a touch of realism to this striking episode by rendering the well known songs of both sides of the great conflict. During the Civil War period, although brother fought brother, their songs floated across the battle line to each other.

The second episode will be what is

termed a "readaptation" of the famous tragedy "The Erl King." This drama and tragedy will be brought out in part through vocal and instrumental music and the spoken word. In the third episode the usual Eveready group will be augmented by the popular radio entertainers, the Record Boys.

### John Drew to Speak on Shakespeare's "Henry IV"

At 8:30 to-morrow evening WEAF's audience will again have the opportunity of hearing John Drew, the famous actor, who will speak before its microphone on the subject "Shakespeare's 'Henry IV.'" Mr. Drew will speak under the auspices of the Players Club of New York City. Probably there is no actor who is better known or who has played before more people in America than John Drew and he was long regarded as America's favorite actor. Last fall Mr. Drew made his initial appearance in WEAF's studio and broadcast some of the scenes of his own famous plays under the auspices of the committee on Near East Relief. Only a few weeks ago he appeared as the guest artist of the Eveready Hour program broadcast through WEAF and a chain of stations, and those who commented upon his previous radio programs will undoubtedly welcome this new opportunity of hearing the famous actor's voice.

## NOTICE

The Stromberg-Carlson advertisement which was scheduled to appear on this page will be found on the Radio Broadcast page of the News Section of to-day's Herald Tribune.



## Radio Mail Order and Parcel Post

Any of the articles advertised on this page can be ordered by mail, receiving the same attention as a personally selected purchase. Cut out the advertisement of the article desired, write your name and address plainly, attach money order or check and mail to-day.

**Vitalitone Cone Loud Speaker**  
19-Inch Full Floating Diaphragm  
Wall Model, 7.50; with Base, 10.00  
15 days' free trial, money back if you return it. We take all risk to please you—we know how good it is. Try it in your own home.  
None Better at Any Price  
**ACCUSTICONE LABORATORIES**  
96 Church St., N. Y. City

**EDZIN THOMPSON RADIO**  
The Radio Sensation of the Year!  
Never in the history of radio retailing was there an offering to anywhere near compare with this sensational chance for the radio enthusiast to satisfy his craving for a radio receiver which is guaranteed to do what he wants to have it do. Either of these sets will do that and more. Packed in original factory sealed cartons.  
**THE THOMPSON GRANDETTE**  
Model V-51, Five-tube Neutrodyne, \$29.50  
List Price, \$125.00  
**THE THOMPSON CONCERT GRAND**  
Model S-70, Six-tube Neutrodyne, \$47.50  
List Price, \$180.00  
We have a few more Stereo Wares, the 3-tube Neutrodyne, Type AA-2, at \$11.00. And a few more Music Master Wares, the 4-tube Type 50, at \$12.50.  
320 WEST 42D ST. PHEN 9313

**UNLIMITED QUANTITY Brightson TUBES**  
True Blue  
W V 100 Type. Reg. \$3.50  
**79c**  
Every Tube in Original Box and Guaranteed Perfect. Mail Orders Filled for 6 or More.  
**City Radio Co.**  
79 Cortlandt St.  
110 West 42d St.

**BRUNSWICK**  
75 West 125th Street  
NEAR LENOX AVE.  
SPECIALLY AIR-CARTONED FOR MAIL ORDERS  
FACTORY GUARANTEED  
**Thompson**  
5 TUBE NEUTRODYNE  
RADIO RECEIVER  
\$125.00 SET \$29.25  
FOR ONLY  
This is the lowest price a genuine Neutrodyne has ever been offered to the public.

**MARWOL-5 TUBE**  
BABY GRAND  
T. R. F. RECEIVER  
\$8.98  
UNUSUALLY LOUD AND SELECTIVE

## Order by MAIL

The merchants advertising on this page are equipped to fill your orders by mail. They offer a simple way of doing your Summer Radio Shopping.

**ENTER CITY RADIO**  
223 FULTON ST. NEW YORK CITY  
**DIAMOND OF THE AIR**  
Sealed Kit ..... \$35.00  
Bruno Basic Kit, listed \$20. \$12.50  
our special.....  
General inst. all capacities, \$1.75  
Streamline S. L. F. Cond., \$1.95  
all capacities  
**BRUNO SERVICE STATION**  
All mail orders filled  
include postage

**DYNAMIC RADIO**  
178 Greenwich St. NEW YORK CITY  
**BLUE TUBES**  
Tested for Oscillation  
Money Back Guar.  
6 Volt Standard  
3 Volt 150  
8 Volt 150 Standard  
Base  
6 Volt 200  
ALL \$1 Why Pay More?  
TYPES

**NETSON RADIO CO.**  
78 Cortlandt St., N. Y. C.  
**WIRE**  
WILL wind all kinds of coils, \$7.50  
1-1200  
**REMLER KIT** \$21.95  
1-610  
3-500

**WORKSMAN RADIO SERVICE**  
14-16 Vesey St., N. Y. City  
CONSOLE CABINETS  
Highly Polished to Fit Every Radio Set.  
**\$18.50 and up.**

# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

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PART TEN

SUNDAY, MAY 23, 1926

12 PAGES

## This Compact Six-Tube Set Uses Resistance Coupled R. F. and A. F. Amplification

Selectivity, Sensitivity and Clarity Result From Use of Crystal Detector and Regeneration

By JAMES B. SCULLY

IT IS not generally known among broadcast receiver experimenters that fixed resistances can be employed just as effectively in radio frequency amplifying circuits as they are so commonly employed nowadays in audio amplifier circuits. Their ability in this direction is no particular secret to engineers and more advanced experimenters, for every engineering textbook describes and illustrates the two types of arrangements, but little use has been made of it so far for broadcast reception.

About five years ago Paul Godley, a well known radio engineer, made up a super-hetrodyne, using resistances instead of transformers in the intermediate stages, took the outfit to Scotland for the first amateur trans-Atlantic tests and set a world's record for long-distance amateur reception. This feat was accomplished just before the advent of the broadcast boom, and in the period of frenzied set-building activity that followed hardly a word was spoken for resistance R. F. In reading over the technical data available on the subject one is led to inquire about this neglect, for there certainly is no reason why resistance cannot be applied to present-day broadcast receivers. It seems that the pseudo-engineers whose habit it was to dig out old circuits and to present them under new names missed a good bet in this direction.

### Resistance Coupled R. F.

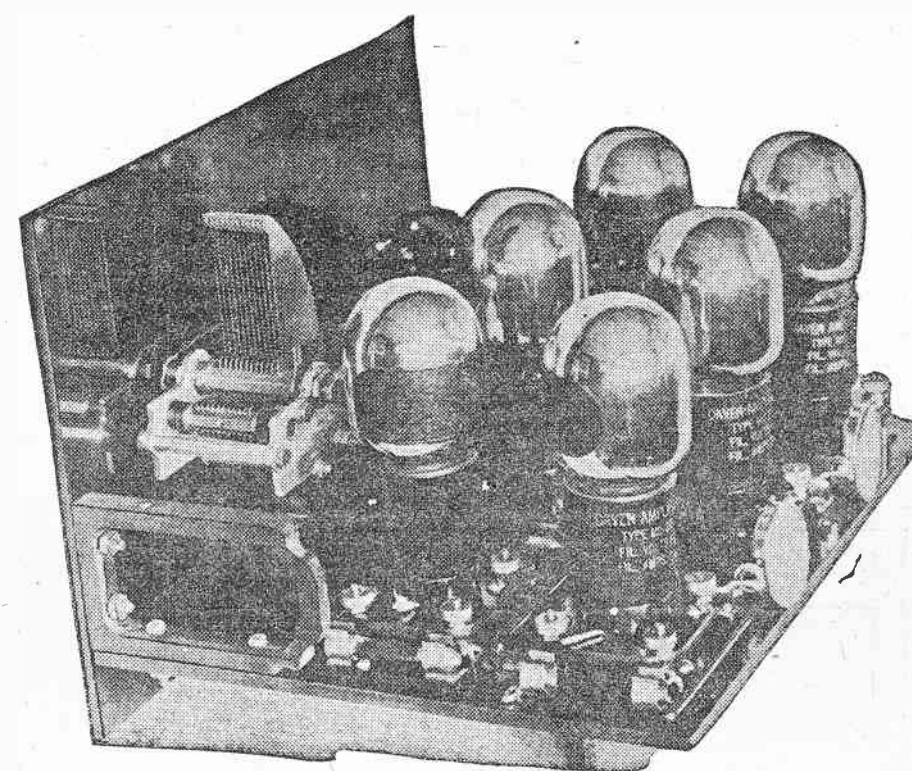
A radio frequency circuit employing resistances and fixed condensers as the coupling units between successive stages looks exactly like the familiar resistance hook-up for audio amplification. The resistors themselves are the very same, only the coupling condensers being smaller in size. Whereas the condensers in A. F. magnifiers vary between .006 mfd and 1 mfd., those in the R. F. sets are about .0005 or .001 mfd.

Since the interstage resistors require no adjustment the problem of tuning is quite simple. If a number of stages are used it is only necessary to provide a tuning combination consisting of inductance and capacity for the antenna circuit and the associated grid circuit of the first tube. The rest of the amplifier takes care of itself. The construction of a complete receiver resolves itself into nothing more than the arrangement of the resistors and the placement of a single coil and condenser on the control panel.

Resistance operated radio frequency circuits possess practically the same characteristics as resistance A. F. They function perfectly without regard for the frequency of the currents they are called upon to handle and provide an amplification per stage equal to the amplification constant of the tube itself. This last property, of course, places the resistance amplifier admittedly below the level of

a tuned and highly regenerative R. F. amplifier on the point of forward amplification, but the deficiency can be compensated for in great part by the introduction of regeneration in a vital point in the circuit.

A very fine little outfit depending on resistances for both its R. F. and A. F. amplifiers was made recently by Sylvan Harris, technical editor of "Radio News." It employs six tubes and comprises three stages of radio frequency and three stages of audio frequency, all with resistances, the detector being a carborundum one. The set was designed specifically for high quality reception of local stations, but in actual service has brought in many distant ones. Its outstanding features are



This picture shows the receiver described in this article with vacuum tubes in the sockets

its simple two-dial control (really two dials, not two dials with a handful of continuously variable micrometer knobs) and its remarkable tone quality.

### Quality Obtained

Of course, we hear a great deal about that elusive thing called "quality," so much, in fact, that people are inclined to take all the enthusiastic blurbs of individuals and manufacturers with considerable more than the proverbial grain of salt, but this is an amplifier whose capabilities are beyond question. There is a crystal detector feeding a three-stage straight resistance amplifier, the crystal input itself coming from a resistance circuit. If there is any better combination it has not yet seen the light of public print.

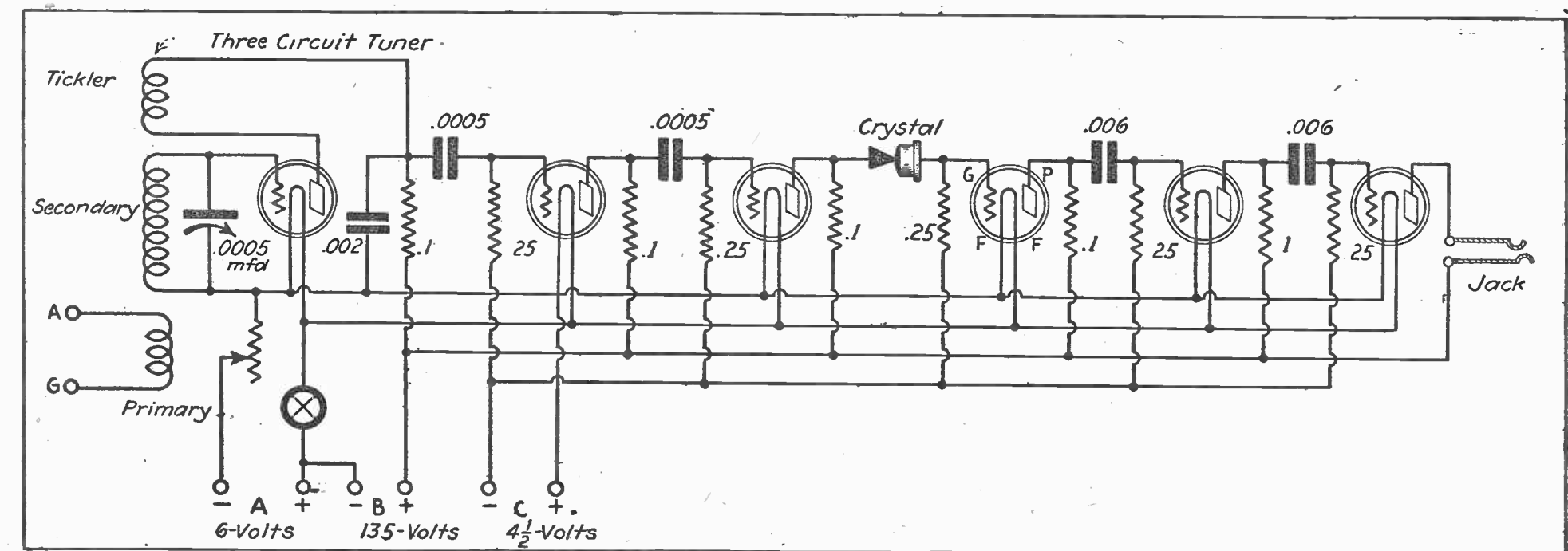
The accompanying illustrations show the receiver plainly. The entire affair is only 10 inches long, 7 high and 8 deep and is a model of compactness. The close mechanical association of the R. F. tubes and appurtenances is of comparatively little importance, because there is only one inductance in the whole set, and it has nothing to feed back into. The resistors themselves have no magnetic effect worth speaking about.

### The Parts Required Are:

Front panel, bakelite or hard rubber, 10x7x4 in.  
Subpanel, 10x8x4 in.  
Six Benjamin shock proof push-type sockets, for standard tubes.  
Bruno No. 99 three circuit tuner.  
Ameco .0005 mfd. S. L. F. condensers.  
Two Marco dials.  
One six ohm Bruno rheostat.  
Two Garfield shelf brackets.  
Cutler-Hammer battery switch.  
Single circuit phone jack.  
Ten resistor clip mountings.  
Carborundum crystal detector.  
Five .1 megohm and five .25 megohm Aerovox fixed resistors.  
Fixed condensers: two .0005 mfd., one .002 mfd., two .006 mfd.  
Binding post strip, bugbar, etc.

The arrangement of the various parts is obvious. On the front panel are mounted the three-circuit tuner, variable condenser, rheostat, battery switch and telephone jack, the coil in the left-hand section, the condenser in the right, the switch in the lower left corner, the jack

(Continued on page five)



The wiring diagram of a six-tube receiver employing three stages of resistance-coupled, radio-frequency amplification, a crystal detector and three stages of resistance coupled audio-frequency amplification.

Additional Radio News Will Be Found in Another Section of To-day's Herald Tribune



# An A. C. Plate Supply Unit Designed for Use With a Full-Wave Thermionic Rectifier

The U X 213 Used Provides 140 Volts With Enough Current for the Average Set

By ELMER M. WAKEFIELD

RADIO listeners who can look back five years on the history of broadcasting will remember when it was every fan's ideal and dream that the time would come when house current service would be adapted for supplying current to receiving sets. The day has come, and during the last six months much development and research work has brought forth this once thought impossible dream.

The success of the development of B battery eliminators may be attributed to the foresight of many manufacturers. Most important among the apparatus developed for B battery elimination is the production of rectifying devices capable of supplying the necessary current and voltage to supplement dry cell batteries. Equally important is the production of transformers, choke coils and filter condensers to aid in smoothing out the "hum."

It is safe to say that more than 85 per cent of the homes in the United States which are electrically equipped are supplied by the power companies with alternating current. If the alternating current were to be applied directly to the receiving set a disagreeable hum would be heard, making it impossible to distinguish spoken words or modulated musical tones. Why most power companies supply alternating current to their customers is evident. It is much easier and cheaper to transfer from one point to another.

To obtain undistorted reproduction it is essential that the plate supply to the receiving set be absolutely constant. That is, there must not be the slightest trace of alternating hum or surge. This is the prime requisite of all B battery eliminators.

There are several methods of rectifying this alternating current, all of which were mentioned in Fulton H. Crawford's article on B battery elimination which appeared in the New York Herald Tribune Radio Magazine April 11, 1926. Therefore it is not deemed necessary to dwell upon this point. It is sufficient to say that the B battery eliminator described on this page employs the use of a full wave thermionic rectifier tube.

## List of Parts

The parts used in the writer's B battery eliminator are mentioned below and were actually selected by him. However, this does not imply their superiority over other standard makes of apparatus, which may be substituted with discretion on the part of the builder.

One Dongan transformer No. 537 (L1, L2, L3).  
Two Dongan choke coils No. 508 (L4, L5).  
One Aerovox condenser block (C3, C4, C5, C6, C7).  
One Aerovox 0.1 mfd. double fixed condenser (C2).  
One UX 213 full-wave rectifying tube (V).  
One R. C. A. socket.  
Three Claret variable resistors (R1, R2, R3) and necessary baseboard, binding posts, connecting wire, etc.

As may be seen from the illustrations, the entire apparatus for the eliminator is mounted on a baseboard, which is nine inches wide and fifteen inches long. No strict rule must be followed in placing the parts. The easiest method, of course, is the most logical—that being to start with the input at one end and end with the output at the other. This plan was followed by the writer when constructing this eliminator.

When a thermionic rectifying tube is employed, as is the case in this circuit, the power transformer must have two secondary windings, namely, one for heating the filament and the other for supplying the plate voltage. It is essential that both windings have center taps. The importance of this feature is easily understood after the wiring diagram has been examined, and it will be noted that both the positive and negative terminals of the output are obtained from the center taps of the secondary windings. In the well made transformer this so-called center tap is located at a point where there is always zero potential, or a nodal point on the cycle of the alternating current.

Most fans know that an alternating current first flows in one direction and then reverses and flows in the opposite. The frequency of an AC current is determined by the number of times it reverses per second. The center tap is located at a point where the current does not increase or decrease with the swing of each cycle. If the center taps happen to be misplaced it will cause a "hum" which will be next to impossible to eliminate.

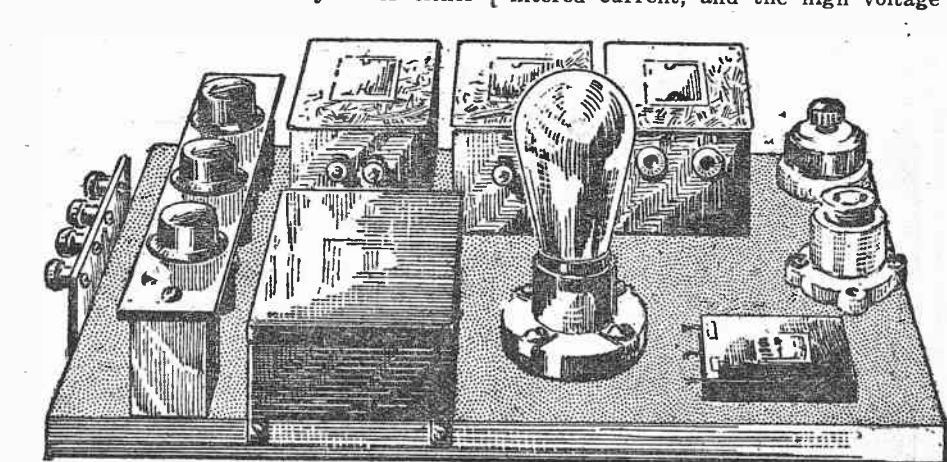
In order to accommodate the UX-213 rectifying tube (V) the filament winding of the transformer should be capable of supplying two amperes at five volts under continuous load. A rheostat in series with the filament cannot be employed to reduce the voltage, as the additional resistance would displace the center tap.

## Constructional Data

The primary, L1, of the transformer is connected directly to the 110-volt (60 cycle

radio receiver will serve to supply the 110-volt AC.

The secondary, L2, supplies 220 volts either side of the center tap, which is the required voltage for the UX-213 tube. However, greater voltages should be avoided, as this is the maximum voltage this tube is designed to accommodate. Each of the two secondary wires either



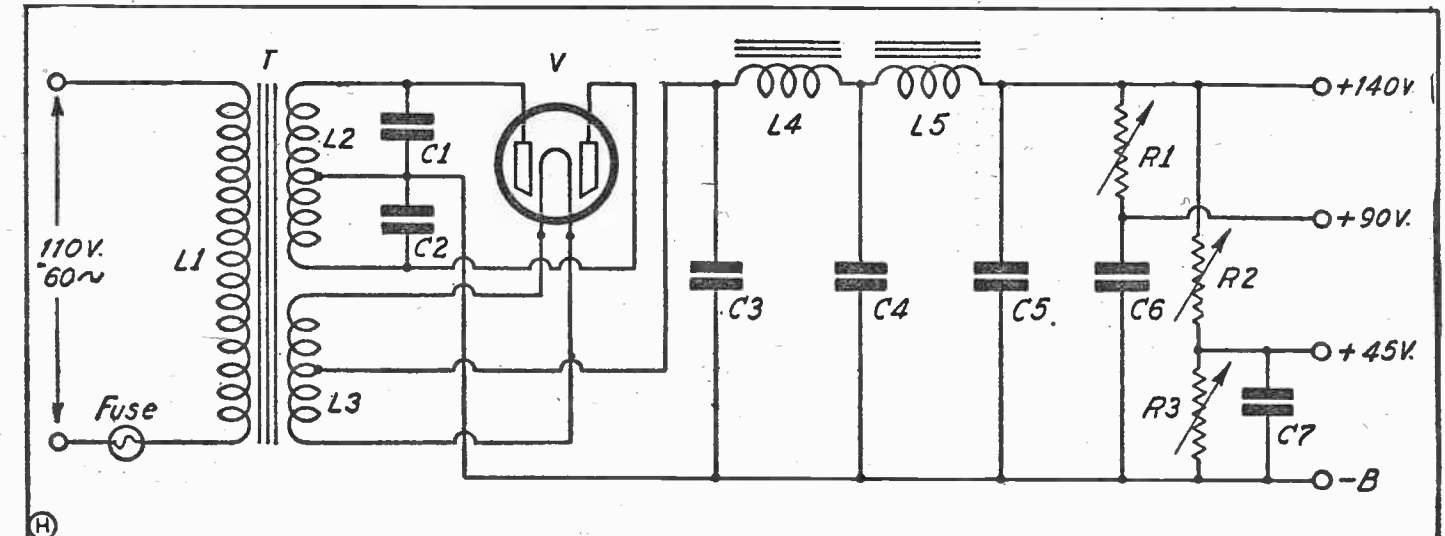
Drawing made from a photograph of the B battery eliminator described on this page

side of the center tap are connected to the plates of the tube. The UX-213 tube is designed to fit the standard UV or UX socket. Inasmuch as there is not a grid element in a rectifying tube, the usual "grid" terminal is the connection for the additional plate. That is, one side of the secondary of L2 connects to the terminal marked "plate" on the tube socket, and the other to the one labeled "grid." In reality the UX-213 tube is two tubes in one, with

and plate secondary windings, which are positive and negative, respectively. Choke coil L4 is connected in series with the positive output of the rectifier and the output is again shunted by a condenser, C4. Both C3 and C4 are two microfarads each. The second choke coil, L5, is also connected in series with the positive leg of the partly filtered current, and the high voltage is

again shunted by a high capacity condenser, C5. The capacity of this condenser is eight microfarads. If the wiring diagram is followed with care there will be no difficulty experienced in connecting up the component parts of the eliminator.

The purpose of the high capacity condensers and the choke coils, which constitute the filter circuit, is to store up the pulsating current so when the lag between alternations comes there will be sufficient



Wiring diagram of the author's B battery eliminator using a full-wave thermionic rectifying tube

in this case) alternating current light socket. A three-ampere fuse may be connected in series with one side of the line as a safeguard against possible mishap to the apparatus in trouble should occur.

If excessive current is placed on the battery eliminator the fuse will "blow," automatically disconnecting the eliminator from the lighting circuit. A "snap" switch connected in series with the primary of the transformer will provide a convenient means for turning the eliminator "on" or "off." A standard extension cord may be used as a means of connecting the device to the electric light socket. Such cords may be purchased in any electrical store. The nearest convenient light socket: to the

two separate filaments connected in parallel, and two separate plates. The wires connecting to the plate elements of the tube on the Dongan transformer are red. The center tap of L2 is brown.

The by-pass condensers, C1 and C2, are contained in one unit having a capacity of .1 microfarad, either side of the common lead, which connects to the center tap of the transformer secondary, L2. The other two condenser connections attach to the two leads of the transformer secondary, placing a capacity of .1 microfarad across each half of the high voltage winding.

The filament winding (L3) is connected directly to the filament terminals on the socket. The center tap of the filament winding provides the positive connection of the B battery eliminator.

The alternating direct current has now been rectified to pulsating direct current interrupting at 120 times a second. The next object of the B battery eliminator is to convert this pulsating direct current to constant direct current and to reduce all interruptions or surges of any kind. This is accomplished by means of the filter.

The filter system of this B battery eliminator consists of a number of high capacity condensers connected in shunt with the rectified current, and two large audio choke coils in series with the positive lead.

Condensers C3, C4, C5, C6 and C7 are all concealed in one unit, which greatly facilitates wiring. These are known as "B blocks" and are being placed on the market by several reliable manufacturers.

Condenser C8 is connected directly across the rectified high voltage obtained from the two center taps of the filament

amount of current to compensate for the drop.

The typical radio receiver of to-day has one or two stages of radio-frequency amplification, a detector and two or three stages of audio amplification. The audio amplifier usually requires from 100 to 200 volts, while the radio-frequency amplifier seldom requires more than 90 and the detector 45 volts. The high voltage output of this B battery eliminator will be about 140 volts, and it is, therefore, necessary to employ some means of reducing it to a lower value for the radio-frequency amplifier and detector tubes. This is accomplished by means of resistance R1, R2 and R3.

Myers Tubes, by means of a special process, are evacuated to the highest degree, so that even though the spacing between the elements has been decreased, yet it is possible to utilize in the plate circuit a potential as high as 300 volts, which, if used in connection with the proper bias, enables the user to obtain great volume without distortion.

Metropolitan Jobbers Merge  
John W. Weber Jr., Inc., and the Rance Corporation, radio wholesale firms, have combined to form the Weber-Rance Corporation, who will

R1 is connected in series with positive side of the rectified voltage and the binding post marked 90 volts. The .1 microfarad condenser C6, which is included in the B block, is connected from the binding post to the negative side of the rectified output.

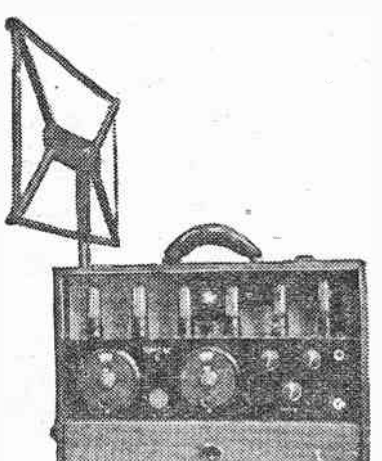
Resistance R2 is connected in a similar

(Continued on page three)

## News and Notes of the Radio Trade

**Portable Receiver and Kit**  
The American Interstate Radio Service has made a very opportune announcement by the introduction of the Rambler Six—a six-tube portable receiver, weighing twenty-five pounds with all equipment. It is equipped with a loop and can be set up in thirty seconds.

This receiver is easy to tune and



carry, and sells for a very low price. The Rambler Six also comes in kit form for those who prefer to build their own.

**A Condenser for Tandem Tuning**  
The present trend of radio progress may be described as a movement toward the elimination of controls. Tandem tuning—the tuning of two or more circuits by condensers with rotors mounted on a common shaft—is a step in this direction. The "Siamese" condenser manufactured by Ameco and designed to meet the exigencies of simultaneous tuning recently has been placed on the market.

Aside from the mechanical construction, which insures perfect electrical contact between individual plates, plate sections and terminals, essential to general electrical efficiency, particular care enters into the matching of the unified condensers, qualifying the unit for its specific purpose of tandem tuning. The two condensers are matched within one micromicrofarad, a painstaking accomplishment, but quite essential to successful tandem operation.

The condensers are of the straight line frequency type (which particularly recommends them for single control superheterodyne work), ranging in sizes from .00025 mfd. to .0005 mfd. (individual capacities).

## A Tube Briefly Described

The three essentials of a good radio tube are all around operating efficiency, ruggedness of construction and uniformity. These essential characteristics are guaranteed to be embodied in the Myers tubes by their manufacturers, the Myers Radio Tube Corporation of Cleveland, Ohio.

The three principal elements of Myers Tubes, namely the plate, the grid and the filament, are held rigidly in a framework composed of nickel, insulated at the proper points by means of pyrex glass. The elements are supported in this framework at both the top and the bottom of these elements. This construction holds the elements with relation to one another in a fixed position, so that they cannot be displaced through even unusually rough handling, and that vibration or other mechanical disturbances do not alter the characteristics of the tubes after they are once assembled. It also permits the use of smaller elements, thus reducing the internal capacity of the tube and allows smaller spacing of the elements with relation to one another. The advantages to be obtained by this mechanical construction are high mutual conductance, high amplification factor, and the absence of microphonic effects.

Myers Tubes, by means of a special process, are evacuated to the highest degree, so that even though the spacing between the elements has been decreased, yet it is possible to utilize in the plate circuit a potential as high as 300 volts, which, if used in connection with the proper bias, enables the user to obtain great volume without distortion.

Metropolitan Jobbers Merge  
John W. Weber Jr., Inc., and the Rance Corporation, radio wholesale firms, have combined to form the Weber-Rance Corporation, who will

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Resistance R2 is connected in a similar

(Continued on page three)

be distributors of radio equipment in the metropolitan district. The new company will have its headquarters at 225 West Fifty-seventh Street, at the corner of Broadway, and will maintain a branch at 1271 Bedford Avenue, Brooklyn, the quarters formerly occupied by John W. Weber Jr., Inc.

The officers of the Weber-Rance Corporation are John W. Weber Jr., president, M. L. Miller vice-president and sales manager, and Harold O. Becker secretary and treasurer. The chairman of the board of directors is T. H. Wickwire Jr., who is well known throughout the industry and identified with several prominent radio organizations.

Among the lines of radio equipment to be carried by these distributors are Bosch, Ferguson, Balte, Ray-O-Vac, Perryman, Amplion, Saal, Philco, Bright Star and Gould Unipower. The company plans to keep the metropolitan and adjoining territory thoroughly covered with a sales force of at least ten men.

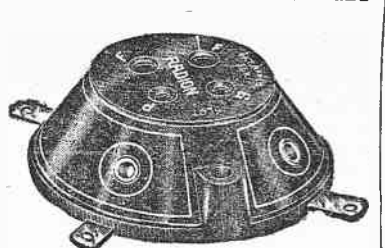
## Master Speaker

The Charles Freshman Company, Inc., manufacturers of the popular line of tuned radio frequency receivers and B battery eliminators, announce the introduction of a new type of loudspeaker.

The speaker is of a very novel construction and incorporates a special reflexed resonating air chamber which affords wonderful volume and realistic quality reproduction. It is but six inches high and is readily adaptable for placing in any nook, corner or on top of or alongside the radio receiver.

Admitted to Membership in R. M. A.  
The De Jur Products Company of New York City, manufacturers of the De Jur rheostat and other radio products, have been admitted to membership in the Radio Manufacturers Association. Mr. Ralph De Jur represented the company at the recent R. M. A. convention held in Atlantic City.

**Socket for UX Tubes**  
The American Hard Rubber Company of New York are the manu-



facturers of the radion V-T socket for new type (UX) tubes. This socket is also made with binding posts.

## Kit of Resistance Units

The Ward Leonard Electric Company, of Mount Vernon, N. Y., have placed on the market a kit of eight fixed resistances for use in B battery eliminators. The resistances are supplied in various sizes and the kit includes one 750-ohm unit, three 1,500-ohm units, one 3,000-ohm unit, one 3,500-ohm unit and two 5,000-ohm units. Each unit is capable of dissipating 20 watts of energy. The units are approximately two inches long and three-eighths inch in diameter. By connecting several of these units in series across the output terminals of the B battery eliminator it is possible to obtain intermediate voltages of practically any desired value for the operation of the detector, radio frequency amplifier and first stage of the audio frequency amplifier.

## Radio Station to Serve the Aquatic Sport Loving Fan

(Continued from page three)

The transmitter has been designed for key operation if it is desired at any time to transmit by code. Four 50-watt tubes are used; two oscillators and two modulators, making the output for telephony 100 watts. It must be remembered the use of this power in an efficient installation on board boat is equivalent to a transmitter many times more powerful at some land station, since the radio waves travel over water notably better, due to absence of energy absorption from closely surrounding objects. Meters have been provided in all important circuits so instant check can be kept on the correct performance of the transmitter. Tube filaments and plate voltage is controlled from the transmitter panel. Special rheostats provide for minute voltage adjustments.

**Plate Voltage Supply**  
Plate voltage is obtained from an Esco 32-volt D. C. drive generator, which will supply 1,500 volts. The current consumption varies between 26 to 32 amperes. High ampere-hour capacity storage Exide batteries have sufficient capacity to permit as much as eight continuous hours of broadcasting if necessary and as previously mentioned, operation for a longer period than this may be had by operating direct from Delco generator.

Variometer type antenna tuning for transmitter eliminates the use of tap connections, making for greater efficiency and ease of operation. The inductance coils in the closed or oscillating circuit are of low loss design.

All connections are made by a plug and jack system of heavy construction to reduce losses, and to add efficiency coils specially designed for definite wavelengths may be quickly plugged in.

A quartz crystal oscillator makes possible correct adjustment for constant frequency.

The speech amplifier, or mixing panel, is of the latest design, employs three tubes and permits the mixing or fading from one program or microphone to the other, with no abrupt change. This feature may be more clearly understood by a comparison with the compound stereopticon where one picture is brought in clear while a simultaneously fading of the other is effected. Microphone connections, fore and aft, make instantly available the broadcasting from special vantage points otherwise too difficult or impractical to reach quickly.

**The Receiver Employed**  
A Grebe synchrophase, especially designed to cover commercial, as well as the broadcasting wave bands, is used for receiving. Handy plug connections in the fore and aft cabin and cockpit permit the plugging in of a number of points for reception of broadcast entertainment.

The send and receive switch automatically controls the connecting of the receiver in or out of circuit.

A special switch has been provided, however, so that if desired the transmitter may be monitored by checking up on the transmissions in the receiver. The speech amplifier, crystal control oscillator and receiver therefore afford three means of practical transmission check up.

Receiver provisions for the commercial 600-meter reception were made, as were the transmitter key connections for emergency use, if ever it

became necessary at sea to call for assistance.

The aerial is an inverted "L" type, flat top, designed for maximum radiation surface, constructed of heavy stranded enamel wire, insulated throughout with Pyrex strain, stand-off and lead-in insulators. Rugged construction and practical design have particularly been considered in the aerial, designed since severe weather necessitates sturdy construction and the aerial must not in any way interfere with bridge or deck maneuvering.

Design and installation work were done by Mr. William F. Diehl and Mr. F. B. Ostman, of the A. H. Grebe engineering department. Mr. Douglas Rigney, owner of the boat and an officer of the Grebe Company, supervised the installation, which took three days to complete.

## Similar to ACF Cruisers

The new MU-1 follows the general lines of all ACF cruisers in sturdy marine construction. The keel is of Oregon pine in one length and the frames are of steam bent oak. The planking is of Oregon pine and the decking is of teak. The forward cabin contains the control apparatus and radio equipment of station WRMU. Berths of Pullman type and wicker furniture complete the furnishings. The after cabin has a series of Pullman berths, additional wardrobe closets and dressers with roomy drawers. The galley of this ocean-going broadcaster has large stove, sink, icebox and everything to permit the best table and service a meticulous host could desire. The very appearance of the galley with its silver platters and neatly disposed essentials excites hunger as well as radiates hospitality.

Smooth and silent high power Hall Scott engines insure ample speed. The MU-1 will make its bow as a racing boat in the New London-Bermuda bout, which is scheduled to occupy 105 hours. Prior to this, however, the MU-1 will be in attendance at many races in the rivers and harbors of the Atlantic seaboard.

## Crown Prince of Sweden To Speak at Ceremonies

A ceremony which cannot be seen except by a limited number of people in the nation can be enjoyed by thousands from almost every other aspect, for on Saturday afternoon, beginning at 3:30, WEAU and WCAP will broadcast the proceedings of the official ceremonies in connection with the unveiling of the statue of Leif Ericsson in Washington, D. C.

WEAU's audience will again have the opportunity of hearing the voice of the nation's Chief Executive, President Calvin Coolidge, who will make an address on behalf of the American people. There will also be an address by the Crown Prince of Sweden, which will be in the nature of an official response to the recognition by Americans of the explorations of the hardy Norseman who is generally supposed to have visited this country before the voyage of Columbus. It is possible that a few brief remarks will be made by the Crown Princess of Sweden. A brief address will also be delivered by Congressman Carl R. Chindblom of Illinois.

**Eskimos on Arctic Coast Enjoy Radio Programs**

With the attention of the world centered on the polar regions through the many audacious attempts to reach the pole by the air route, Station WJZ has proof that it most reaches the pole every night. The proof is in the form of a letter received within the last week from a missionary at Shingle Point on the Arctic Coast, Alaska, which is now framed with its postmarked envelope and hangs in WJZ's studio. The letter follows:

Church of England Mission, Shingle Point, Arctic Coast, Alaska, January 15, 1926.

Broadcasting Station WJZ, New York City, N. Y.  
Dear Sirs:

We wish to express our appreciation for the privilege of listening in to WJZ during the past four months. As our semi-annual mail leaves here in about ten days you will be able, from the time it takes this letter to reach you, to appreciate something of our isolated position. In spite of the distance when conditions are favorable we can get very clear reception on our loud speaker. We heard very clearly and greatly enjoyed on the morning of January 12 your program being broadcast to Australia. Atmospheric conditions on New Year's Day somewhat marred the opening program from your new super-power station at Bound Brook and we missed hearing Big Ben. However, as we get London direct we were not so disappointed as we otherwise might have been.

Our mission is situated on the Arctic Coast about 100 miles east of the Alaska-Yukon boundary line, and our work is among the Eskimo people who live along the Arctic Coast. Needless to say the Eskimos are filled with wonder at the possibility of the human voice being carried thousands of miles through the air and then reproduced by the receiving set.

As we have not seen the sun for nearly two months we have enjoyed and appreciated the radio very much, and we again wish to thank you for the splendid programs that we have enjoyed from your station. Wishing you every success during your present year. Very sincerely yours,  
THE REV. A. W. GEDDES.

## SANGAMO Mica Condensers

In intermediate sizes

Improve Tone, Range and Volume

Capacities in microfarads and prices	
0.0004	0.001
0.0005	0.0015
0.0006	0.0015
0.0007	0.0015
0.0008	0.0015
0.001	0.0025
0.0015	0.003
0.002	0.003
0.0025	0.003
0.003	0.003
0.0035	0.003
0.004	0.003
0.0045	0.003
0.005	0.003
0.0055	0.003
0.006	0.003
0.0065	0.003
0.007	0.003
0.0075	0.003
0.008	0.003

With resistor clips, 10c each

## Radio Exchange

Rate, 40 cents a line. Ads. accepted until 12 o'clock noon Friday.  
PHONE PENNSYLVANIA 4000

## Parts and Equipment

**IT'S BEEN DONE**  
THE NEW PATENT PENDING "SUR-LOC" CONNECTOR. The missing link of the Alkaline type storage battery. Admitted the greatest improvement to date. 15% to 30% greater capacity over the crimped-on pressure connectors. Four times as much metal in connector over any existing types. Positive element which swells and contracts in charging and discharging cannot become loosened as in crimped connector. No soldering. Element simply inserted with fingers into connector and becomes tighter and tighter if you try to remove. No soldering. "Hawley" development. Old types can be adapted by writing us. Try the new "Hawley" with all of its improvements and experience. Complete assembly type (nothing to put together) includes chemical, 12.00; 100 Volt, Type A or B, 12.00; 150 Volt, Type C or D, 12.00; 180 Volt, Type E or F, 12.00; 200 Volt, Type G or H, 12.00; 220 Volt, Type I or J, 12.00; 240 Volt, Type K or L, 12.00; 260 Volt, Type M or N, 12.00; 280 Volt, Type O or P, 12.00; 300 Volt, Type Q or R, 12.00; 320 Volt, Type S or T, 12.00; 340 Volt, Type U or V, 12.00; 360 Volt, Type W or X, 12.00; 380 Volt, Type Y or Z, 12.00; 400 Volt, Type AA or BB, 12.00; 420 Volt, Type CC or DD, 12.00; 440 Volt, Type EE or FF, 12.00; 460 Volt, Type GG or HH, 12.00; 480 Volt, Type II or JJ, 12.00; 500 Volt, Type KK or LL, 12.00; 520 Volt, Type MM or NN, 12.00; 540 Volt, Type OO or PP, 12.00; 560 Volt, Type QQ or RR, 12.00; 580 Volt, Type SS or TT, 12.00; 600 Volt, Type UU or VV, 12.00; 620 Volt, Type WW or XX, 12.00; 640 Volt, Type YY or ZZ, 12.00; 660 Volt, Type AA or BB, 12.00; 680 Volt, Type CC or DD, 12.00; 700 Volt, Type EE or FF, 12.00; 720 Volt, Type GG or HH, 12.00; 740 Volt, Type II or JJ, 12.00; 760 Volt, Type KK or LL, 12.00; 780 Volt, Type MM or NN, 12.00; 800 Volt, Type OO or PP, 12.00; 820 Volt, Type QQ or RR, 12.00; 840 Volt, Type SS or TT, 12.00; 860 Volt, Type UU or VV, 12.00; 880 Volt, Type WW or XX, 12.00; 900 Volt, Type YY or ZZ, 12.00; 920 Volt, Type AA or BB, 12.00; 940 Volt, Type CC or DD, 12.00; 960 Volt, Type EE or FF, 12.00; 980 Volt, Type GG or HH, 12.00; 1000 Volt, Type II or JJ, 12.00; 1020 Volt, Type KK or LL, 12.00; 1040 Volt, Type MM or NN, 12.00; 1060 Volt, Type OO or PP, 12.00; 1080 Volt, Type QQ or RR, 12.00; 1100 Volt, Type SS or TT, 12.00; 1120 Volt, Type UU or VV, 12.00; 1140 Volt, Type WW or XX, 12.00; 1160 Volt, Type YY or ZZ, 12.00; 1180 Volt, Type AA or BB, 12.00; 1200 Volt, Type CC or DD, 12.00; 1220 Volt, Type EE or FF, 12.00; 1240 Volt, Type GG or HH, 12.00; 1260 Volt, Type II or JJ, 12.00; 1280 Volt, Type KK or LL, 12.00; 1300 Volt, Type MM or NN, 12.00; 1320 Volt, Type OO or PP, 12.00; 1340 Volt, Type QQ or RR, 12.00; 1360 Volt, Type SS or TT, 12.00; 1380 Volt, Type UU or VV, 12.00; 1400 Volt, Type WW or XX, 12.00; 1420 Volt, Type YY or ZZ, 12.00; 1440 Volt, Type AA or BB, 12.00; 1460 Volt, Type CC or DD, 12.00; 1480 Volt, Type EE or FF, 12.00; 1500 Volt, Type GG or HH, 12.00; 1520 Volt, Type II or JJ, 12.00; 1540 Volt, Type KK or LL, 12.00; 1560 Volt, Type MM or NN, 12.00; 1580 Volt, Type OO or PP, 12.00; 1600 Volt, Type QQ or RR, 12.00; 1620 Volt, Type SS or TT, 12.00; 1640 Volt, Type UU or VV, 12.00; 1660 Volt, Type WW or XX, 12.00; 1680 Volt, Type YY or ZZ, 12.00; 1700 Volt, Type AA or BB, 12.00; 1720 Volt, Type CC or DD, 12.00; 1740 Volt, Type EE or FF, 12.00; 1760 Volt, Type GG or HH, 12.00; 1780 Volt, Type II or JJ, 12.00; 1800 Volt, Type KK or LL, 12.00; 1820 Volt, Type MM or NN, 12.00; 1840 Volt, Type OO or PP, 12.00; 1860 Volt, Type QQ or RR, 12.00; 1880 Volt, Type SS or TT, 12.00; 1900 Volt, Type UU or VV, 12.00; 1920 Volt, Type WW or XX, 12.00; 1940 Volt, Type YY or ZZ, 12.00; 1960 Volt, Type AA or BB, 12.00; 1980 Volt, Type CC or DD, 12.00; 2000 Volt, Type EE or FF, 12.00; 2020 Volt, Type GG or HH, 12.00; 2040 Volt, Type II or JJ, 12.00; 2060 Volt, Type KK or LL, 12.00; 2080 Volt, Type MM or NN, 12.00; 2100 Volt, Type OO or PP, 12.00; 2120 Volt, Type QQ or RR, 12.00; 2140 Volt, Type SS or TT, 12.00; 2160 Volt, Type UU or VV, 12.00; 2180 Volt, Type WW or XX, 12.00; 2200 Volt, Type YY or ZZ, 12.00; 2220 Volt, Type AA or BB, 12.00; 2240 Volt, Type CC or DD, 12.00; 2260 Volt, Type EE or FF, 12.00; 2280 Volt, Type GG or HH, 12.00; 2300 Volt, Type II or JJ, 12.00; 2320 Volt, Type KK or LL, 12.00; 2340 Volt, Type MM or NN, 12.00; 2360 Volt, Type OO or PP, 12.00; 2380 Volt



## Propagation Tests Show That Radio Waves Split in Two

Substantiation of the theory that radio waves split into a ground wave and a sky wave in passage from transmitter to receiver, has been found in preliminary compilation of data secured by radio engineers of the General Electric Company in broadcast wave propagation tests conducted from January 1 to May 8.

According to the split wave theory, one wave passes along the earth and the other, passing into the air, probably about 100 miles or so above the earth, continues until reflected down upon the receiver by a semi-conducting layer in the atmosphere. The ground wave weakens rapidly and becomes negligible about 200 miles from the broadcasting station and reception at greater distance is due entirely to the sky wave.

In conducting propagation tests with the co-operation of radio listeners in every part of the country, the engineers were seeking, among other things, the possible relation of radio reception and the condition of the weather. The weather condition is known to depend largely on the barometric pressure over various parts of the country, and radio engineers endeavored to find a relation between reception records and the barometric pressure through which the waves had passed. From present analysis of data it seems probable that barometer and weather have only a minor effect on radio conditions. The data do show that signals received at short distances are stronger when they have come along a region of even pressure than when they have come from a low pressure area to a high pressure area, or vice versa. At distances of more than 400 miles, however, the conditions on the surface of the earth seem to have little or no effect. On the basis of the split wave theory of transmission, it becomes obvious that if the sky wave goes through an arc reaching 100 miles or more above the earth, weather conditions, which are known to go up less than ten miles, can have but little effect upon it.

Reports received and tabulated by the General Electric engineers were made on all stations received by the listener and they covered practically all stations on the air on wave lengths covering the entire band reserved by the Department of Commerce for broadcasting and on powers from 50 watts to 5,000 watts.

The investigation of fading indicated that there had been a change in conditions from January to February. In the study of January reports, it was found that most of the fading reports came from a definite region between 200 and 400 miles from the transmitter. The February reports, however, indicate that equally bad fading occurred at all distances beyond 200 miles and was not confined to any particular zone. Ten per cent of the reports record bad fading, 35 per cent slight fading and 55 per cent no fading. They emphasize the fact that this is now one of the worst obstacles to perfect broadcast service and they further indicate that increasing the power of the broadcasting stations is the only remedy for fading now known.

In studying the average signal strength at various distances from a broadcasting station the engineers found, from the reports, that the signals decrease rapidly in volume for the first 300 miles. This is true of all transmitters, no matter what the power. The high power stations, while they decrease just as rapidly, give stronger signals at all distances. From 300 to 800 miles away the signals seem to remain fairly constant in strength and seem to depend largely on the radio conditions. In January signals were stronger 600 miles from a transmitter than at 300 miles. In February this was no longer true. In fact, there is considerable evidence that radio reception was everywhere poorer in February than in January. As indicated above, this change in transmission is due to some change in the upper atmosphere rather than a change in weather conditions on the earth.

### Time Controlling Switch

Ushichiro Tokumi, a Japanese inventor, announces the perfection of a time controlling switch which may be applied to turning a radio receiving set on and off at any desired time.

The device may be mounted on the panel of any receiving set and serves as a time indicator in addition to the automatic switch. Patent is pending.

## Information for the Novice on Selecting and Operating a Set

Crystal Receivers Provide Local Programs; One-Tube Outfits Give DX on Headphones, but Five-Tube Sets Required for Loud Speaker

By HUGO GERNSBACK

OF ALL the people, the radio beginner—or shall we call him novice?—is entitled to the greatest amount of sympathy; and he of all people does not get much of it. Perhaps the radio industry itself is most to blame for this condition. Too often in the past has the novice gone to a radio store, only to be sneered at and have fun made of his questions that seemed logical enough to him, but foolish to the "know-it-all" behind the counter. Even to-day, this feeling has not been eradicated entirely, and it is therefore small wonder that the beginner is not always very anxious to become initiated into the mysteries of radio.

There are two sorts of novices: The one who buys a set complete and the one who buys parts, in order to construct the set himself. For the man who buys the outfit already assembled his task is simple. If he is a novice we might say this to him:

If you have not much money to spend and wish to receive local stations only start in, by all means, with a small crystal set. The crystal set requires no batteries and uses a pair of telephone receivers. It is not possible to attach a loudspeaker to a crystal set, as the power delivered by it is very minute. For purity of sound the crystal set has no peer; however, it does not work well as a rule for greater distances than fifteen miles. The tuning of most crystal sets is not very sharp either, by that is meant if you are near a broadcast station it will be almost impossible to tune that station out in order to receive another one. Long distance stations cannot be received except under unusual conditions.

### The One-Tube Set

The next low price set to consider is a one-tube set. There are some very excellent sets of this kind on the market, some of these being able to occasionally receive stations 2,000 miles away. These sets as a rule also work with a pair of headphones. If a loud speaker is to be added you need what is called an amplifier, which means one or two more tubes and more batteries. I suggest to a novice that he make himself familiar first with the one-tube set before he attempts to work a loudspeaker.

The one-tube set, as a rule, has but few controls, that is, few knobs and dials with which to make adjustments, and for the novice the fewer adjustments there are the better. More than one dial makes tuning somewhat complicated until you get the hang of it.

If you have more money to spend and wish to get a larger outfit—one that works on a loudspeaker—there are a number to choose from. As a rule an outfit with less than three tubes does not work a loudspeaker well. To get long distance (DX) stations clearly it is best to have at least a five-tube receiver. The storekeeper will be glad to show you how to operate it. The operation of most of these sets is very simple after you have become accustomed to working it. The thing that you should not tamper with until you understand more about electricity and radio is the apparatus itself.

The batteries are of great importance. All vacuum tube sets have two kinds of batteries: First, the "A" battery, which supplies the current for lighting the filaments of the lamps or vacuum tubes. It is usually a storage battery, or when dry cell tubes are in the set, dry cells may be used.

### The Plate Battery

Next, we have the "B" battery or high tension battery. In order to memorize this better, I suggest that you associate the letter "B" with beware. The reason is that unless you are careful, the "B" battery will cost you a good deal of money. It makes a huge difference how the two batteries, the "A" and "B" types, are connected. Every radio outfit has, as a rule, two binding posts marked for "A" and "B" batteries. It is absolutely essential that the "A" battery be connected to the "A" binding posts and the "B" battery to the "B" binding posts.

"BEWARE," therefore, not to change these connections. If you do, and if you have a five-tube set, this slight mistake is apt to cost you \$10 in the twinkling of an eye, as you will burn out all your vacuum tubes, at \$2 each.

After you have used your "A" and "B" batteries for a certain length of time you will find that the sounds in the loud speaker or telephone receivers gradually become weaker,

which is an indication that either the "A" or "B" batteries are getting low. Sometimes it is only the storage battery that is discharged or the "A" dry batteries run down. This can be usually ascertained by looking at the bulbs themselves. If they emit a very dim light, the storage battery, if such is used, needs recharging; otherwise, the dry cells will have to be renewed. Dry "A" and "B" batteries cannot be recharged, notwithstanding the claims made by a lot of wisecracks. The only thing that run-down dry cells are good for is the ashcan.

If the "A" battery has been renewed and still the outfit does not work well, the "B" battery probably is run down as well. Here is a simple test to find out if the "B" battery is still good or must be discarded:

### Testing Batteries

Take an ordinary 25-watt, 110-volt lamp such as you use in your house for lighting purposes. Connect the two metallic parts of the lamp to the two extreme terminals of the "B" battery. If the lamp does not light up at all the "B" battery is dead.

This test can only be made with a 45-volt "B" battery or two 22½-volt "B" batteries, which, of course, must be connected in series in order to make the test. By series is meant attaching the plus (+) terminal of one battery to the minus (—) terminal of the other with a short piece of wire. That will leave one plus (+) and one minus (—) terminal on each of the 22½-volt "B" batteries. Connect two short wires to these terminals and with the two wires touch the two metal parts of the incandescent lamp. Unless the lamp lights, one or both batteries are dead. In connecting "A" and "B" batteries with a set it is of extreme importance that the plus (+) and minus (—) connections match up with the markings on the binding posts. Plus (+) must connect with the plus (+) and minus (—) must be connected with the minus (—) terminal.

### The Aerial

I now come to the aerial—one of the most important parts of your outfit. For best results, the total length of your aerial should be less than 100 feet. It must be insulated from all points on the building with good insulators. By 100 feet I mean the total length of the wire from your outfit up to the other end of the roof. The bare wire should never come in contact with the building, with the window molding, etc. Where the aerial wire leads to the outfit it must positively be insulated. As a matter of fact the entire aerial can be insulated, contrary to popular opinion. The radio waves pass easily through all insulation, so it makes no difference whether the wire is insulated or not, but the wire must be insulated wherever it touches stone, coping, woodwork, walls, etc. The best aerial is an uninterrupted piece of wire. If you must use more than one piece, do not attempt to just twist the wire ends together or you will have trouble. If you cannot solder the pieces together yourself, have some one do it for you.

### The Ground Connection

The ground is all important. By ground is meant a connection direct to Mother Earth. Any continuous wire or metallic object that makes a permanent and good union with the earth is called a ground. As such we have water pipes, gas pipes and radiator pipes.

The safest bet is always a cold-water pipe. But again here is where the little thing is important. Do not attempt to just wrap the ground wire—which connects to the ground binding post of your set—around the water pipe. This will spell failure. Get a 10 or 15 cent ground clamp from your radio store and attach it to the cold-water pipe. The important part is that the pipe must be scraped metallically clean where the ground clamp is attached.

## Proofs Available of Existence of Ionized Atmosphere Layer

According to papers presented by the British National Committee for Radio-Telegraphy at the recent international radio-telegraphy meeting at Washington, direct proofs are available of the existence of an ionized layer in the upper atmosphere.

"The results provide direct experimental proof," says the British National Committee, "in that interference phenomena have been shown to exist both by day and by night, while for the night-time phenomena it has been proved that the interfering rays come down from the upper atmosphere and do not travel in a horizontal plane."

"The differences observed between day and night phenomena are adequately explained by a theory of diurnal variation, itself based on Larmor's theory, according to which the under-boundary of the deviating layer is higher at night than during the day. In connection with the electrical processes by means of which rays are deflected by the layer, mention may be made of the extension of the ionic refraction theories of Eccles and Larmor made by Appleton and by Appleton and Barnett in which the effect of the earth's magnetic field on the phase-velocity of wireless waves is taken into account. It is shown that if the negative carriers in the atmosphere are electrons, as seems most probable, the formulae for the phase-velocity given by Eccles and Larmor require considerable modification, the terms arising from the recognition of the magnetic field being of importance except in the case of ultra-short waves. It is found that the atmosphere acts to wireless frequencies as a quartz crystal does to optical frequencies, in that there is a rotation of the plane of polarization for transmission along the magnetic field and double refraction for transmission at right angles.

"In the general case it is found that the ray deviated by the upper atmosphere should be of elliptical polarization, so that we have here a possible theoretical basis for the explanation of direct-finding errors originally advanced by Eckersley and Bellini. It may be mentioned that the investigations of Smith-Rose have shown that directional errors are obtained with a vertical transmitting antenna so that the atmosphere must be responsible for the production of abnormal polarization of the waves. Further experiments made by Smith-Rose and Barfield on the Adcock system of direction-finding show that lateral deviation of the waves, such as would be produced by a tilted ionized layer, does not exist, so that we must regard the influence of the earth's magnetic field on the properties of the layer as largely responsible for the complex polarization."

"A more detailed investigation of the magneto-ionic theory shows that such complex polarization is produced only when the time between two collisions of an electron and gas molecules is long so that directional errors should be most pronounced at night when the layer is high and in a region of low pressure."

"Among the selections which will be heard during this radio program will be 'When Twilight Weaves a Golden Dream' by Beethoven, 'I Sing Because I Love to Sing' by Pissotti, 'The Summer Winds' by Bishop, Trio with solo by Miss Gardner, 'In the Time of Roses' by Reichardt, 'To a Wild Rose' by MacDowell, with violin obligato by Mrs. Julia Larsen, and 'The Night Bells' by Vincent. The twenty young ladies who compose the Glee Club represent seven different states.

"Les. Pecheurs des Perles" by WEAF Grand Opera Co. The grand opera "Les Pecheurs des Perles" (The Pearl Fishers) will be broadcast by the WEAF Grand Opera Company in tabloid form to-morrow evening, beginning at 10 o'clock Eastern daylight saving time. Both the vocal and instrumental portions of this grand opera will be under the direction of Cesare Soderro and broadcasting will be done through WEAF, WCAE, WJAR, WCAP, WTAG, WTIC and KSD.

## Here's Proof!

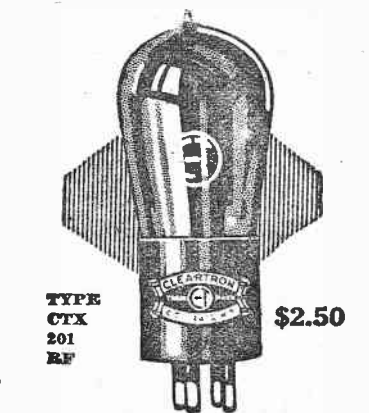
"WHEN Cleartron Type CTX 201 RF Tubes were inserted in the R. F. amplification stages of a neutrodyne, there was an immediate improvement in reception."

"Weak signals were louder, and we were actually able to bring out intelligibly stations which could not be received with the ordinary tubes."

Extract from a letter from R. F. Gowan

Former head of De Forest Radio Laboratories. Originator of the Honeycomb Coil. Now Chief Engineer Hudson Radio Laboratories.

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27.50 PARAGON 2-Tube.....6.99  
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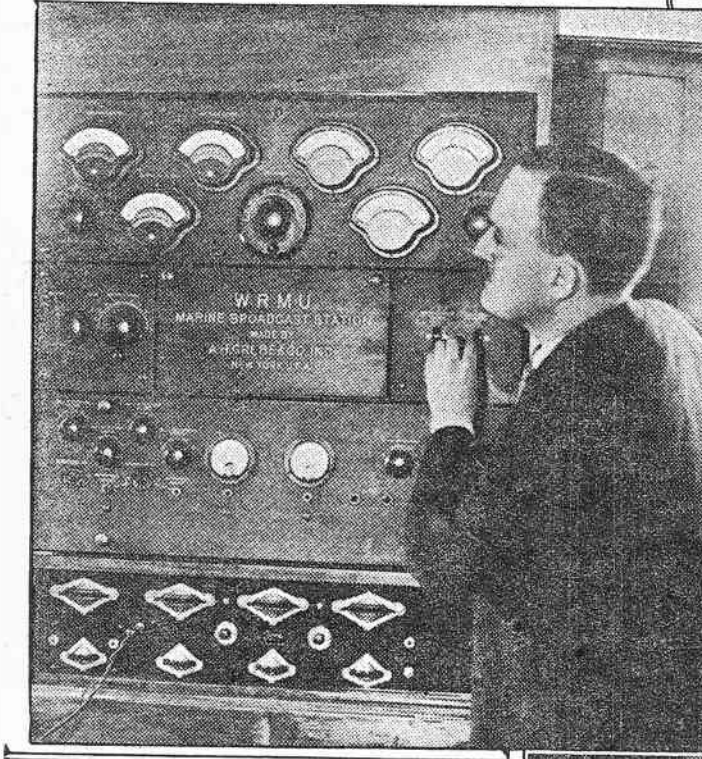
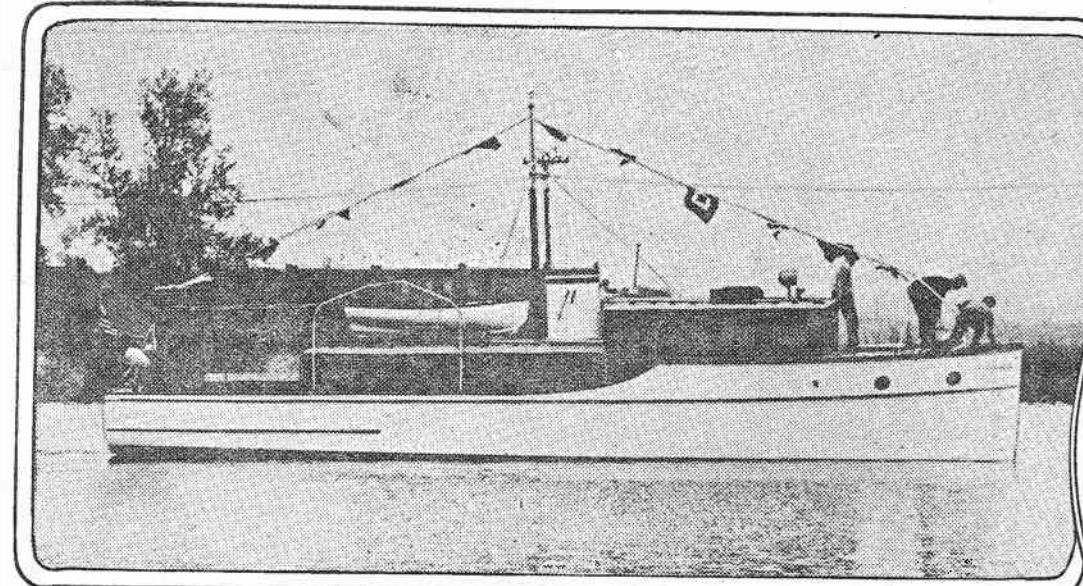
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**Herald Tribune**  
**Radio Magazine**

World Radio History

# Marine Broadcasting Station to Serve the Aquatic Sport-Loving Radio Listener

The New MU-1 Is Fully Equipped With Modern Transmitting and Receiving Apparatus

By FREDERICK B. OSTMAN

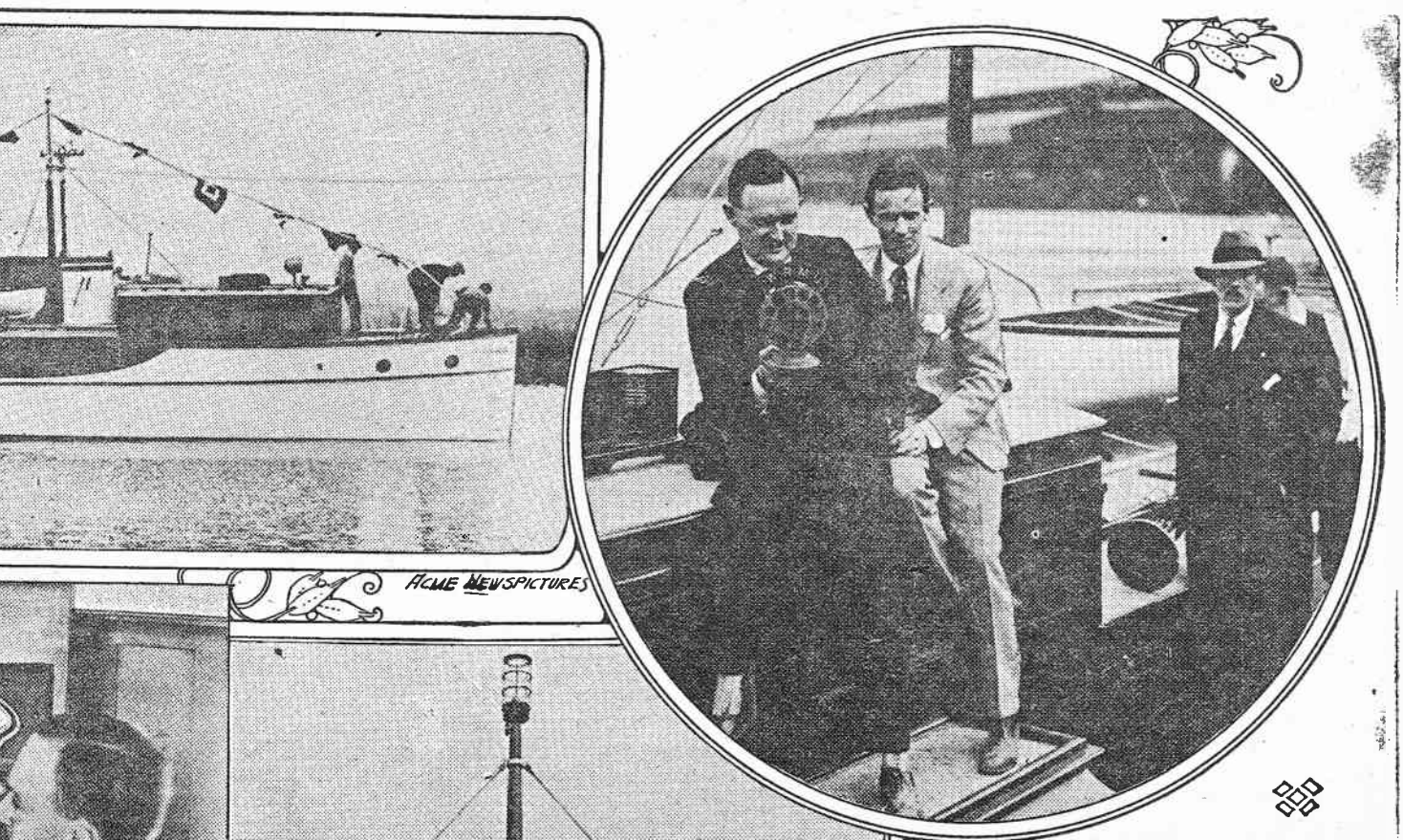


Douglas Rigney tuning the marine broadcast transmitter described in this article. Above—The cruiser MU-1 immediately after it was launched.

WITH the launching of the new de-luxe cabin cruiser MU-1 early this month at the Jackson & Sharp yard of the American Car and Foundry Company, Wilmington, Del., an innovation in radio broadcasting was created.

Ruth Rigney, four-year-old daughter of Douglas Rigney, treasurer of A. H. Grebe & Co., smashed a bottle of champagne on the bow, christening the vessel the MU-1. Instantly following the boat slid down the ways proudly into the waters of the Delaware.

Many radio fans will be interested to know that in this cabin cruiser is contained the completely equipped marine broadcast station WRMU, designed to operate on 63 meters for relay work and on 236 for direct broadcasting. The boat and transmitter have been principally designed to broadcast aquatic sporting



Broadcasting from the deck of the new MU-1

MU-1, with station WRMU, built for greater efficiency and range, will be ready to serve the aquatic sport-loving broadcast listeners.

The marine broadcasting station WRMU was the first and is the only broadcast transmitter of this type in the country at the present time. It has done much to delight the sport world by covering events which heretofore it has been impossible to broadcast.

The broadcasting apparatus for this work has been carefully designed, incorporating features not found in the equipment on last year's yacht and from the experience obtained it has made possible the construction of equipment many times more efficient and powerful. Rugged features so necessary for marine installation, plus refinements for high quality broadcast transmission, have been incorporated. The transmitter has been designed with greater power output than that which ordinarily will be used, insuring reliable transmission over good distances under extremely adverse conditions.

Power and control panel installation was designed and installed by Claude Vermilye, engineer of the Metropolitan Electric Manufacturing Company of Long Island City. The power and control panels contain meters which show the battery voltage and current consumption at all times. Switches control all circuits, Delco charging plant, etc. A special knife switch for emergency use has been provided to permit the operation of the transmitter direct from the charger should the battery circuit become damaged at any time.

(Continued on page eleven)

A close-up view of the antenna used on the cruiser MU-1

events as did the original marine broadcaster last year, also called the MU-1. Many race events for the radio public were covered, including the gold cup regatta, held under the auspices of the Columbia Yacht Club of New York. The gold cup races will be repeated this year. Other events on the schedule of the MU-1 include the New York-Bear Moun-

tain race on the Hudson River; the New York-Block Island race; the race from Larchmont Yacht Club to Gloucester, Mass.; the triangular event from Sheephead Bay Yacht Club-Jones Inlet-Scotland Light Ship, and various events near Philadelphia in conjunction with the sesquicentennial celebration.

To cover these feature events, the new

## An A. C. Plate Supply Unit Designed for a Full-Wave Thermionic Rectifier

(Continued from page two)

manner and its purpose is to reduce the high voltage to the proper value for the detector tube. Condenser C7 (one microfarad) is connected across the positive detector binding post and the negative lead.

The resistance R3 may be either fixed or variable. The writer happened to choose one of the variable type. However, a fixed resistance having a value between 7,500 and 10,000 ohms will answer the purpose equally as well. This resistance is connected directly across the detector output, as indicated in the wiring diagram.

The builder may mount the resistances in any manner he chooses. After they have been once adjusted so that best results are being obtained there is no further cause for disturbing them. For this reason there is no cause to fit them up with an elaborate mounting. The writer chose to mount him on a small panel two

inches wide and eight inches long, supported by two pieces of wood sufficiently high enough to prevent the resistances from touching the baseboard.

Four binding posts are necessary—one for the negative connection, one for the detector positive, one for the radio-frequency tubes and one for the audio tubes. These were mounted on a small strip of composition and placed near the resistances.

The completed eliminator will supply 140 volts at 65 milliamperes, which is ample for any receiver on the market at the present time. When it is considered that the average five-tube radio frequency receiver does not consume more than 30 to 35 milliamperes on the plates of all the tubes, there is plenty of available power.

The high voltage feature of the elimina-

tor makes it highly desirable. Makers of commercial radio receivers during the past year or more have been prescribing the use of at least 130 volts on the plates of audio-amplifier tubes. Most manufacturers of transformers have changed the design of their products to stand up under the increased voltage. Resistance coupled audio amplifiers also require a high plate voltage due to the resistance connected in series with the plate supply.

When the B battery eliminator is used in actual practice it should not be placed nearer than three feet from the receiving set. It is also desirable to place it considerable distance from the antenna lead-in wire. These points tend to reduce any possible hum which might be induced into the receiving circuit.

It is possible to further reduce any of

the AC hum by grounding all metal boxes or containers of the component parts. A still better plan is to have a copper case made by a tinsmith to fit over the entire unit. The case should be grounded and a hole drilled over the rectifying tube to allow the air to circulate, thus preventing the tube from overheating.

As a matter of precaution it is a good plan to place the eliminator out of reach of any children. The high voltage output, while not extremely dangerous, is capable of giving a severe shock or burn.

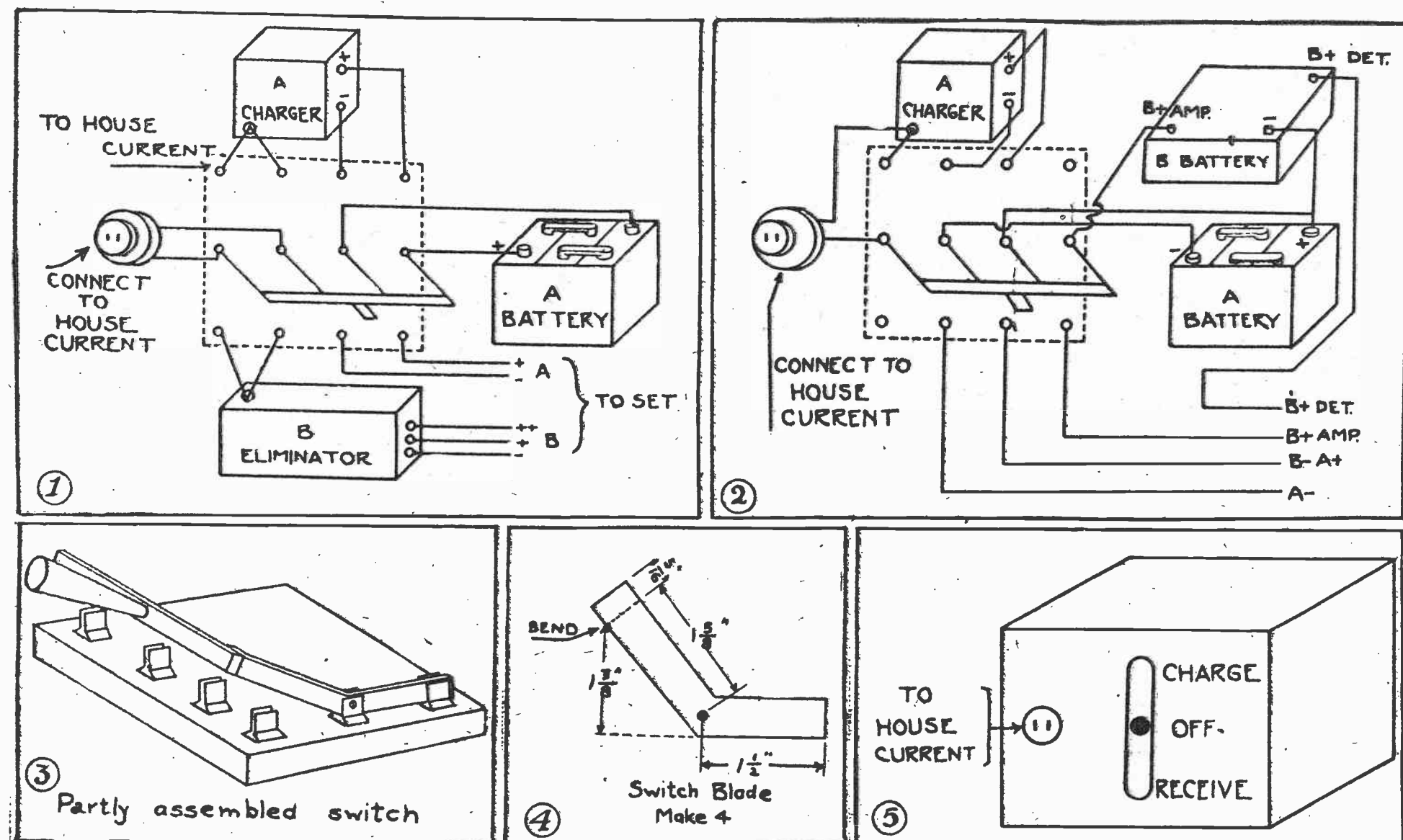
This B battery eliminator has been in actual operation at the writer's home for the last few weeks, supplying the plate current to a five-tube receiver, and it is impossible to detect any alternating current hum in the loud speaker. This is proof of the fact the B battery eliminators may be made to operate the heavy current-consuming radio receiver.



# How to Construct a Switch for Controlling A Battery and Charger Circuits

May Also Be Used To Control Set; Standard Switch Parts Used

By R. C. HITCHCOCK



OF THE many people who have their own A battery chargers it is surprising to find how few have any convenient method for quickly and easily connecting their storage batteries to their chargers. The most usual method seems to be: (1) Disconnect battery from set; (2) connect charger to battery, and (3) plug in charger to house current. Some chargers can be left connected to the storage battery all the time, but this cannot be done in some chargers, as the charger is grounded—and as the A battery is also grounded through the set, a short circuit of the house current is likely to occur. A simpler system of connections using a single master switch with several blades is here presented.

Two switches are shown to fit the two most-likely requirements. Figure 1 is for

the radio installation, which comprises a B battery eliminator, storage A battery and charger. Figure 2 is for the radio set having storage A battery and dry cell B battery. In the diagrams the switches are included in dotted lines. Considering Figure 1 first—throwing the switch down connects the house current to the eliminator and connects the storage battery to set—this is the "receive" position. Lifting the switch up disconnects both the eliminator and storage battery with one motion—the eliminator is sure to be cut off except when the set is being used—this is the "off" position. Throwing the switch to the top of the figure connects the house current to the charger and also connects the storage battery to the charger, this is the "charge" position.

In Figure 2 a similar switch with dif-

ferent connections is shown—it provides for connections for A and B batteries and for A battery charger. It will be seen that the B negative and A positive are left permanently connected, as they are in most sets. Throwing the switch to the upper position in Figure 2 places the A battery on charge; throwing it down connects A and B batteries to set. (The B plus detector wire is left permanently connected to the set.)

The switch might consist of two regular double pole double-throw knife switches fastened to a hard rubber bar equipped with a new handle. However, as an improvement on the usual 180 degree throw switch a quick throw switch is used. By using a "bent" switch lever the total throw need be only a little greater than 45 degrees and the switch can be put into

a cabinet, with the handle projecting for operation (see Figure 5). The dimensions for an ordinary battery knife switch lever are given in Figure 4. In making this lever note the dotted line in Figure 4 where the lever is bent so that it may be bolted to the common bar. The regularly supplied switch levers are removed by filing off their rivets. Four new switch blades are made of sheet brass or copper, according to Figure 4, or to suit the switch used, and are fastened in the center posts, using small machine screws and lock nuts, or single nuts soldered to prevent their working loose. If the switch is to be mounted in a cabinet, as suggested in Figure 5, a small plug inlet for the house current may be put on the outside, and the positions of the projecting switch handle lettered as shown.

## The Vacuum Tube's Contribution to the Quality of Reproduced Music

By Dr. Alfred N. Goldsmith  
Chief Broadcast Engineer Radio Corporation of America

THE quality of reproduction of music in the home depends, as has been pointed out in earlier articles of this series, on many elements at the transmitting and receiving stations. The contributions to musical quality from the transmitting and receiving set have already been considered, and it has been pointed out how important it is that each of these, and particularly the receiving set, shall be acoustically synchronized. Acoustic synchronizing, or the accurate re-creation in the home of the sound waves produced in the studio, is the determining factor in the enjoyment of radio programs. Few people realize the very important part played by vacuum tubes in the receiving set as regards quality of musical reproduction and the real necessity for exercising discretion in the choice of the vacuum tubes used and for maintaining them and their batteries in good operating condition.

From the standpoint of securing real musical results in the home, tubes must meet a number of difficult specifications. While high-grade tubes do, as a matter of fact, meet such specifications, it is by no means uncommon to see the entire circle of broadcast transmission and reception broken and tone quality ruined by the use of unsuitable or unreliable vacuum tubes. Considering, first, some of the electrical

constants of the tubes and without going into the technical details of the matter, vacuum tubes have a certain characteristic which is known as the amplification factor. If the amplification of the tubes used in the receiver is too small, weak and unnatural sounding signals will result. If, on the other hand, the amplification is too great in its relation to the design of the receiving set, the receiver may "oscillate" or produce squealing or howling notes which cannot be conveniently eliminated or controlled.

Another important constant is what is known as the "internal impedance" of the tube. Roughly speaking, this is a measure of the opposition of the tube to the flow of plate current through it. It is the factor which limits the current drawn from the B battery. If the internal impedance is too small there will be an excessive drain on the plate batteries without corresponding advantage and plate battery renewals will be uncomfortably frequent. On the other hand, if the internal impedance is too high, weak signals of unsatisfactory character will be produced and tone quality on the average loud speaker will be distinctly unsatisfactory. Accordingly, internal impedance of vacuum tubes must also be held within carefully considered limits.

Inside of modern vacuum tubes are close together, and they, in conjunction with the wires leading from them to the

contact pins in the base of the tube, constitute what are known as electrical capacities. In other words, there are miniature condensers formed by the filament, grid and plate, the capacities of such condensers residing inside of the tube. It is a fact that in many highly efficient circuits these internal tube capacities definitely influence the electrical behavior of the set. Receivers which are "neutralized" or "balanced" against tendency toward oscillation (howling) are necessarily so balanced for a particular tube. If the internal capacity of tubes varies too far receivers which would otherwise properly function will begin to produce uncontrollable noises, generally of a buzzing or whistling nature, whereupon the musical enjoyment of the audience is destroyed. Consequently, a watch has to be kept by the test laboratories of the tube manufacturer on the internal capacity of high quality vacuum tubes.

Inside of the vacuum tube is a glowing element called the filament. It is a sort of reservoir from which streams a current of electricity in the form of a myriad of tiny electrical charges called electrons. These pass from the filament to the plate inside of the tube and their flow is definitely controlled by the grid element between the filament and the plate, which acts as a sort of electric valve, turning on and off the flow of current through the tube and presumably in accordance with

the shape of the sound originally produced in the broadcast studio. This, in general terms, is the process whereby the original signal is reproduced in the home. It is clear that an essential portion of this process is the emission of a sufficiently copious stream of electrons from the filament. If the stream is reduced to a mere trickle the signals will become weak and distorted. In this case, even for a low volume of sound in the home, there will be rattles and distortions in tone quality. Only by careful choice of filament material and a thoroughly correct process of manufacture and testing has it been found possible to produce filaments which not only have a sufficient electron emission when new, but which maintain their efficiency during a long, useful life. It may be added that it is particularly difficult to produce such satisfactory filaments when great economy in the amount of power required to heat the filament is imperative, as, for example, in the case of dry battery tubes. Filament design is accordingly a real factor in tube performance and the production of musical quality.

Vacuum tubes used as amplifiers require a high vacuum. Unusual and apparently extravagant precautions must be taken to extract gases from the bulb and even from the metallic elements inside the tube and the very glass itself. The pres-

(Continued on next page)

## Some of the Educational and Utilitarian Uses of Broadcasting

If Commercial Stations Are To Be Devoted Primarily to Advertising, They Must Carry a Certain Amount of Entertainment Features

By C. W. Warburton,  
Director of Extension Work, U. S. Department of Agriculture

THIS is Station KSAC, the College of the Air, Kansas State Agricultural College at Manhattan. This is the announcement for which hundreds of folks all over the central United States are listening at 7:30 o'clock each evening from Monday to Friday, when the Kansas State College broadcasts its regular course of educational lectures. Similarly, other educational institutions are extending their fields beyond the college campus. The Kansas college, however, was one of the first to recognize the educational value of radio and to make systematic use of it.

From the beginning of the school year in September until late in the following spring, a regular schedule of lectures is broadcast to hundreds of listeners who are registered for these courses. In addition to those who are registered, correspondence received at the college indicates that several times as many listen in more or less regularly on the educational talks. The lectures cover a wide variety of topics, such as crop and livestock production, dairying, poultry raising, foods and nutrition, household economics, English, chemistry, botany, zoology and the several major engineering fields.

These radio lectures constitute a sort of glorified correspondence course, in that those who are taking the course have the opportunity to hear the voice and thus have, in a measure, the personal contact with the teacher which heretofore has been limited to the classroom. After each lecture is given, mimeographed copies, with such additional tabular and illustrative matter as may be desirable, are mailed to the registered listeners. In. At the end of the course an examination is given and those who show evidences of proficiency are given a certificate. In some institutions definite credit toward a college degree is given for satisfactory completion of radio courses.

1,771 Persons Registered. Registration for the radio courses given by the Kansas State Agricultural College during the college year 1925-26 includes 1,771 individuals registered for a total of 11,431 courses. While the major portion of these individuals reside in Kansas or nearby states, the far-flung possibilities of radio are demonstrated by the fact that there were registrants from more than thirty states, from several of the provinces of Canada, and from Mexico. The growing popularity of the courses is indicated by the fact that the total registration was nearly double that of the previous year, while the average number of courses for which each individual registered increased from 2.5 to 6.8. I have gone thus fully into the radio courses presented by the Kansas State Agricultural College, because this institution was one of the pioneers in the field and its faculty is exceedingly enthusiastic about its possibilities. Kansas State University, the State University of Iowa, Iowa State College, Ohio State University, Michigan Agricultural College and Oregon Agricultural College are other institutions which are giving

programs in farm areas. Many of the commercial broadcasting stations which are devoted primarily to entertainment features introduce occasionally, and in some cases regularly, educational broadcasts. This is particularly true of stations which serve the more important agricultural areas. They have

found it advantageous to introduce in their programs, in addition to weather and market reports, talks on a wide variety of agricultural subjects. These are contributed by members of the staffs of agricultural colleges or by the farm press and by successful farmers and rural leaders. A feature of many broadcast programs, particularly during the morning hours, is a talk to housewives.

A striking example of the educational use of the radio is the fifteen-minute popular talks on scientific subjects which are arranged by Science Service, an adjunct of the National Research Council, for broadcasting by one of the radio stations at Washington. These talks are prepared by eminent scientists and constitute a definite effort to present scientific facts to the public in an interesting and entertaining way.

To be most effective radio lectures should be combined with mimeographed or printed copies of the text, which are mailed to the listeners, together with such additional tabular and illustrative material as may be desirable. Some institutions broadcasting radio courses mail copies of the lectures to those who are regularly registered for them, just as soon as each lecture is completed. Others send summaries of the lectures at the end of the course, together with answers to questions which have come in from listeners. It is manifestly impossible, however, to register or to send the printed text to the great majority of those who hear the lectures. It is equally impossible to measure the benefits which will result in a more broadly educated people and one which is better satisfied with its home life, whether in the city or in the country.

No Limitations. While the agricultural colleges are finding the radio of particular value in reaching rural people its advantages in an educational way are not by any means limited to this class of institutions or to farm homes. The program manager of the broadcasting station of one of the state universities tells me that his station broadcasts courses in education, appreciation of literature, history, sociology, journalism, political science, botany and zoology. He sees great possibilities for broadcasting in other fields, such as appreciation of music, popular astronomy, economics and government. Incidentally one of the most popular features of the program from this station is a Sunday evening half hour of popular hymns.

What is the future of educational broadcasting? This educational use of the radio is so new that, like other uses, no man can say what form it will take a year or five years from now. Just as newspapers and magazines appeal to different groups of people according to the character of reading matter they print, so each radio station is likely, it seems to me, to build up a following according to the program it presents.

Like the magazines, most stations will have to depend largely on advertising for their support, though this advertising may be so carefully and completely sugar-coated as not to be recognized as such by the casual listener. On the air, to an even greater extent than on the printed page, it is difficult to segregate advertising from other matter.

If certain commercial stations of the future are to be devoted primarily to advertising, they must carry a certain proportion of educational and entertainment features to maintain their following. Educational features in such programs, however, are likely to be more or less casual and incidental. The expense of providing these features and the competition with advertising and entertainment are likely to cause them to remain a comparatively minor factor.

On the other hand, radio broadcasting has greatly widened the field of the colleges and universities. They have ready at hand a large number of experts who can provide educational programs at comparatively little added expense. Those who have had most experience in broadcasting educational material are most emphatic in their statements that the radio constitutes the greatest medium yet devised for reaching the public. As was recently stated to me by one who has had much to do with broadcasting from one of these colleges, "Any information which is of value to any group of people, wherever located, can be given to them by radio at very slight cost." The radio is the only agency which can go into every home over a wide area and seek those who are specially interested in the message it carries. Here, perhaps, is a partial solution to the problem of overcrowded class-rooms in our colleges and universities.

## Women Should Receive Credit For Changes in Radio Design

Man May Take All the Honors for the Development of Our Present Sets, but His Wife Knows Where Responsibility Rests

By J. K. Smith,  
Stewart Warner Corporation

THE relationship of women to the popularity of radio broadcasting is something concerning which no data is yet available. Much has been written about this interesting and important subject, but nothing so far deduced from the meager information at hand is all too purely.

As in most purely technical developments in the United States, woman was given little thought in the early days of radio. Her wishes, which might have been consulted in the purchase of a phonograph or the renting of a house were entirely ignored when husbands only recently emancipated from the saloon began to fall victim to the strange bazaars that called themselves radio stores.

Many a woman who for years had lived in queenly serenity as director of her own household, forcing John to take off his wet rubbers in the outer hall and correcting him when he so far forgot himself as to spill cigarette ashes on the rug, suddenly found her living room invaded by leaky storage batteries and unbecomingly full bird houses stuffed with wire. That she failed to revolt against this sudden and unadvised usurpation of her rights might have given a hint to the psychologists, but apparently it did not. Her acquiescence was taken for granted. It was something unexplainable, perhaps—as unusual an occurrence as a solar eclipse—but after all no more puzzling than the vital economies of a B battery. Radio was peculiarly a man's affair, and her part in its popularization was to sit perfectly still and speak only in whispers while John tried to hear static through the earphones.

Which brings us to the prospects for the future. It is plain that so long as two such widely differing theorists must in the nature of things live in the same household, the simplified radio set of the future will be a compromise. With the ether congested as it is in the metropolitan districts of the country it is plain that the elimination of dials can never be brought to the point where individual tuning of critical circuits is abolished. But it is likewise plain that multiple verniers, rheostats and other heretages from the early Egyptian period of radio will have to go.

Women Not Fooled. Women are not to be fooled by any elimination of controls which consists merely in the substitution of a knob for a dial. Nor are they to be lured by single dial controls augmented by eight or ten vernier adjustments. The "clean panel" movement for this year seems likely to produce an arrangement already found effective by a number of manufacturers—three principal dials, an oscillation control and a single rheostat for all tubes.

The modern set is highly sensitive and does its work with laboratory precision. It is housed in cabinet work that insures it a place in the living room. And it is easily tuned. Man may take all the credit for the development. It is like him to feel his importance. But the wife who sits across from him at the library table darning socks or reading a motion picture review while a jazz orchestra 500 miles away renders an appropriate anthem, knows where the responsibility rests. Without her radio might still be classified with the jig saw puzzles that sired it. And if she is not yet satisfied, then radio is due for a considerable change.

Reveries of Silence. It was inconceivable, however, that woman would sit long in dumb complacency while this new arrival was being put through its paces. During the day, while John was down town working for money to squander on the new Whoois Variometer that would make his set so much more sensitive and selective, she discovered that she could listen in on cooking school talks and noon-day concerts. She began to resent the hours of silence in her household every evening, not only because John was present but not vinting, but also because of the entertainment from which she was barred.

So she spoke her mind and the loudspeaker took its place alongside the storage battery as an important item in the great American scheme of housefurnishing. She has been speaking her mind ever since, for, unfortunately, when John took the earmuffs off his ears, he was no longer isolated from conversation and he was forced to hear the complaints that a few months ago he might have ignored with good grace.

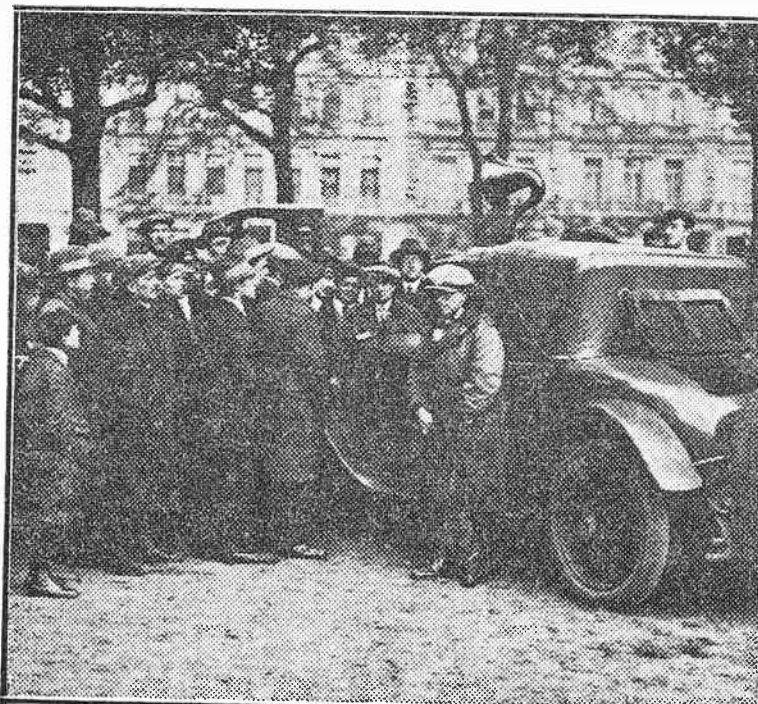
The reason for the popularity of five-tube sets has been widely debated, but in the debate one important cause seems to have been entirely overlooked. The panel simplicity of such sets was undoubtedly an important factor. But still it cannot be credited with the entire responsibility for the five-tube movement.

When radio was younger a one-tube set was made to respond to two broadcast wave lengths, and it was attuned to one or the other with a multiplicity of knobs and dials. The patient made did not argue about the complication. It seemed to him that the more closely his set resembled a powerhouse the better it ought to function.

Parts Eliminated. It was woman who demanded the elimination of switchpoints, levers, excess binding posts, vernier knobs and the like. In her basic psychology every man thinks he is a born mechanic. On the other hand, every woman knows she isn't. Woman felt something of a panic in looking at the funny controls on John's set. It seemed to her a mystery that never would be solved or worth the solving. Some day, she knew, radio sets would be made with no more controls than a gas stove, at which time she could begin to look upon radio as her own. And so it has come about. There has been much talk in technical magazines of recent date concerning twin control of sets—and even of single dial control—although engineers admit that such devices must in their very nature be less efficient than sets where radio-frequency circuits are individually tuned. Man, who is by nature a "DX-hound," is a stay-at-home gypsy, is more interested in efficiency than simplicity. Woman with her recollection of the

Terms Have Different Meanings. Although the two terms are used freely as synonyms, "aerial" and "antenna" do not mean the same thing. The "aerial" is really only the exposed wire, while the "antenna" is the whole pick-up system, including aerial, lead-in and ground or counterpoise.

## British Use Radio to Receive News



During the general strike in Great Britain the government broadcast news at regular intervals through the stations of the British Broadcasting Company. This picture shows a wireless-equipped motor car giving out news to the volunteer food transporters in Hyde Park.







12 noon—WAGH program.  
1:30 p. m.—Hill, Bellevue.  
7:45 p. m.—Harold Manning, soloist.  
8:00 p. m.—William Sweeney, baritone.  
8:15 p. m.—Tom Fleming, violinist.  
8:30 p. m.—Louis Caton, tenor.  
8:45 p. m.—Richard Delunzio, violinist.  
9:00 p. m.—Well-Fashioned Quartet; Albert  
10:00 p. m.—Cliff Ulrich, Ray Sinnott.  
10:15 p. m.—Rehearsal.  
1230K—WGAC—FREEPORT—244m  
8:00 p. m.—Sidney Faulhaber, violinist.  
8:15 p. m.—John F. Flannery, Jr., soprano.  
8:30 p. m.—Mary McMahon, pianist.  
8:45 p. m.—John F. Flannery, Jr., soprano.  
9:00 p. m.—Hartney Jr. Duo.  
9:15 p. m.—Revelers.  
9:30 p. m.—James J. Cornell recital.  
10:00 p. m.—Jolly Frolics Dance Orchestra.  
10:15 p. m.—"The Merry Song of the Sea."  
1230K—WJNY—NEW YORK—210m  
7:00 p. m.—Kneibitzer, organ.  
7:15 p. m.—Leroy Montesanto, tenor.  
7:30 p. m.—Harold Miller, organ.  
7:45 p. m.—Berliner's Imperial.  
8:00 p. m.—"The Rover Reciter."  
8:15 p. m.—"The Rover Reciter."  
8:30 p. m.—Lillian Flosbach.  
8:45 p. m.—"The Rover Reciter."  
9:00 p. m.—Frank Gallias, aka artist.  
9:15 p. m.—"The Rover Reciter."  
9:30 p. m.—L. K. Kirsh, solo.  
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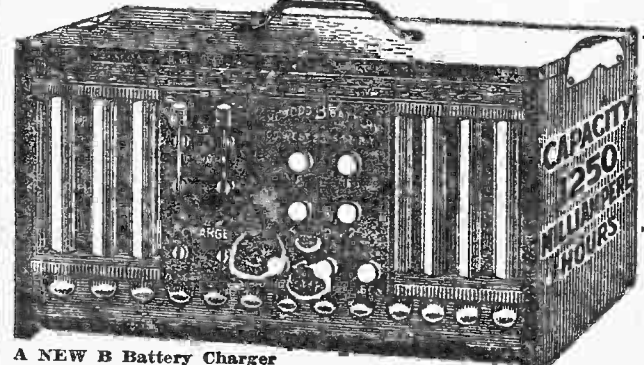
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No soldering—no technical knowledge—no workshop needed

Only two tools needed, a screwdriver and a pair of pliers, AND THEY ARE FURNISHED WITH KIT

Acme's famous 4-tube Reflex Set in a kit. Even the loop is furnished. Everything is there except tubes, batteries and loud speaker.

A wonderful set for home or camp.

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**\$65.00**

No antenna, no ground, only one knob to operate.



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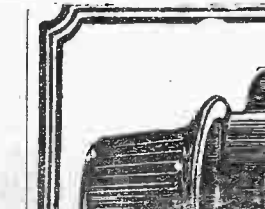
NOT until you listen to an amplifier built around MODERN Transformers can you experience that joy that radio brings when it is properly reproduced.

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BEST AT ANY PRICE

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**RHEOSTATS**  
To Save Your Tubes

### AIR-KING



DISTANCE and selectivity are a sure thing when you build your set around AIR-KING!

The AIR-KING is a three circuit tuner—the most efficient type of tuner made. It is 180° non-radiating, wound with Litz wire on genuine Bakelite forms. Only six wires to connect and NO switch points.

**YOUR DEALER HAS FREE HOOK-UPS**

### LEGO WONDER

REFLEX & CRYSTAL SETS

Something entirely new.

100% SENSITIVE

10 IMPORTANT FEATURES READ THEM CAREFULLY

- 1.—No parts to replace or wear out.
- 2.—The use of a NEW MATERIAL that effectively eliminates distorted and interrupted reception and substitutes clarity and increased volume.
- 3.—Absolutely 100% sensitive. No searching for sensitive spot.
- 4.—Glass encased. It is immune from sun and dust.
- 5.—Specially designed to withstand high voltage or reflex circuits.
- 6.—Specially constructed throughout, it is practically everlasting.
- 7.—It is ALWAYS READY—no adjustments of ANY kind needed.
- 8.—As good looking as it is efficient. High nickel-plated throughout, and attractively designed. It enhances the appearance of any set.
- 9.—Constructed so that it is thoroughly VIBRATION-PROOF.
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For Sale by All Dealers 90c. or Sent Postpaid Insured \$1.00.  
Lego Corp., 225 W. 77th St., N. Y. C.

### Cyclone FAMOUS



**WORLD'S BEST**

"A," "B" and "C" BATTERIES specially built for your Radio Set in all types. Highest Quality. GUARANTEED FOR DISTANCE, CLEARNESS and LONG LIFE.

Insist on Cyclone

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### Exide RADIO BATTERIES



**"A" Battery**

**The Long-Life Battery**

### AMBASSADOR COIL

THE MOST WONDERFUL COIL IN RADIO'S HISTORY Coast to Coast Reception With an Ambassador Coil The Coil That Makes the Perfect Set


**EASILY BUILT**

This Coil in any hook-up always lends itself to a very simple arrangement of parts which makes the set extremely easy to build. Rugedness is a characteristic which is always present and even though the set shown here, as built by an amateur, contains the parts of only well known manufacturers, its first cost is low. Besides, the upkeep, which depends on the number of tubes, is small, for three tubes are all that you require.

**SELECTIVITY**

The sharpness of tuning of this Coil is without equal. The tuning of the stations WGI, WHN, WJAX, as shown in the picture was done by Mr. Herbert N. French, 21 Central Ave., Flushing, N. Y. In a recent test in Philadelphia before three radio experts, it was conclusively proven that a set with this Coil could separate without interference stations broadcasting at the same time only three meters apart.

## WITHERBEE RADIO 'A' BATTERIES



**Built Right Since 1903**

Witherbee Radio A Batteries have every one of the requisite characteristics that a successful battery must have. Built—not assembled—complete in a factory specializing since 1903 in the production of a quality product.

**Guaranteed in writing for two years against defects in either material or workmanship.**

## DICTOGRAND

PHONOGRAPH UNIT  
LOUD SPEAKER

INSTRUMENTS THAT MADE A RECORD

1. Operates without extra batteries.
2. Adjustable dial controls volume.
3. Handsomely compact in construction.
4. Finished in a rich ebony, set off by a gleaming silvered rim on the bell.
5. Fully guaranteed.

**\$24.50**

PHONOGRAPH ATTACHMENTS  
SOLD ON APPROVAL  
**\$10.00**

## "B" BATTERIES

EVEREADY 22U Small, 89c  
EVEREADY 22U Large, \$1.45  
EVEREADY 45U Large, \$2.95

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U V 200				301A
201A				299

**DON'T WAIT** till prices go sky high in September. Now is the time to buy. This genuine De Forest for \$89 is a remarkable value.

### The Famous Genuine DE FOREST

D-10 Portable 4-Tube Reflex Set **\$89**

Absolutely Complete

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# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

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SECTION NINE

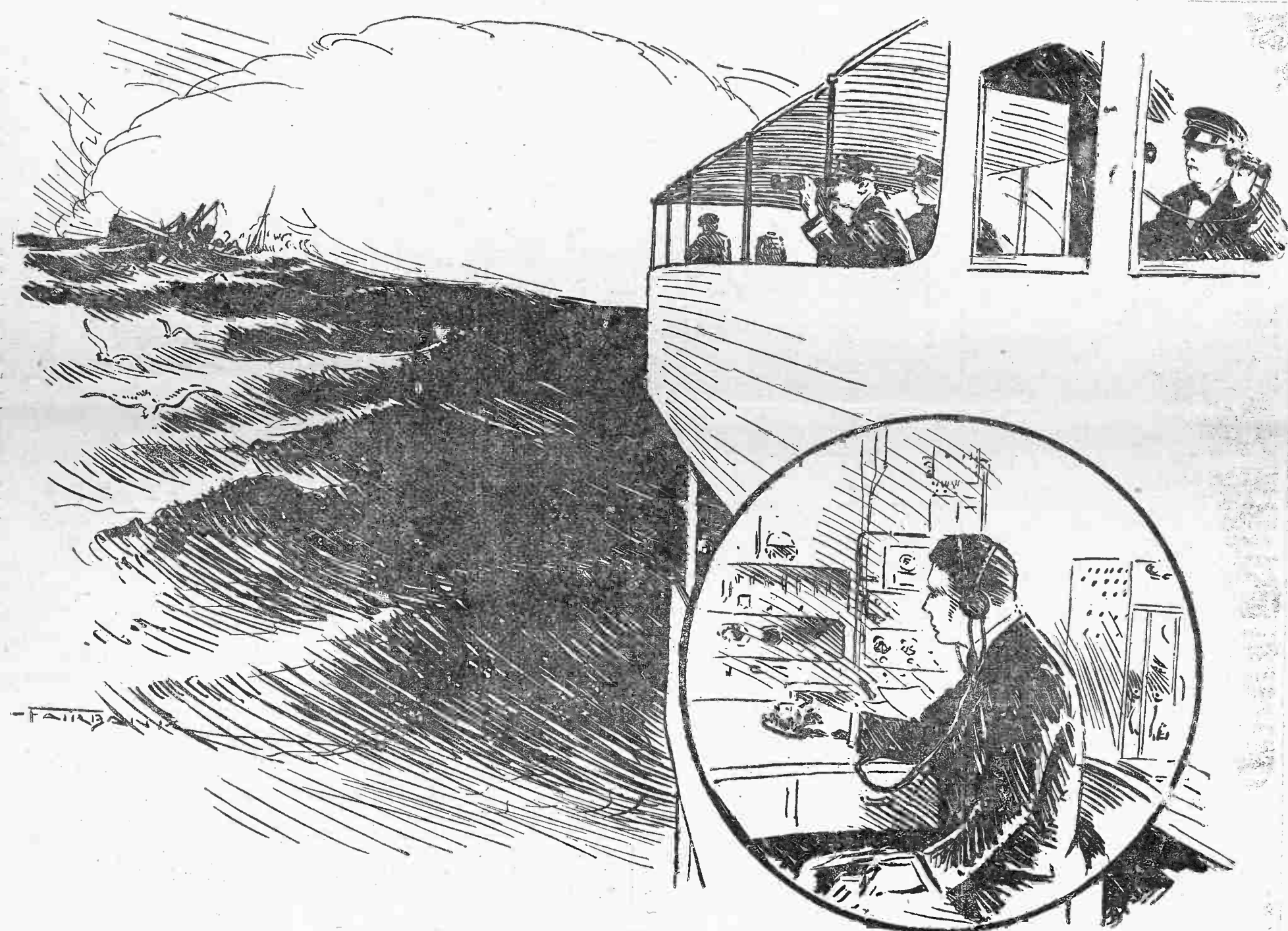
SUNDAY, JULY 27, 1924

16 PAGES

## Radio Traces Course of Sea Derelicts

Hydrographic Office Broadcasts by Radio Positions of Floating Wrecks and Icebergs Dangerous to Navigation and Indicates Their Probable Drift

By MAURICE ROSENWALD



UNLESS a man has been to sea the news of the abandoning of a lumber schooner by its crew during a storm means very little—that is, except where there has been loss of life. Then the average newspaper reader perhaps will turn to some one and remark something about how terrible it must be to have to abandon a ship that is sinking in midocean, and then he promptly forgets all about it. And so it was with the four-masted lumber schooner Governor Parr, which was abandoned off the coast of Nova Scotia last October.

But the work of the United States Hydrographic Office, which is under the direction of the Secretary of the Navy, had just started, so far as the Governor Parr was concerned. From the day of its desertion by its crew the derelict schooner's progress has been followed by radio broadcasts almost daily, the latest report coming the other day from the Ballin, which sighted the derelict over half-way across and notified the Hydrographic

Office by radio. The Hydrographic Office immediately broadcast the message, and in addition published it in its daily bulletin, and then in its weekly bulletin, and then followed that up with a chart showing the course that the derelict had taken and its tendency to drift to the eastward.

The Ballin's message stated that the four-masted derelict schooner Governor Parr, masts gone, stern and bulwark partly smashed, deck house standing, and deck awash but apparently intact, was passed in latitude 45:20 north and longitude 17 degrees west. Every vessel that sights the lumber-laden derelict sends the same sort of message and in this way other vessels can keep clear of the derelict.

In other days, and not so long ago at that, shipmasters had to depend on the reports as they were made by the captains of the various vessels as they made port. These in turn were made up in pamphlet form by the Hydrographic Office and issued free to all vessels. But, in any case, the derelict or other obstruction would have drifted a week before any further notice would have been received.

While the Hydrographic Office has two

derelict destroyers, they are of little use in the case of lumber laden schooners, and the only thing that can be done is to follow the course of the derelict ship and warn vessels of its probable track. Lumber schooners, like everything else, disintegrate in time, and when once the vessel sinks below the surface of the water it goes direct to the bottom. At one time there was a belief that waterlogged vessels floated ten or twelve feet below the surface, but that belief has been dispelled.

Directly after the horrible Titanic disaster in 1912 the International Ice Observation and Ice Patrol Service, provided for by the International Convention for the Safety of Life at Sea, called for the patrol of the North Atlantic trade routes during the months of March, April, May, June and as much longer as necessary. This year the United States Coast Guard Cutters Tampa and Modoc have been detailed for that service.

Their duties are to determine the southerly, easterly and westerly limits of the ice fields and to keep in touch with these fields as they move to the southward, and to send daily radio messages as to the whereabouts of the ice, particularly that

ice that may lie in the path of the regular North Atlantic lane. The following is the regular daily routine of the coast guard ships:

(a) At 6 a. m. and 6 p. m. (75th meridian time), ice information is sent broadcast for the benefit of vessels using 600-meter wave length (spark). This message is sent three times, with an interval of two minutes between each.

Broadcasts by spark will be eliminated as soon as possible, and vessels have been advised to equip themselves with C. W. receivers.

(b) At 7 a. m. and 7 p. m. (75th meridian time), ice information is broadcast by radio on 1,621 meters (185 kilocycles), C. W. These broadcasts are sent three times, with an interval of two minutes between each.

(c) At 8 p. m. (75th meridian time), a radiogram is sent to the Hydrographic Office, Washington, D. C., through the nearest land radio stations, defining the ice danger zone, its southern limits, or other definite ice news, while other mes-

Continued on page four



# A Highly Efficient Two-Tube Portable Regenerative Receiver

The Receiver May Easily Be Carried in an Automobile

By GEORGE M. MEYER

OUTDOOR radio is now in full swing. No matter where you go on a vacation you will find some one operating a receiving set. One gets a good thrill from radio while sitting before a receiving set and listening during the dark, lonesome nights spent out in the little bungalow between the high hills away from the din and racket of the city. The automobile on a week-end trip finds radio an interesting pastime when he sits in his car and listens in to the programs from the town he left several hours before. Every one may keep posted on the events at home by listening in an hour or so each evening after the day's frolic in the open.

Various sets which have heretofore been discussed have their advantages and disadvantages as applied to portable work. When you are going more than forty miles from home and expect to listen in on the "ether wavelets" from afar don't expect to operate a loud speaker unless you have a complete set similar to the one used at home with three or more tubes and a long aerial. Receiving conditions are entirely different away from home when the set is located up in the mountains or at the seashore. Stations you hear at home do not come in with the same intensity thirty or forty miles away. Perhaps some of them cannot be heard at all at that distance. This has surprised many summer campers. Other stations which may have been very weak come in with great strength, while others fade badly. Nevertheless it is all a very interesting pastime and the receiving set should be included in the vacationist's luggage.

## The Writer's Portable

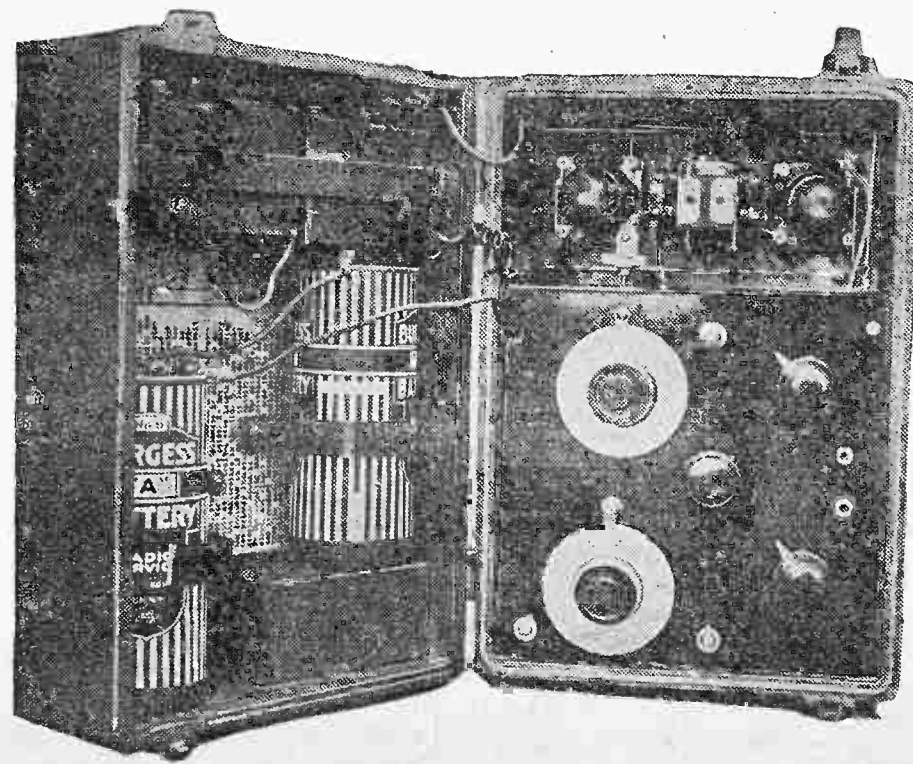
In designing the receiving set about to be described the writer picked out the standard single-circuit hook-up, as it was simple to operate, gives maximum signal strength and employs light and compact apparatus. When this circuit is properly constructed and the correct coupler and condenser used the selectivity is nearly equal to the standard three-circuit tuner. One of the advantages of this circuit lies in the ability of the set to work with an extremely short antenna.

As the portable outfit was designed with the purpose of using it a number of miles away from the high-powered stations, the broadness of tuning is not evident. Of course, the further away we get from the transmitter the sharper the tuning. The receiving set was also designed to take care of batteries, both A and B. It was made rather small, so that it would fit closely in the rear of the automobile, where it was out of the way until wanted. The cabinet in which the writer's set was constructed formerly housed an army crystal set, type BC 14-A. The works of the army set were entirely discarded as new apparatus was used.

Thousands of these receiving sets have been disposed of by the army salvage department for a small sum. No doubt there are still many of these old sets in use which can be changed over to this two-tube set. The reason for using the special box was on account of the fact that it was of sturdy construction and waterproof. It was built to withstand much "banging" around. It is for this reason that the builder of a similar set is advised to build a strong box if the set is to be taken from place to place. A narrow strip of soft rubber was imbedded around the walls of the box, so that when the lid closed it was moisture-proof. A heavy black iron carrying handle on the top of the lid made it convenient for carrying. In the lid of the outfit the A and B batteries were fastened by means of brass brackets which held the batteries in place. No matter which way the set was carried or operated, the batteries were securely fastened to prevent shifting. The batteries were connected to the circuit by means of covered lamp cord which had been stripped of its outer cotton covering for neater appearances. This wire is stranded and is very flexible. The wires were made a little long at first and then wound around

a pencil to form a spring effect allowing for stretching when the cover was moved. These little details are suggested for making the set foolproof and adaptable to all sorts of conditions. Looking down at the set, the tube compartment will be seen at the right. In this narrow opening are housed the two tubes with their sockets and the amplifying transformer. The leads to the batteries and the four wires

long way in avoiding body capacity for which this circuit is noted when the ordinary cheap condenser is used. The coupler selected was properly designed with a small rotor or tickler having only sufficient turns on the coil to cause regeneration, without violent squeals. In fact, this circuit when completed would not screech and squeal in the least, and regeneration would approach to maximum

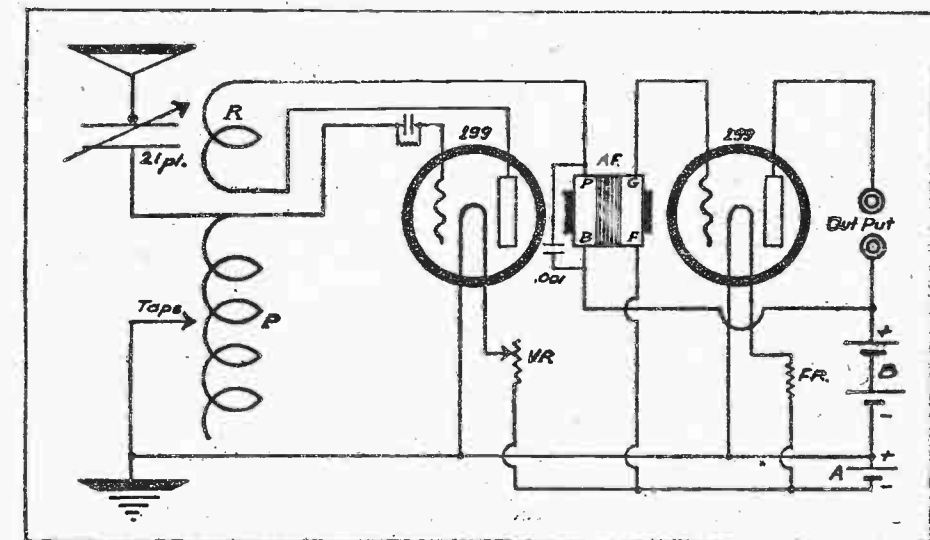


to the set proper are carried through a side partition in which a hole was cut. There are four leads to the tuning apparatus, i. e., grid, plate filament and B battery positive.

The main panel contains two tuning dials, a tap-control switch, rheostats, push-pull switch, aerial and ground post, and two receiver tip holders. The dial in the upper left corner controls the antenna series condenser, while the dial to the right is on the shaft of the tickler or plate coil. Indicators are fastened in the panel near the two dials. Underneath this panel are fastened the rheostats, tap switch, vario-coupler and variable condenser. This is a very simple outfit, as can be seen by the apparatus required. For this reason it is extremely simple and easy to operate with its two dials and a rheostat adjustment. The grid condenser and leak are carefully mounted near the detector socket in the open compartment.

## Selections of Parts

Owing to the simplicity of the single circuit receiver the parts required are not costly. Almost every radio fan of a few months' standing has the apparatus on hand to build such a receiver. The writer



was particular to get the best of parts for the circuit, as the set was to be used for accurate receiving data in remote localities and maximum reception was the goal. For this reason porcelain based sockets were used for the UV-199 tubes. A low loss condenser was selected in order to sharpen tuning. The condenser chosen had metal end plates which were connected to the antenna circuit, and went a

the sets listening in the surrounding neighborhood. Avoid using couplers with too many turns on the tickler. If the coupler you would like to use has a habit of squealing violently remove some of the turns on the rotor coil until it regenerates smoothly.

Following is a list of the parts required in order to complete the outfit:

One good coupler 180-degree rotor.

One low loss variable condenser with metal and plates.

One audio transformer (ratio 9 to 1 or 6 to 1).

One tap switch (panel mounting type preferred).

Two porcelain base sockets for UV-199 or C-299.

Two rheostats, 30 ohm type.

One box for set with panel for apparatus.

Two three-inch dials with indicators.

One grid leak, about 5 megohms.

One phone condenser, .001.

Two phone tip terminals.

Two tubes (199 or 299).

Two six-inch dry cells.

Two small size B batteries.

One cut-off switch.

Two binding posts.

Bus-bar wire, solder, etc.

Above are the parts required in detail. Everything has been mentioned for the circuit. The cost should not exceed \$20 with the exception of the tubes. In the writer's set one rheostat having 30 ohms resistance is used. Two are shown on the set, but it was found that the amplifier and detector could be run from the same rheostat without bad effects and hence the first rheostat was cut out. This also eliminated an extra wire run to the socket from the panel. The writer believes that a 20-ohm rheostat would be better for controlling the two tubes, as it now becomes necessary to move the rheostat slider almost all the way over before the tubes are working properly. It might be suggested here that, a fixed rheostat on the amplifier tube would serve nicely, putting the single rheostat on the detector tube by itself. This will be put in the set described in the near future, and will add to the simplicity of operation. The filament of the amplifier is not critical, and once adjusted the resistance will remain permanent, without further change.

## Wiring the Circuit

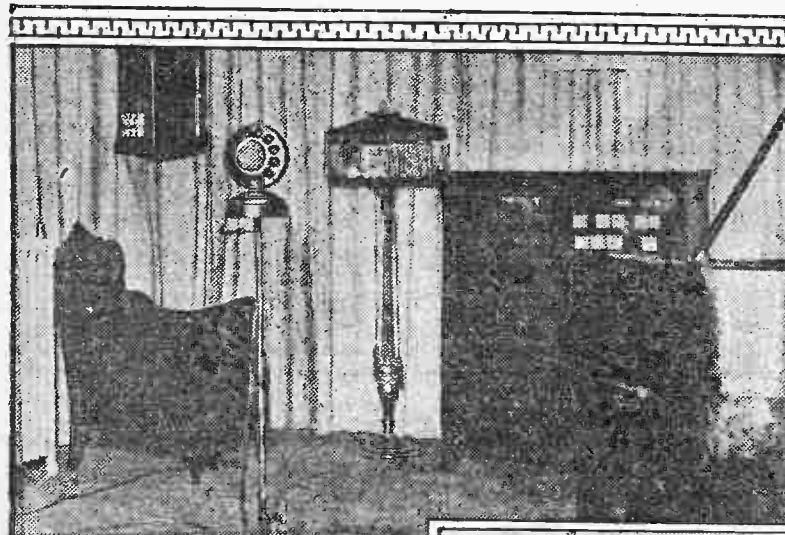
The usual procedure of careful wiring is necessary in this circuit, some of which may be done with bus-bar wire, while a number of the leads will have to be flexible. The flexible leads may be made from lamp cord with the outer coating of braid stripped off to make the job neater and the wire more flexible. Some of the wiring, such as the tap leads and condenser connections, will be of bus-bar wire. Owing to the fact that the panel must be partly wired with loose flexible leads which will pass through the hole to the tubes, before the panel is put in place, several feet of lamp cord or other flexible wire will be required. Solder all connections with extra large connections, as the outfit will probably get a few knocks around while in use.

The batteries which are mounted in the lid of the box are fastened to the circuit by means of flexible lead wires long enough to avoid any pulling or strain when the lid of the box is opened.

## Tuning In

There are two controls, one to get the station and the other to increase the volume. The antenna condenser worked in conjunction with the tap switch will cover the wave-length range from 150 meters to 600 meters. This makes a very flexible receiver for both amateur wave-lengths and the broadcasters. The tickler coil which is in the plate circuit controls the volume. In one direction the stations become stronger, while in the reverse direction they decrease in intensity. In working for DX stations it is best to work the tickler coil almost up to the point of oscillation and move the wave-length dial back and forth slowly. If the station comes in distorted reduce the regeneration slightly or reduce the filament temperature. On local reception for stations up to twenty-five miles distant it will not be necessary to run the filament temperature up or force the tickler circuit. The outfit constructed by the writer works a loud speaker on all of the local stations, with but forty-five volts of B battery.

Third Avenue Railway opens powerful broadcasting station to instruct public how to prevent accidents



©Kadel & Herbert.

Perhaps the last people in the world that a radio fan would expect to open a broadcasting station would be a street railway company, but nevertheless the Third Avenue system of New York City has completed a powerful 500-watt station of the highest type, and is now on the air on a 273-meter wave length. Its call letters are WEBJ. In addition to to prevent street car accidents, it will also broadcast the best of concerts. The entire station is built by W. J. Quinn, chief electrical engineer of the railroad, and his staff.

The photographs show a corner of the studio and one of the big steel masts that support the aerial and counterpoise.

The station's programs have been arranged to include many popular features of general interest as well as safety talks. The names of several new artists as well as those known to the radio audience appear on the schedule.

## Radio News From the Capital

WASHINGTON, D. C.—Inventors of radio apparatus are promised relief from the long delay experienced in obtaining patents on their product by a movement just inaugurated by Secretary of the Interior Work. Secretary Work has sent invitations to the presidents of the American Bar Association, American Patent Law Association, Chicago Patent Law Association, Cleveland Patent Law Association, Michigan Patent Law Association and Pittsburgh Patent Law Association, asking them each to nominate a member to serve on a committee to simplify methods of procedure and expedite the business of the Patent Office.

The plan of Secretary Work is to have the committee after its organization make a thorough review of the Patent Office and to submit suggestions for changes in methods that should result in bringing the work of the bureau to a current basis in the near future. Because of a tremendous increase in the patent business during the last few years the Patent Office has been unable to keep up with the number of applications for patents that have been filed by the public.

There are pending at present in the Patent Office 2,653 applications for patents on radio inventions. Some of these applications are several years old, while most of them are at least a year old.

Radio was the means of saving many lives during the recent disaster resulting from the tornado at Lorain and Findusky, Ohio, according to the report made of the incident by the Commander of the U. S. S. Wilmington to the Navy Department.

At 11:45 p. m. on June 28, while anchored at Put-In-Bay, the Postoffice Air Mail Service, has won for himself quite a reputation as a singer. The Postoffice Department is experimenting at Omaha, Neb., in an effort to devise a radio set satisfactory for mail airplanes. Pilot Knight is helping with these experiments. Not long ago he was in the air over Omaha testing a transmitting set. During the test he sang "Old Gray Mare." Hundreds of letters have been received by the Postoffice Department from as far east as New Hampshire expressing appreciation for the song.

and Wilmington that Governor A. V. Donahey, of Ohio, addressed a letter of thanks to the commandant of the Ninth Naval District at Great Lakes, Illinois.

Several protests have been received by the Department of Commerce against the character of broadcasting indulged in by Station WHN at New York. According to the protests, WHN used radio to induce young girls to apply for positions as chorus girls.

In the absence of Secretary Hoover, Department of Commerce officials refused to comment on the complaints. But they made it quite clear that they considered themselves powerless to do anything in the matter.

While Secretary Hoover has announced that he is opposed to radio censorship, radio officials of the Department of Commerce believe he may change his mind because of recent developments. Sponsors for radio legislation assert a new radio law will be enacted at the coming session of Congress which will give the Secretary of Commerce authority to cancel the license of any station which broadcasts objectionable matter.

Dr. James Harris Rogers, father of underground and undersea radio communication, has just celebrated his seventy-fourth birthday. Dr. Rogers is busily engaged in attempting to devise a method of underground broadcasting.

Dr. Rogers's most recent invention is a form of insulation which he believes will overcome the last obstacle that stands in the way of perfect radio transmission. The wheel of wires that he laid underneath Hyattsville, Md., during the war and through which were picked up important German plans of action, is being replaced with a new and better wheel insulated with Dr. Rogers's product.

## Mail Plane Pilot a Songster

Pilot Jack Knight, of the Postoffice Air Mail Service, has won for himself quite a reputation as a singer. The Postoffice Department is experimenting at Omaha, Neb., in an effort to devise a radio set satisfactory for mail airplanes. Pilot Knight is helping with these experiments. Not long ago he was in the air over Omaha testing a transmitting set. During the test he sang "Old Gray Mare." Hundreds of letters have been received by the Postoffice Department from as far east as New Hampshire expressing appreciation for the song.

## Improved Loud Speakers Aiding Reception

The improvement in radio reception this summer as compared with previous seasons, which has been widely noted and commented upon, is due in no small degree to the better design and construction of loud speakers. In a statement on this subject prepared for the Radio Section of the Associated Manufacturers of Electrical Supplies, C. E. Brigham, chief research engineer of C. Brades, Inc., says:

"After a year of painstaking research and experimentation in the laboratories of the members of this organization, the majority of loud speakers now on the market represent a notable advance over the earlier models, both as to power and tone production. The consequences of these developments are especially important for summertime radio, as atmospheric conditions during warm weather have in past years made loud speaker reception frequently unsatisfactory.

"The better tone production of loud speakers of the latest design may be noticed particularly: when one listens to an organ recital, which, to my mind, is the hardest sort of music to reproduce successfully. Organ reception has been improved several hundred per cent over last year. In fact, if one tunes in on an organ recital during these hot summer months, and then tries to recall doing such a thing last summer, one cannot help realizing and appreciating that loud speaker reception has greatly improved. The main difficulty has been with the lower notes, and when these are reproduced without affecting the tone of the extreme high notes, then indeed the perfect loud speaker has been designed.

"Loud speakers of to-day are a great deal more sensitive than those of a year ago. Once it was believed that a loud speaker could function only with a set of very strong amplifying power, but now it is frequently used with excellent results on two-tube sets, and operated under favorable conditions by single tube receivers. However, improvements in the design of the sets must be given part of the credit for this increased range of the loud speaker.

"It has been found that distortion in the loud speaker may be traced to the diaphragm and the air chamber immediately above it, leading to the horn. The most difficult problems center about the material and design of the diaphragm.

"Diaphragms have both magnetic and resilient qualities, and the importance attached to each varies with different types of loud speakers. It is in the development of the resilient factor that most of the work of the past year has been done. Some types have been developed with corrugated diaphragms, others with up-shaped or cone-shaped diaphragms. Various kinds of material, such as aluminum,

German silver and impregnated linen have been tested and adopted or rejected. Finally, the mountings and clampings have been shifted and altered in many different ways."

## Radio Proves Itself To Be Missing Link for Campers

Some of the letters received by a broadcasting station would arouse envy in the heart of a sportsman. Bishop Brothers, of Ellishouse, Nova Scotia, in a letter to WGY, recently complimented the station on its program and then explained that they are in a camp in the woods on one of the most beautiful lakes in the province where "moose, deer and bear are plentiful and we find the radio the missing link between us and civilization." Then read this: "Last night while listening to your program we heard a slight noise outside the camp and upon going outside found that two moose had walked past not fifty yards from our door. I had the pleasure of landing a three-pound lake trout just before supper to-night."

## Jewish Program From WEAF

The Women's League of the United Synagogue of America will present to WEAF's audience on Monday afternoon Mrs. Israel Friedlaender, the wife of the late Jewish scholar and professor, Dr. Israel Friedlaender, assassinated four years ago while on a mission of mercy in Ukraine. The subject of Mrs. Friedlaender's address will be "Hebrew Education in the Palestine," where she has been a resident since the unfortunate event took place.

SCA has come to the conclusion that there is nothing like the short wave lengths. He may be heard working both coasts with his lone 50-watt tube on 150 meters. This station also has many remarkable records to its credit.

## Major Russell at WOR

Major C. E. Russell will tell one of his unpublished stories of the Department of Criminal Intelligence, namely "The Strange Adventures of Corporal MacPherson," in a talk which he will broadcast from WOR on Monday evening. Major Russell was connected with the Criminal Intelligence Service of the United States army during the war. He was stationed in France and his true stories of the actual experiences at the front lay bare the story of the invisible powers behind the armies in France.

## Brooklyn Distributors for New Receiver Appointed

The Brooklyn Radio Service Company, of which Ben Ginsberg is the head, has been appointed Brooklyn distributors for the Ultradyne super-heterodyne receiver, which, it is claimed, embodies some remarkable features.



THE COBURN DUO-FLEX PUTS THE ARTIST IN YOUR HOME

Due to the superior design of the Coburn Duo-Flex, used in this set, the quality of reproduction is truly remarkable. You can hardly believe it is radio. Even the most discerning and crowded downtown district a demonstration will convince you. Come in and be astonished. Price, complete with storage battery..... \$110 Price, complete with dry cells..... 100

## Radio Exchange

Rate, 35 cents a line; minimum, 3 lines. Agents caps and white space only display permitted. Ads. accepted until 4 P. M. Friday.

PHONE PENNSYLVANIA 4000

## Parts and Equipment Service

ONE hundred volts for the "HAWLEY" knock-down Rechargeable "B" storage battery sold on an unconditional guarantee or return of your money without any loss or charge. With the exception of elements, these knock-down units are fresh, new, and have patent rights owned exclusively by B. S. Smith, inventor and pioneer of knock-down and assembled batteries. They comprise only quality material, such as heavy glass vials (no test tubes in this) heavy perforated separators, special stoppers and tested large size Edison elements. An 8 page illustrated folder of complete instructions, pending charges and charging free with all unit orders. 22 volt unit, \$2.95; 25 volt, \$3.75; 30 volt, \$4.50; 35 volt, \$5.25; 40 volt, \$6.00; 45 volt, \$6.75; 50 volt, \$7.50; 55 volt, \$8.25; 60 volt, \$9.00; 65 volt, \$9.75; 70 volt, \$10.50; 75 volt, \$11.25; 80 volt, \$12.00; 85 volt, \$12.75; 90 volt, \$13.50; 95 volt, \$14.25; 100 volt, \$15.00. Complete sample cell 30c. prepaid. Orders shipped same day as received. B. S. SMITH, 31 Washington Ave., Danvers, Conn. Tested Edison elements 3c. per pair.

REPAIRED PHONES.....SETS REWIRED Phones magnetized while you wait. Old sets removed and replaced. FREE TESTS. All work guaranteed. ROY'S STORE. 100 West 46th Street, Cor. 6th Ave. OPEN EVENINGS. BRYANT 0916

SPECIALIST ON NEUTRODYNE REPAIR and tests. REGENERATIVE Sets built to your desire and guaranteed; price very reasonable. Former Supt. of U. S. ARMY. NEAR 42D ST. Telephone Murray Hill 9352.

PHONES MAGNETIZED, REPAIRED, KEYSERLING BATTERY CO. 225 East 14th St. Lexington 3662.

For Sale. Build a SEE JAY rechargeable "B" genuine Edison elements (not the small size). Pure nickel wire; heavy glass cells; hard rubber separators and imported potassium hydroxide. 915 Brook av., near 161st st. "L" Station. Mail orders filled. Jerome 1739. OPEN EVENINGS UNTIL 10 P. M.

SPECIAL MONDAY ASSEMBLY SEE JAY RECHARGEABLE EDISON ELEMENTS BATTERY. 100 VOLTS, \$8; 140 volts, \$11; 180 volts, \$14; 220 volts, \$17; 260 volts, \$20; 300 volts, \$23; 340 volts, \$26; 380 volts, \$29; 420 volts, \$32; 460 volts, \$35; 500 volts, \$38; 540 volts, \$41; 580 volts, \$44; 620 volts, \$47; 660 volts, \$50; 700 volts, \$53; 740 volts, \$56; 780 volts, \$59; 820 volts, \$62; 860 volts, \$65; 900 volts, \$68; 940 volts, \$71; 980 volts, \$74; 1000 volts, \$77. SEE JAY. 915 Brook av., near 161st st. "L" Station. Mail orders filled. Jerome 1739. OPEN EVENINGS UNTIL 10 P. M.

WHOLESALE RETAIL EDISON Elements for "B" Batteries. All other parts in stock. Mail orders filled. ROMCO STORAGE BATTERY CO. 146 W. 68th St. Phone Columbus 1258.

Batteries. RADIO specialist; batteries recharged, re-eagle battery Co., 242 West 145th St. Bradhurst 3461.

RADIO BATTERIES, special summer price, 130 ampere, U. S. L. batteries. TALKER BATTERY CO., 242 West 145th St. Bradhurst 3461.

Agents Wanted. RADIO representatives wanted for special work at convenient hours. Sounding good. Maitland Reich, 2955 Columbia Ave., Philadelphia, Penn.

## FREE PROOF

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Best radio set? Radio engineers say SUPER-HETERODYNE—greatest invention, clearest tone. Don't take their word. Prove for yourself right in your own home. Just telephone or write, requesting home demonstration of Radiola Super-Heterodyne, aristocrat of all the radio sets. No aerial, no ground.

Work the two simple knobs yourself. Jump from distant city to distant city.

Phone or write TODAY

Remember, no obligation to buy. Convenient terms may be arranged.

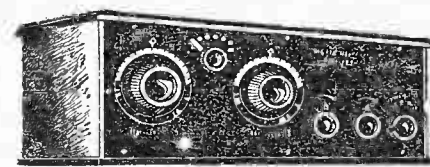


RADIOLA SALES COMPANY, INC. BROADWAY AT 57TH STREET FISK BUILDING, NEW YORK Telephone Circle 9127



**Ludwig Baumann**  
does not charge interest!

**1.50 weekly**  
pays for this  
**TUSKA**  
3 tube set

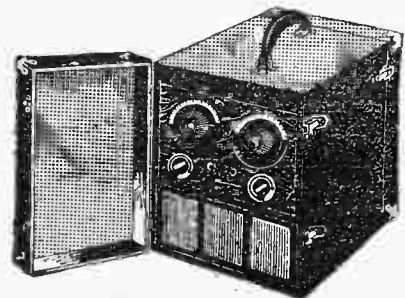


This is the famous Tuska No. 225, most powerful of all 3-tube sets. Complete with 3 Cunningham or R. C. A. tubes, 4 B batteries, storage battery, loud speaker and plug.

**\$99**  
COMPLETE

**1.25 weekly** pays for this

**Ambassador**  
CAMPFIRE MODEL **Portable Set**



**\$89**  
Complete

Designed for use anywhere. Complete with 3 tubes, A and B batteries and built-in loud speaker. Batteries are contained in case and are connected by us. Nothing to bother with.

**1.00 weekly** pays for our

VACATION MODEL **Ambassador Set**

Complete with 3 tubes, A and B batteries and loud speaker **\$69**

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Harlem: 144 West 125 St. Newark: 581 Broad St.

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You'll find only standard, dependable merchandise at our stores and low prices that will tempt the shrewdest of Radio Buyers.

**\$5.00 O-T-3 Tubes** . . . **\$2.95**

Same as 201A—6 volt. Beats them all by test!

**\$18.00 Presto-Light Storage Batt.** **\$10.95**

**\$15.00 Perfectone Loud Speaker** . . . **\$7.95**

**\$7.50 Navy Head Sets** . . . **Now \$3.45**

**7x10 Cabinets (sanded, ready to stain)** **95c**

**7x10 PANELS Composition** . . . **29c**

Every item in our store marked down—Don't miss this opportunity!

Branch: 22 Beaver St. **Liberty RADIO** Branch: 4 John St.  
**106 LIBERTY STREET**

If you want to buy, sell or exchange your radio sets or parts the Radio Exchange will help you.

## The New Week on the Radio

By Pioneer

Roger Wolfe (Kahn's) Biltmore Cascades Orchestra, which during the last six months has risen from obscurity to high rank as a modern dance orchestra, has been given an additional weekly period of broadcasting by Station WJZ, the Saturday tea-hour music now being a regular feature by that organization through Station WJZ. For a month WJZ has been broadcasting the after-theater dance music by Wolfe's Orchestra every Tuesday night, and because of the number of requests from listeners who wanted to hear the orchestra at an earlier hour as well as at the 11 o'clock period the Saturday afternoon tea-hour music will be broadcast in addition to the Tuesday program.

So many commendatory letters came to WEAF after W. W. Williams gave his talk on "The O. Henry I Knew," and there were so many requests that Mr. Williams give further information about his famous friend, that WEAF has persuaded the speaker to continue his interesting reminiscences of America's great story teller. Next Tuesday night, July 29, at 7:55 o'clock, Mr. Williams will radiate through WEAF what he calls "Close-ups of O. Henry." His talk will deal in the main with the author's early days in New York, one of the most interesting periods of O. Henry's career.

A treat is in store for radio fans Tuesday, July 29, at 2:30 p. m. when the entire company of "So This Is Politics," now playing at Henry Miller's Theatre, will journey to Newark and broadcast one or two acts of the play from WOR.

Many people far removed from Madison Square, New York City, will hear the exemplification of the impressive "Mooseheart" pledge by the Loyal Order of Moose assembled in convention Wednesday evening, July 30. Station WJZ will broadcast the elaborate outdoor fete to be staged at Madison Square that night. This is the first time the famous pledge of the L. O. O. M. will have been heard by the radio audience. Commencing at 9 o'clock WJZ will broadcast the proceedings of the fete until 10:30, including the concerts by the prize-winning organizations of the glee club, quartet and Moose Band contests, as well as the New York City Police Glee Club and the famous Boys' Military Band from Mooseheart, in addition to the exemplification ceremonies. As the ceremonies are to commence, the bells of the Metropolitan Tower will chime 9 o'clock and the microphone will pick up and transmit their soft notes as, well as the music of the bands.

The Women's League of the United Synagogue of America, will present to WEAF's audience on Monday afternoon Mrs. Israel Friedlaender, the widow of the late Jewish scholar and professor, Dr. Israel Friedlaender, assassinated four years ago while on a mission of mercy in the Ukraine. The subject of Mrs. Friedlaender's address will be "Hebrew Education in Palestine," where she has been a resident since the unfortunate event took place. Her address will be supplemented with a musical program consisting of piano solos by Sylvia D. Lyons.

To secure faithful reproduction of large bands has always been a difficult problem for broadcasting experts. The volume produced by individual wind instruments varies greatly. The work of each is important to a harmonious whole; consequently, if the microphone is not well placed an unsatisfactory reproduction is the result. The United States Marine Band, which is broadcast through Stations WEAF and WCAP, is one of the best examples of such broadcasting, and the radio listener can best appreciate this by imagining himself as one of the listeners at the concert hall where the concert is being played rather than as one of the radio audience in his home. Discriminating musicians have frequently remarked regarding the faithful reproduction of the Marine Band, which will be a feature of WEAF's program on Monday evening.

A program featuring the compositions of William G. Hammond, with

Sara Hammond, soprano, as soloist, will be offered to WEAF's audience on Monday afternoon. Mrs. Hammond is well known through her many recitals, and her husband is one of America's well known composers. He will accompany her on this occasion.

Describing what he calls the best cup of tea he ever brewed, L. Dow Covington, F. R. G. S., a WEAF program feature, usually startles his audience with a description of how he concocted the drink. In the shadow of the pyramids, the famous explorer and archaeologist built a fire, the fuel for which was weirdly obtained by opening the skull of an unimportant mummy and touching it with a lighted match. He explains that the Egyptians used a bituminous substance in mummifying, which makes the skulls burn evenly and give forth a very pleasant odor. In his lecture for WEAF's audience on July 28 Mr. Covington will describe his ten years of excavation in the pyramids.

Miss Elsie Ahrens, who carried off the honors of the Music Week Contest held at Erasmus Hall, Brooklyn, recently, will be a feature of the afternoon program at WEAF on Wednesday. She was especially recommended for her legato interpretation and professional mien. Some of the numbers which she featured in her successful contest recital will be included in her WEAF program.

Following the dinner music program from the Waldorf-Astoria, under the direction of Joseph Knecht, WEAF offers on July 28 a program by Florence Hendrickson, contralto, accompanied by Mme. Johanna L. Bayler. Miss Hendrickson was soloist at the recent memorial services for the late Professor Kayser, held at Hunter College, and has been heard in concert throughout the metropolitan area.

## Radio News From Foreign Lands

Radio is exciting a mild interest in Hayti, according to a report to the Department of Commerce. There are from fifteen to twenty sets in Hayti, and they easily pick up New York, Pittsburgh and California.

A new air route has been inaugurated between Leopoldville and Elizabethville, in the Belgian Congo. The planes are equipped with radio sets.

The Danes are beginning to use wireless direction stations. One such station has already been erected at Gilleleje, and if it proves successful others will soon be erected.

The Germans have just concluded their first radio exhibition at Hamburg. More than 100 German firms were represented at the exhibition, which took up 2,000 square meters of floor space. The price of the sets, which covered all varieties of receivers, from the most elaborate and expensive to the simplest and cheapest, ranged from \$10 to \$300. Around 15,000 people attended the exhibition.

Another warning has been issued in Poland, calling attention that installation of receiving or transmitting radio sets is forbidden by the government.

## Robin Redbreast Broadcasts

A robin redbreast perched high in a tree near the peace cross in the Episcopal Cathedral grounds at Mount St. Alban, Washington, D. C., unconsciously took part in recent open air religious services which were being broadcast. As a result the robin's warbling was heard by thousands of people in the eastern section of the United States. The clear, vibrant voice which came from the robin's throat not only attracted the attention of the congregation in the cathedral grounds, but went into the microphones and was broadcast by WCAP along with the religious services. Radiophans in Maryland and Virginia reported hearing the bird's voice.

## 1845 Songs From WOR

Miss Rosalind Fuller, ingenue of "Fashions," is a feature of the WOR program on Thursday afternoon, when she will broadcast her radio debut consisting of a chat on the drama and several song numbers of the vintage of 1845 and 1924 respectively.

## QUESTIONS & ANSWERS

This Week's Most Interesting Question

James Millen—Please tell me how to recognize a single circuit receiver when I see the circuit diagram for same. Just lately I saw a circuit printed in one of the radio magazines that was called a two circuit tuner, a variometer was used to tune the grid filament aerial and ground circuit and the plate circuit tuned by a variometer. I feel sure that this is but a single circuit tuner.

Answer—You are correct, this is but a single circuit tuner, though it can be called a two circuit tuner and to the majority of radio fans it is a two circuit tuner. To clear up this subject we will explain the difference between single and two circuit tuners.

A single circuit tuner is any type of circuit in which the aerial is conductively coupled to the grid circuit. No matter whether trick forms of untuned primaries are used, if they are directly coupled to the grid circuit then the set is a single circuit tuner. To obtain regeneration in a single circuit tuner it is general practice to use a tickler coil, but, though a plate variometer is used it does not alter the fact that a circuit is single circuit when the grid is directly connected to the aerial.

A two-circuit tuner is a tuner wherein the aerial and ground circuit is separate and distinct from the grid-filament circuit. That is, any circuit having primary and secondary circuits that are connected only by induction that circuit is a two circuit tuner. All circuits having a primary and secondary that are separate and distinct and have tickler feed back are still but two circuit tuners, despite the fact that many manufacturers call them three circuit tuners, a three circuit tuner must have a tuned plate circuit along with a separate primary and secondary. And even then a three circuit tuner is only a three circuit tuner when the plate circuit must be in exact resonance for each station. Some tuned or so-called three circuit sets are not and as a consequence are really nothing more than two circuit tuners.

## Superdyne Information

Walter T. Lang—I have built a superdyne receiver and it operates very well except for the fact that the radio frequency tube is constantly falling into oscillation. The tickler coil is very hard to adjust. I am using 67½ volts on the plate of the radio frequency amplifier. Is it advisable to use another stage of radio frequency amplification with the superdyne? Is a crystal detector practical on a superdyne? Would it be advisable to incorporate regeneration in the detector tube circuit?

Answer—Suggest that you use less plate voltage on the radio frequency amplifier; it will make the set easier to handle and will stop the tube from falling into oscillation as easily as it does now. Adding another stage of radio frequency amplification would only further complicate the tuning of the set; no increase in signal strength worthy of the additional parts would be noticed. Do not attempt the use of a crystal detector on this set, as all constants would have to be changed to use such a detector. Regeneration may be added to this set, but because of the difficulty that would be encountered in tuning the set and because the increase in signal strength would be so slight we feel that it would be inadvisable to do so.

Lowering Wave Length M. Fishman—I have constructed the single tube regenerative receiver as described in the Radio Magazine of July 13. The set is one made by remodeling an old crystal set. The receiver operates very well except that stations below 400 meters cannot be received. How can the set be changed so as to bring in the low-wave stations?

Answer—To lower the wave-length tuning range of this set a small fixed condenser (.00025 mfd.) may be placed in series with the aerial or a 25-turn coil may be connected across the aerial and ground posts.

## Rheostat Resistance

Charles B. Sweeney—What resistance should a rheostat have that is to be used to control the filament of a UV-199 tube?

Answer—A rheostat having a resistance of thirty ohms should be used to control a UV-199 tube.

# What Every Fan Should Know About Radio Receiving Circuits

There Are Few Standard Circuits, but Many Variations

By SIDNEY ELBER

"CIRCUITS" are to radio what bait is to fishing. When a number of radio fans get together and begin boasting of their achievements, the credit for any particularly brilliant reception record is always given to the circuit, and little or no mention made of the individual parts that comprised the set. This is only natural, as it can safely be assumed that the performance of mere parts is dependent entirely on how they are arranged.

The average broadcast enthusiast probably thinks that there are circuits and circuits without number.

There are and there aren't, depending on his understanding of the meaning of the word. If he follows Webster's definition of "the path of the electric current," rather than any conglomeration of closed wires in a "circuit," he will accept a "circuit" as being only a fundamental arrangement, and he will be astonished at the rapidity with which a large number of our so-called "new circuits" fade into insignificance. In the past, you know, the crafty experimenter only had to make a wire take three bends instead of two in a diagram, and a gullible public immediately acclaimed his handiwork as the sensation of the age.

In an effort to make known the truth about these "inventions," some of which are downright fakes, the writer has prepared a series of articles dealing with circuits of every kind and explaining how they are twisted and distorted to form hundreds of different variations. This first article goes back to the simplest of all radio sets, the crystal receiver.

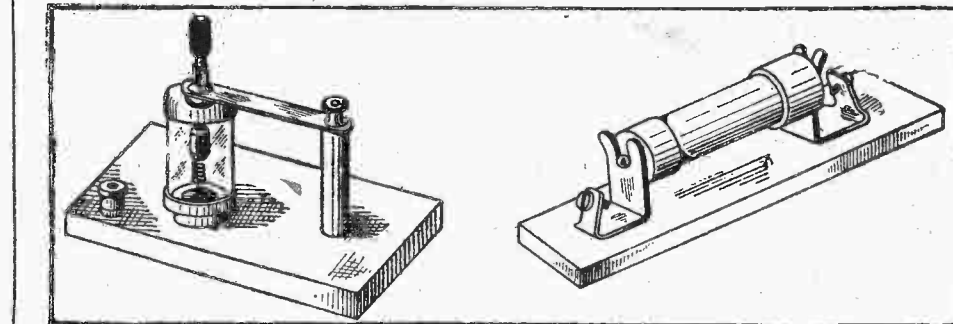
## Fundamental Circuit

Fig. 1 shows a set that might almost be called the ideal one, because it has no controls. It uses only a crystal detector, C, a pair of ear phones, P, and the usual aerial and ground, A and G. Nothing less complicated can possibly be made. With such an outfit radio signals actually can be heard, but they would be hopelessly jumbled and probably very weak. If

there ever was a fundamental circuit, this is it.

By adding a coil of wire, TC, directly in series with the aerial, as in Fig. 2, the quality of selectivity is introduced. This coil must be so made that the number of turns in use can be varied at will, thus enabling the circuit to be adjusted, or "tuned," to different settings that will correspond to the wave length of different transmitting stations. This circuit is a decidedly better one than that of Fig. 1.

We now come to the first lesson in



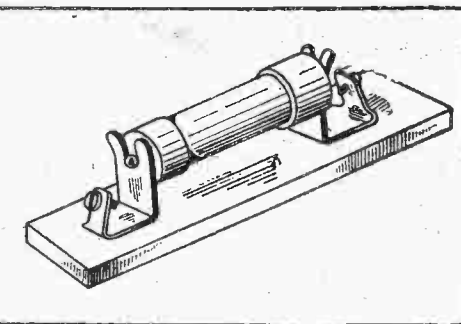
circuit building. By taking the parts of Fig. 2 and merely changing the position of the tuning coil a different circuit is had. It is a slightly improved one, due to the fact that the crystal and phones have been removed from the direct path of the current flowing through the aerial. A small fixed condenser, F, has also been added to improve the tone quality. The tuning coil can consist merely of a hundred or so turns of insulated wire on a three or four inch tube, with a slider traveling across it over a bared section.

Progressing, we find that by fixing this same coil with a second slider, Fig. 4 can be drawn. The wiring has been changed to the extent of pushing the ground lead from the first slider to the second one. Little is gained by this move in the way of results, but the two sliders keep both hands busy if they do nothing else. Single and double slide crystal receivers were widely used seven and eight years ago.

One rainy evening during that period some bright individual must have had nothing to do, so he went and stuck even a third slider on the same single layer coil of wire to keep the other two com-

pany. It gave absolutely no increase in volume, selectivity or distance, but simply looked nice and lent a mysterious air to the set. It also showed that the circuit changer existed even then. The new slider merely provoked the aerial a bit, as shown in Fig. 5.

The purpose of the sliders in the last four sets is to change the total amount of wire in use, as explained, and this in turn tunes the set. Now, the same effect can be secured by a different method. Two untapped coils can be taken, con-



nected in series, and one arranged to turn within the other. The resulting instrument is a "variometer" and works very nicely in conjunction with a crystal detector.

The circuit used is that of Fig. 6. This really has some claim to originality, for at least a different tuning device is employed. The crystal detector, fixed condenser and ear phones are, of course, inevitable. The variometer is shown as "V."

A variometer crystal set makes a nice little outfit, as it is simplicity itself. Therefore, being simple, it can readily be made less so by applying a few tricks. For instance, the wire from the top side of the crystal detector, instead of going to the aerial and top of the variometer, as in Fig. 6, can be led to the point where the two variometer coils are joined. Result—"new circuit."

Then again, the crystal wire can be left undisturbed and the wire from the fixed condenser and phones lifted instead. Another new circuit. Still again, this same wire can be replaced, so that the set looks like Fig. 6 again, but this time the wire

from the ground is removed from the bottom end of the variometer and connected to the middle point instead. Here we have four circuits which can be made to look totally dissimilar on paper, yet which are all equally good. The slight changes in no way improve the operation over that of the original circuit, nevertheless they are changes. More than one tube circuit has been called "new" for less excuse than this.

The various sets just described are all of the "direct coupled" type. They are so termed because the aerial and ground circuit is metallically joined with the detector-condenser-phones circuit. Sets in which these two arms are not directly combined are said to be "loose coupled" ones. A typical set of this class is shown in Fig. 7.

## Vario-coupler Set

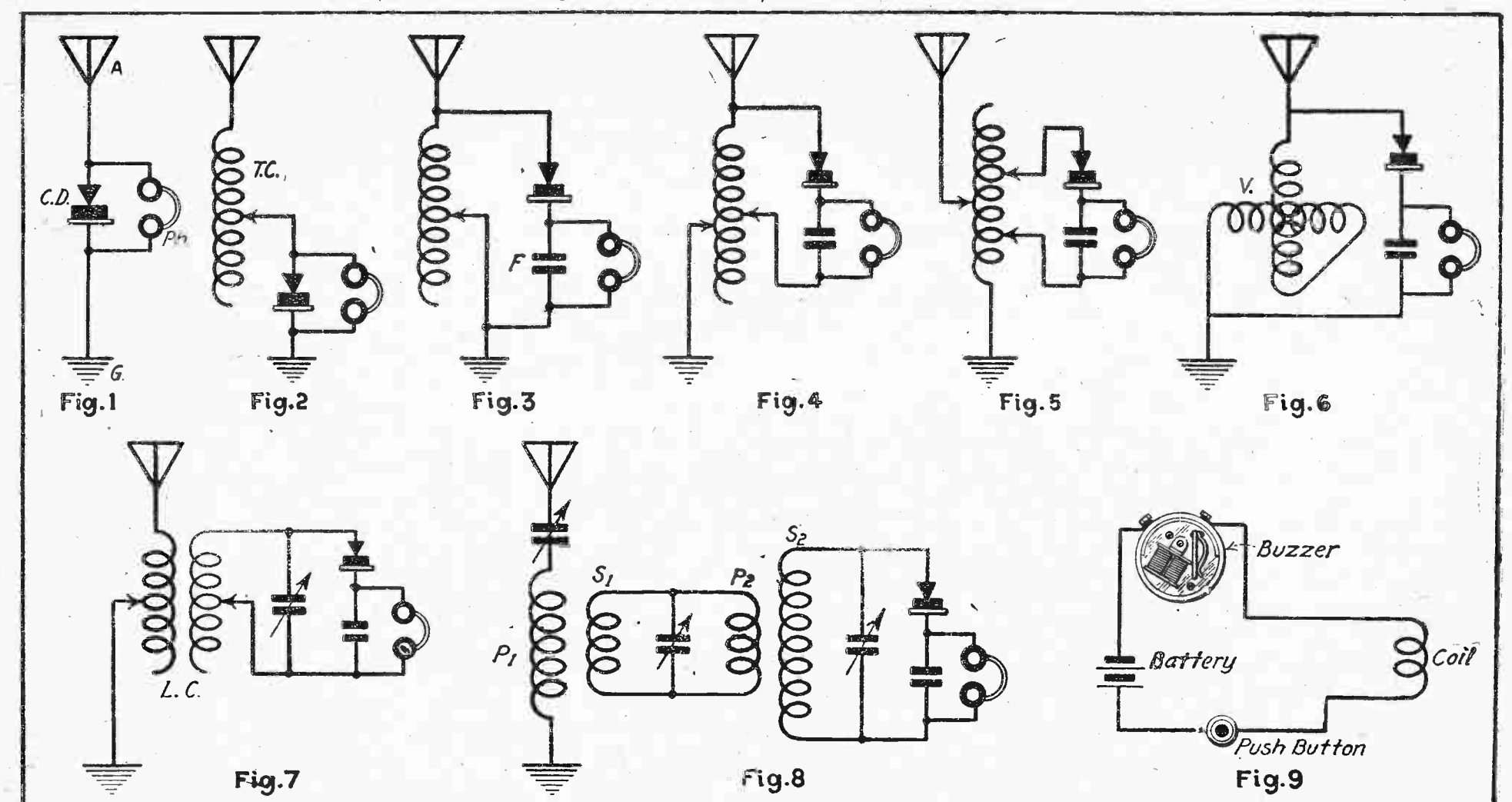
The new instrument here is "LC." This can be either an ordinary vario-coupler or a loose-coupler. The latter is an old-fashioned coupler in which the secondary slides in and out of the primary instead of turning in it. Its secondary is tapped.

The left hand coil is the primary. The arrow resting on it may represent either the primary slider of the loose-coupler or the switch of the vario-coupler. The right hand coil is the secondary. A variable condenser across it is of some help in tuning. The crystal detector, condenser and phones follow as usual.

There is little variation in loose-coupled crystal sets. The physical separation of the aerial and crystal circuits is their main feature. It enables the tuning to be sharpened somewhat, but not much. The looser the coupling between the primary and secondary the sharper the tuning, but also, in almost every case, the weaker the signals. A compromise must be struck some place for the sake of convenience.

Occasionally one sees a crystal set consisting of a vario-coupler, variable condenser and variometer, with the conden-

Continued on page four





# Will Liquids Replace the Modern Three-Electrode Vacuum Tube?

## Tests Prove Signals Can Be Received With Colloids When Properly Used

By WM. M. HENDERSON

EVERY radio fan is well acquainted with the efficiency of the three-electrode vacuum tube. It is also generally known that the disadvantages of the present-day tube are the frailty of the filament and the uncertainty of the

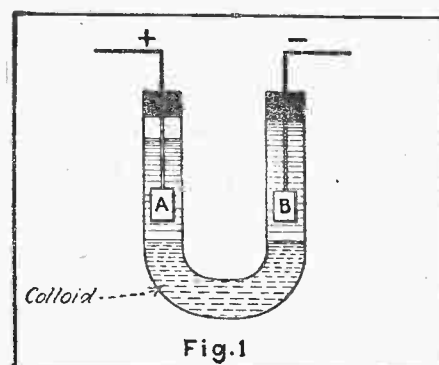


Fig. 1

vacuum. These two disadvantages have caused many radio inventors to attempt the design of some form of rectifying and amplifying apparatus to take the place of the present tube.

The results obtained through tireless research and design have done much to further dependable radio transmission and reception. One of the most interesting of these developments is the use of colloidal liquids to replace the vacuum and filament in a tube.

Though this form of rectifier and amplifier is not developed to an efficient stage,

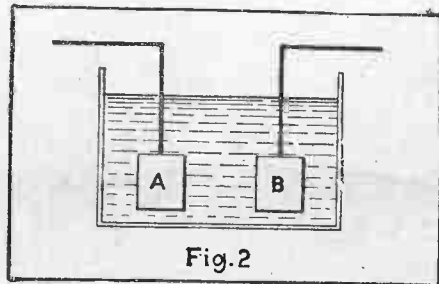


Fig. 2

and though it may never be, a simple description of how a colloid solution acts as a radio device will be given to the readers of this magazine to acquaint them with the new development and also to place before those who are experimentally inclined

a working knowledge of a colloid "tube," so they may experiment with it if they so desire.

The heart and substance of this "tube" is a colloid. Those who have studied chemistry know that a colloid is a compound which, when placed in a liquid, absorbs that liquid, similar to a sponge, and the particles of the colloid are held in suspension by the liquid. When the liquid is driven off from a colloid by evaporation one of two things will occur—either the colloid will become a hard, solid mass incapable of re-absorbing a liquid, or will become a solid again capable of reabsorbing a liquid.

### Colloid Classification

Colloids of the former class are called irreversible, and when solidified after once absorbing a liquid are in a coagulated state. Colloids of the latter class are called reversible.

This suspension of colloid particles in a liquid is commonly called a colloidal liquid and sometime a solution. Though neither of these is absolutely correct, they are now commonly used and will be in this article.

Colloids generally form solutions called a "sol"—that is, whatever liquid a colloid is placed in has "sol" placed after it to name the solution—as an example, alcohol plus a colloid equals alcohol. When a colloid is placed in a liquid the result is a perfect fluid, but not as a rule transparent.

Colloids are divided into two classes, emulsoids and suspensoids. The emulsoids when placed in water have the water penetrate their particles, while the suspensoids are those colloids which are not penetrated by the liquid—thus particles of suspended colloids will be in a state of suspension in the liquid. Emulsoids are mostly organic substances, while suspensoids are metals, sulphur, selenium, etc.

The latter are the ones used in radio work. If a colloid solution be examined under a powerful and sensitive microscope it will be noticed that there is a constant movement of the particles in the liquid. This

movement is given two explanations. One is that each particle of the colloid has a charge of electricity and each particle is charged at the same polarity. Consequently there is a constant repulsion between particles which would cause the movement noticed under the microscope. The second theory is that the liquid molecules are constantly striking the colloid particles. The impact between the molecules and particles gives the noticed particle movement.

No matter which may be the real cause of this movement, and either may be wrong, still it is conceded that it is this particle movement which gives a colloid solution its rectifying and amplifying properties. A test of this can be made by using the apparatus shown in Fig. 1. A glass U tube, a colloid, distilled water and two platinum or aluminum electrodes are necessary. These colloids may be procured in most drug supply houses.

With the apparatus mounted as shown in the diagram and a source of high potential current connected to the correct leads a concentration of particles around one electrode will be early discerned by the increased coloration around that electrode.

When a colloid solution is to be employed as a rectifier of radio signals it is prepared as shown in Fig. 2. A glass jar, two electrodes and a colloid solution are necessary. Electrode B has four times the surface of A. This rectifier can be connected in a radio receiving set in place of a crystal detector. The signals from nearby stations will be received with greater volume than with an ordinary crystal. CW can also be received on this detector without the aid of an external heterodyne or a tickler. For best results the depth of A must be varied.

The action of this detector, however, rapidly becomes weaker, and at the end of two or three hours becomes inoperative. Its activity may be renewed, however, if the connections are reversed. A constant reversing of connections will keep the detector in action for some time.

Slight success has been obtained by

using this type of "tube" as an oscillator in the circuit shown in Fig. 3. Here a control electrode, similar to the grid of a vacuum tube, is interposed between A and B. Reversal of polarity also materially increases the life of the oscillator.

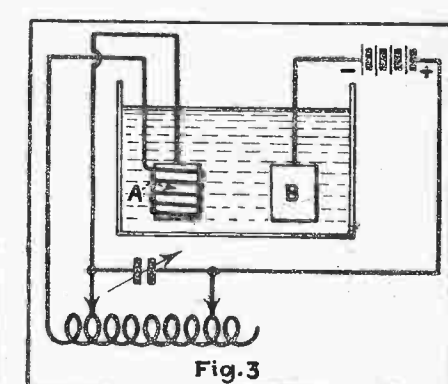


Fig. 3

Two circuits for using the tube as an amplifier are given in Fig. 4. The first is for a simple two-electrode "tube." This operates in the following manner: An alternating current flowing through the input circuit causes a variation of resistance, which is, of course, proportional to the potential variations. Because of the negative characteristics of the "tube," a reinforcement of the alternating circuit is obtained in the output circuit.

For the amplifier circuit connecting a "tube" with a control electrode the action

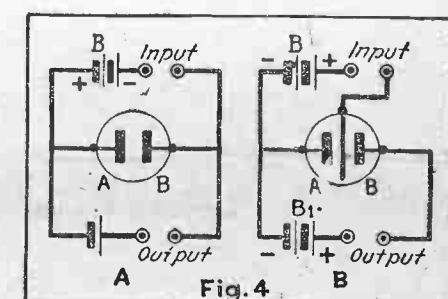


Fig. 4

is different. The variations in the applied alternating current force the control electrode to act electrostatically upon the flow of colloid particles between A and B, with a consequent slightly amplified current flowing in the output circuit.

## Radio Traces Course of Sea Derelicts

Continued from page on:

changed so that the publications of the bureau contain reports from all the seven seas, and notes on conditions of the ports on those same seven seas. The Great Lakes and other inland waters are not neglected, for they are taken care of in just the same way.

## Radio Receiving Circuits

Continued from page three

ser in series with the ground and the variometer between the crystal detector and the upper end of the coupler secondary, but a receiver like this is absolutely foolish. The bulky instruments absorb almost as much energy as they allow to pass, and there is precious little of it in a crystal set anyway. One variometer would do the work a great deal more efficiently.

### Filter Circuit

The circuit of Fig. 8 is also a loosely coupled one, but the writer is willing to wager that it is a new one to a lot of broadcast listeners. It is a double-coupled affair, with two primaries, P1 and P2, and two secondaries, S1 and S2. S1 and P2 are arranged as rotor balls on one shaft, turning within P1 and S2, respectively. Three variable condensers are used; one tunes the aerial circuit, another the first secondary and second primary at once and the third the second secondary. (Got it straight?) The crystal, etc., are across the last condenser.

This unique layout was used in a new obsolete ship receiving set before bulbs were heard of commercially. Its one ad-

vantage was that of sharpness, a much-needed one in crystal sets. However, it took a pretty strong signal to get through without being lost in the couplings. This circuit can be tried, as an experiment, with two vario-couplers. It will be found interesting, even if not startling. A dozen crazy departures from Fig. 8 can easily be evolved, but they will not be one mite better than it.

Fig. 9 does not look like a radio circuit, and is not one. It is a buzzer-test system for adjusting the detector. A high-tone buzzer, a dry cell, a push button and two turns of No. 18 bell wire, five inches in diameter, are all connected in series. The coil is simply placed near the set, not on top of it, and while the buzzer is kept going the catwhisker is adjusted until the buzzing is heard loudest in the phones. The crystal is then all set for reception. The test coil may have to be experimented with somewhat. If it is too close, the buzzing will be heard even with the catwhisker off the crystal; if it is too close, it will not be heard at all.

(The second article will take up some of the modern one-tube circuits, which are very interesting to study. Watch for it.)

United States vessels. It was also a part of the work of the office to ascertain the errors and rates of all chronometers sent to United States vessels on fitting out for sea.

### Work of the Hydrographic Office

Since that time the Hydrographic Office has led the way in removing guesswork from navigation. With the aid of the Navy Department vessels it has charted the depths of all oceans, has disseminated all sorts of maritime information, maintains branch offices all over the world where shipmasters may receive the latest marine data and co-operates in every way with those seeking information. In fact, the Hydrographic Office goes so far as to issue printed question and answer pamphlets containing the information that many seek, and, until they try the bureau, seek in vain.

The Hydrographic Office was one of the first agencies to realize the value of wireless and early took the lead in pressing its advantages and the advisability of having every vessel equipped with aerials for the reception of ice warnings at least. It goes without saying, that had the Titanic the facilities that trans-Atlantic liners are furnished with to-day, in regard to ice reports at least, we would never have had the feeling of horror that passed over us when the wireless gave us the first inkling of the terrific loss of life in that most startling of all marine disasters.

With the daily information of the track of the bergs as broadcast by the ice patrol and the endless research now going on to determine the speed and track of the Labrador current, we may rest assured that any ship which runs into a berg has done so through crass stupidity or neglect of duty by her officers and crew.

## General Harbord Announces New Radio Plans

The adoption of an entirely new and extensive program for the promotion of radio broadcasting in Latin America by American interests following the abrogation of an agreement under which the American companies had jointly participated in South American radio business for the past three years with interests of England, France and Germany, is announced by General J. G. Harbord, president of the Radio Corporation of America. He says the new plans give the United States its first unrestricted opportunity to utilize fully its resources in developing radio in South America. Five of the principal countries of the continent—Argentina, Uruguay, Chile, Venezuela and Brazil—will benefit by the new plan, according to General Harbord.

The program not only includes a change in the system of distributing merchandise which enables the American company to direct its radio activities with far greater efficiency than the previously existing arrangements had permitted, but it involves in addition the introduction of a practical method for the support of broadcasting which will be first applied as a trial to the powerful broadcast station at Buenos Ayres.

General Harbord explained that negotiations with other radio companies in South America had been in progress for several months, the outcome of which was the dissolution of the original local organization known as Radio Sud America. He pointed out that one radio company in England, France and Germany, together with the Radio Corporation of America, had originally formed this organization as the sole distributing agency for the sale of radio apparatus of English, French, German and American manufacture, but that arrangement did not prove sufficiently flexible to enable the participating members to conduct their individual business on a basis best suited to the technical and commercial development of the art and industry in South America.

"The cancellation of this former agreement marks the beginning of a new era in our South American radio activities," General Harbord said. "We are now in a position to carry the banner of the United States' leadership in radio below the equator. We have been somewhat retarded in the South American field, due to the restrictions imposed by the four-sided compromise which has been in force since the end of the World War.

"One of the outstanding advantages of the plan which was made effective following our release from Radio Sud America, is a system giving direct contact with the South America radio market from New York, thus eliminating the expense incidental to carrying on operations through intermediate distributing centers. With newly organized outlets forming a part of the distribution circuits, terminating at Buenos Ayres, Montevideo, Sao Paulo, Rio de Janeiro, Valparaiso and other leading cities, every new development in broadcasting apparatus will be made available to South Americans practically simultaneously with their introduction in the United States.

"There is every reason to believe that Latin America will continue to show an increasing interest in radio broadcasting. Particularly is this true now that a way has been devised to give her the advantages of apparatus embodying all the latest improvements contributed by engineers and scientists in the United States. Such cities as Rio de Janeiro, Buenos Ayres, Montevideo, Sao Paulo and Valparaiso, and other centers of art and education scattered throughout the republics of Latin America are some of the great reservoirs which broadcasters may tap for a variety of program matter to be broadcast to millions of homes where the light of radio has not yet entered.

"Unlike North America, distances between cities are greater and a large percentage of the population resides in the vast farming regions. Radio broadcasting must break down these barriers of space which isolate town and village from the cities. Wire facilities, too, are not within as easy reach of the people of South America as they are in this country. Radio broadcasting will do much to supplement existing means of communication such as the telephone and the telegraph.

"It is a well known fact that Latin

now look to America to help in developing radio broadcasting in their respective countries. This knowledge is based upon the events of the past years, which have conclusively proved to the world that America now leads in radio communication in all its branches."

### Commonwealth Radio Club

Edward E. Pugh, president of the Commonwealth Radio Club of America, 104 West Eighty-fourth Street, New York City, states that the membership drive carried out during the last few weeks has met with success, as expressed in many letters received which indorse the club plan.

The number of enrollments received has provided nearly sufficient funds to warrant the sponsors of the club in selecting a club home. A suitable location on Eighty-sixth Street, between Columbus and Amsterdam avenues, is under consideration.

Mr. Pugh also states that while the annual dues of the club were originally placed at \$5, early in August these will be increased to \$10 per year, and will remain at this figure until after the opening of the clubhouse some time during August. Subsequently the dues will be raised as the activities of the club enlarge and funds are required for extension. Mr. Pugh states that the C. R. C. A. is a membership organization to benefit radio fans and is not in any sense a stock promotion.

### Reducing "B" Battery Costs

G. E. Furness, manager of the radio division of the National Carbon Company, on July 21, was the host at an informal dinner to a number of radio editors.

Mr. Furness made a very interesting talk on certain engineering and economic phases of the radio battery question. He also announced that a new and revised price list of Eveready "B" and "C" batteries would become effective August 1.

He also stated that his company has produced a new heavy-duty 45-volt "B" battery, having about two and one-half times the capacity of the older type of cell. Considering this factor and the new lower price at which it will be sold, users of the heavy-duty battery will achieve a reduction in battery costs of about 65 per cent.

Mr. Furness remarked that the policy of the National Carbon Company was constantly to reduce battery costs and that further reductions might be expected as the company's engineering and designing forces attained results at which they are now aiming.

### Opens New Radio Store

The Great Northern Radio Company has opened a third store at 4 West Forty-third Street, near Fifth Avenue, which will make a specialty of catering to the Fifth Avenue and Grand Central zone trade. The Great Northern Radio Company has been pre-eminently successful in the operation of its other two stores at 60 Vesey Street and 127 West Thirty-third Street. They specialize and are authorized dealers in De Forest sets and tubes, and are counted among the biggest retailers of this well known line. One of their main lines is an exceptional display of cabinets, most of the well known manufacturers being represented. Philip Feldman is president of the Great Northern Radio Company.

### Band Broadcast Is Difficult

To secure faithful reproduction of large bands has always been a difficult problem for broadcasting experts. The volume produced by individual wind instruments varies greatly. The work of each is important, to a harmonious whole; consequently, if the microphone is not well placed, a very unfaithful reproduction is secured.

### Tom Masson To Be at WJZ

Tom Masson, for twenty-five years the managing editor of "Life" and recognized as one of the greatest authorities on humor in the world to-day, will speak from station WJZ on Friday, on the subject of "Humor." Just what angles of that comprehensive subject he will treat is a secret which he wishes to keep until the time of his address.

### Invalid Appreciates Radio

A radio prescription is putting S. R. Helms, of Monroe, N. C., back on his feet after an invalidism of over fourteen months. Writing to WGY recently, he said: "I am one patient that an M. D. prescribed a radio outfit for and it was the greatest prescription he ever made, as it has done me more good than specialists and sanatoriums. I sincerely wish that every shut-in could have a radio set."

## Amateur Receives Special A. R. R. L. Certificate

CHICAGO.—E. C. Page, of Evanston, Ill., radio operator for the auxiliary ketch Big Bill, which is making a two-year trip to the South Seas in the interest of the Deep Waterways Commission, before leaving this city was presented with an official relay certificate by R. H. G. Mathews, central division manager of the American Radio Relay League. This act makes him an official A. R. R. L. relay operator and requires him to forward all amateur radio messages that he receives during the long voyage.

Being himself an amateur of considerable experience, Page has announced his intention of communicating on short wave lengths. As the Big Bill will eventually travel around the world, he will have the unusual opportunity of being able to converse in code with amateurs in many foreign countries. His transmitter has a wave length range of from 80 to 700 meters.

This set was built from the standpoint of three important angles, that of amateur low loss practice, commercial efficiency and practicability, and, finally, its adaptability for hard usage on board a ship at sea. The Hartley circuit is used, employing two fifty-watt tubes connected in parallel. The entire equipment was planned and assembled by Frederick Marro, R. H. G. Mathews and William Schweitzer, of this city. The power supply is obtained from a 1,500-volt dynamotor. The ship is equipped with a thirty-two-volt light system and this operates the radio through a series resistance. Copper bus bar wiring is used throughout and special attention has been given to the construction of the set to make it sturdy and efficient.

Porcelain supports are used wherever possible, and in such places as they are not practical, hard rubber has been substituted. No molded material of any kind is found in the equipment. The dielectric losses have been minimized through careful design and construction. Loading inductances have been provided to bring the wave length up to 700 meters to allow for communication with commercial ship and land stations.

The tuner, which is of the low loss type and embodies all of the special advantages of that form of construction, was built by K. E. Hassel. This receiver has a wave length of from 50 to 200 meters and will be used exclusively for picking up short wave amateur sending stations.

A second tuner with a wave length range of 200 to 600 meters has been installed. This is fortunately provided with a special loading arrangement to allow for reception of signals on wave lengths of 2,000 meters and up. A complete set of "spares," including rheostats, tubes, condensers and key, is carried.

Inasmuch as the receiving set uses three "B" batteries and a "C" battery, a number of sets of batteries have been sealed in evacuated airtight metal containers that have been packed carefully in a cool spot below the water line of the ship. The ground consists of a two-foot copper strip around the hull.

### Alberta, Canada, Forms

**Amateur Association**  
CALGARY, Alberta, Canada.—Radio amateurs from all sections of Alberta meeting at this place recently completed the organization of the Alberta Radio Experimenters' Association with the object of consolidating amateur activities. The membership in this body is restricted to amateurs holding government transmitting licenses and serious experimenters nominated by members and voted upon. The officers are Dr. Beddingfield, High River, president; A. H. Asmusen, Calgary, secretary; A. V. Evans, Calgary, secretary, and W. Schopp, treasurer. Members of various committees have been appointed.

### Special Broadcasts For Lettuce Farmers

As a special service to New York State farmers marketing lettuce, one of their most perishable crops, station WGY, Schenectady, N. Y., is broadcasting daily, except Sunday, a special report on the farm movement of lettuce. This report will be prepared by the New York State Department of Farms and Markets and will inform the farmer daily where the bulk of lettuce shipments is being made.

PORTABLE three-tube reflex, Harbinger type, loud speaker and batteries in cabinet 15x12x7; weight 24 pounds; guaranteed one year complete, \$45. Watkins 1701-J.

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Which again places WALTHAL in a position of leadership. An innovation—an instrument which enables us to

### TEST YOUR TUBES FREE

EVERY tube purchased here will be given a laboratory test by this instrument, which acts as an X-Ray, immediately indicating any slight defect in the tube.

No more need you purchase tubes "blindfolded." With this test, combined with WALTHAL'S prices and Insurance (which means return your purchase if not satisfactory), we predict that we will sell more merchandise this week than we have ever sold before.

Some stores are charging for this service by raising the price of tubes—at WALTHAL'S the TEST is FREE.

### SAFETY

This instrument is to radio what four-wheel brakes are to the automobile and what X-Ray is to the medical profession.

### PROPHECY

We predict that within a very short time every radio concern will follow WALTHAL'S lead or be compelled to render this invaluable service FREE.

Remember—WALTHAL'S INSURANCE POLICY PROTECTS YOU ALWAYS!

### Prices Good Until Fri., Aug. 1st

FRESH "B" BATTERIES		TUBES	
Eveready Battery Co. reduces prices. WALTHAL falls in line.		UV 199-200-201A	
		WD 11-WD 12	
		3.27	
		CUNNINGHAM	
		C 300-301A—C 11	
		C 199—C 12	
		3.30	

Wholesale and Retail  
MAIL ORDERS \$5.00 AND OVER  
FILLED. MONEY ORDERS ONLY.

## Large Alteration SALE

# Vim

66 CORTLANDT ST.

AMBASSADOR STANDARD PARTS FOR 3 TUBE SET		EVEREADY	
All ready to wire, complete with Ambassador Genuine Coil		108 Volts—\$5.90	
\$14.95		Heavy Duty, Long Life, Noiseless.	
TRANSFORMERS		STANDARD SETS	
Erta	\$2.95	EASY TO BUY—EASY TO PAY	
General Radio	\$3.95	Use This Coupon	
Acme	\$2.95	Get them! Please send your representative to give me demonstration.	
American	\$3.95	Name .....	
Modern	\$3.95	Address .....	
Federal No. 65	\$3.95	Time .....	

WESTERN ELEC. 10D, \$34.95

MUSIC MASTER  
Lowest Price

## MID SUMMER SALE

Big Reduction on all Standard Sets and Parts

# Paragon, De Forest, Crosley, Etc.

Full stock of loud speakers and large assortment of high grade parts for those who build their own.

During July and August we close at 7 P. M. Tuesdays and open Wednesdays at 5 P. M.

MAIL ORDERS GIVEN SPECIAL ATTENTION

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FIRST AND LARGEST RADIO STORE IN BRONX  
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THE HERALD TRIBUNE is broadcasting every Sunday in the RADIO EXCHANGE exceptional buys in Radio parts and equipment. Tune in every Sunday and receive service, sound advertising and low prices.



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The Improved  
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SET ON DEMONSTRATION

Booklet containing full instructions showing complete plans, diagrams, etc. Price 50c

**JUST A FEW OF THE FEATURES**

1. Combines distance, selectivity and volume.
2. Completely cuts out all local stations by one degree variation of the dial and brings in distant stations other sets fail to get.
3. Uniform and maximum radio frequency amplification can be obtained over the entire wave length range.
4. The Ultraformers are designed to amplify at one frequency only, and only the desired signals can pass through them.
5. Only two dials for all wave lengths.
6. Incorporates every good feature of the famous Super-Heterodyne.
7. Employs new modulation system, which makes it the most sensitive receiver known.
8. Aerial or Loop.

**SPECIALS**

TUBES	LOUD SPEAKERS	PLUG
German Telefunken \$1.00	24 inch Firth \$4.98	Weston 59c
HEAD SETS \$12.00		CONDENSER ACME LO LOS \$3.95
Nathaniel Baldwin Type "C" \$5.25		TRANSFORMERS Acme Super-Heterodyne \$3.98
SET 3 TUBE Monodyne \$15.00		

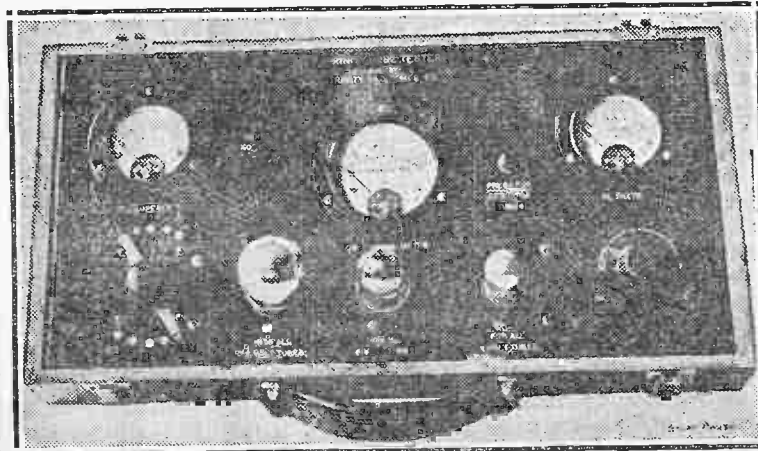
## A Timely Hint About Tubes

New Device Determines Instantly the Worth of Spurious Tubes

By S. J. SLATER

WITH the expiration of tube patents and the advent of new bulls on the market, myriads of radio tubes, each with individual characteristics, are sold over the counter to-day to people who accept them more or less passively and then hope that they are good ones. It is but too true that at least 95 per cent of these radio tubes receive no more test before the customer than merely lighting of the filament—some of the larger and better stores go so far as to test for plate current, or the flow of "B" battery current through the tube, but neither of these methods proves the merchandise to be good or operative.

It is a fundamental fact in radio that the tube is the heart and soul of the set, as well as the most expensive item. Many people complain about the performance of their sets, though never considering the tubes—saying they can't get any distance at all while their neighbors with less expensive sets get everything. But



then when one day a lamp burns out and a replacement is made, you may hear them—quite commonly—raving about the DX they are suddenly able to pull in. In such cases usually no increase in volume is noticed, mostly a better quality of reproduction and a decided increase in sensitivity results with the better tube. Such cases are very frequent and are especially probable now when the market is flooded with all sorts of tubes, most of them beautiful imitations of the good kind. Since I am certain that good results in a radio set cannot be obtained if the tubes used are not good oscillators and are not sensitive, this is offered as a timely hint to prospective purchasers.

It is evident that the only authentic proof of the quality of a radio tube—the heart of the set—lies in the slow method up to and at present employed: that of using the tube for several days in a tested set and noting the quality of amplification and general sensitiveness. I have had tubes which I've prized highly for their excellent quality and clarity in reproduction of the vocal frequencies and I have had tubes which were not so good—also some which I have been "stung" on—but no longer can the latter type be sold to me!

Imagine a large radio store selling hundreds of tubes per week, giving each tube the elementary test for amperage, voltage and milliamperage—such a test has been instilled in some of the larger stores. Ridiculous! Those hundreds of tubes have still to be tested and the purchasers will do it, but, because of the lack of a standard of comparison, they will not know how good the tube is and will continually be left in the dark about its quality. Lucky he is if he gets DX, clarity and volume with no distortion but if he doesn't, can he have a con-back? He gets local stations—but is it therefore all well and good? Locals come through under the worst conditions and are, therefore, not good indicators of tube efficiency, which we desire.

Then how can we know, when we buy a tube, whether we are getting "good stuff"?

Up to the present, there were no stores testing tubes for oscillation in actual comparative figures. Just trying the tube in a set is a fairly good test, but not at all accurate, and then how many stores test tubes that way for customers—and is there broadcasting going on every minute of the day?

One solution lies in the new Trinity Tube Tester, manufactured by the Trinity Manufacturing Company of New York and developed by their research engineers to the degree of its

giving an instant reading in figures of oscillation or sensitiveness of the tube by a special Thermocoupled galvanometer besides giving all the other characteristics of the tube, such as filament voltage and amperage drain at one reading.

This new tube tester has lately appeared in one of New York's largest radio concerns, namely, the Liberty Radio Store. The exactness of the tests is so fine that a good tube is instantly told from a less sensitive one. Some tubes show normal voltage and amperage readings, but are low in oscillation. These are immediately sent back to the factory and the customer gets a perfect tube instead. The outfit is rather an ingenious one. It is small and probably weighs only ten pounds. There is a single three-way switch for 2, 4 and 6 volt supply from the usual storage "A" battery, a switch for 22½ or 67½ volts on the plate of the tube for detector and amplifier: respectively and sockets for any make

of tube. The meters are of high quality and give accurate readings. The galvanometer is of the thermocoupled type and reads to units. A satisfactory idea can be had from the above photo.

**Unsuccessful Try-Out of 5XX**

LONDON—What is said to be the world's biggest broadcasting station was opened at Chelmsford in Essex recently, and its debut was anything but a success. Listeners-in in London who were all keyed up for the occasion were very much disappointed to hear practically nothing. After a time they did manage to make out a faint mumbling and some time later an occasional word could be understood, but there was a persistent interruption from high-pitched whistling Morse signals. Another peculiar feature was a curious sound like that of a watch being wound up, which was heard now and again.

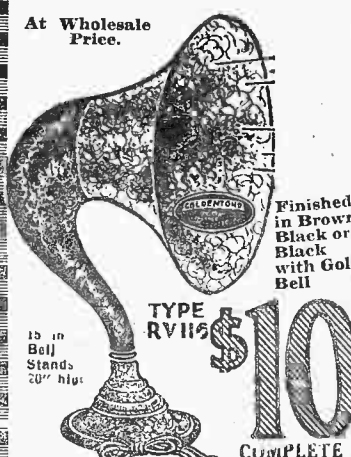
The afternoon transmission, which was sent out between 4 and 5 o'clock, could not be heard at all. People in the heart of London equipped with crystal sets failed likewise to hear the evening experiments. The new station was best heard in the morning hours. In fact, it was heard too easily. With headphones the signals were so strong that one had to "tune out" so as not to be overwhelmed with the volume of sound.

The Chelmsford station, which is known as 5XX, has been loaned to the British Broadcasting Company by the Marconi people for experimental purposes only. It is sixteen times as powerful as 2LO, the London station of the B. B. C. Its twin aerial masts, 450 feet high and 800 feet apart, completely dwarf the little town of Chelmsford. The wave length is 1,600 meters. The actual power used at first was 15 kilowatts, but it is intended to increase this shortly.

The first experiments from the new station were devised primarily to determine the extent to which the effective receptive range of the crystal set can be increased.

As Captain Ekersley, of the B. B. C., puts it: "The present receptive range of the crystal set is approximately twenty-five miles. My belief is that by transmitting from a sufficiently powerful station this range can be increased to 100 miles at least."

Buy Direct from the Manufacturer

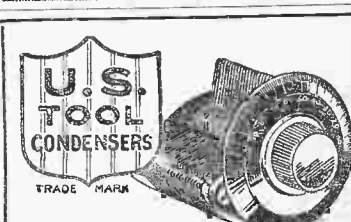


The surpassing features of this Amplifier are:

- A. It gives absolutely no metallic sound.
- B. Value is satisfactory.
- C. It is pre-eminently a loud speaker unit.
- D. No additional batteries needed.
- E. No bothersome headset unit.
- F. It produces perfect articulation.
- G. It is entirely free from all distortion or "blasting."
- H. It is sold at a strictly wholesale price. Do not be misled by the unscrupulous retail dealer trying to sell you Golden-tone Amplifiers, as we only sell direct to the consumer.

**BRITANNIA SILVER CASTING CO.**  
33 Crosby Street, New York  
Gentlemen: Please send me one of your RV115 Golden-tone Amplifiers. Price \$10.00, with your Special Built Loud Speaker Unit Free.

Finished in.....  
C O D.....  
Money Order, Check, Address.....



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**Continental Radio & Elec. Corp.**

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**R. H. McMann, Inc.**

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**UNITED SCIENTIFIC**

**LOW LOSS**

**SCIENTIFIC**

**CONDENSERS**

Made of Superior Materials

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**TUBES**

REPAIRED AND EXCHANGED \$2.50

ALL TYPES

CUNNINGHAM R. C. A., ETC.

We will either repair your tube or give you a brand new tube at the same price. Price without old tube, \$2.50. All tubes shipped same day after receipt.

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RADIO TUBE HOSPITAL

206 BROADWAY NEW YORK

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**INSIST UPON**

**AMSD**

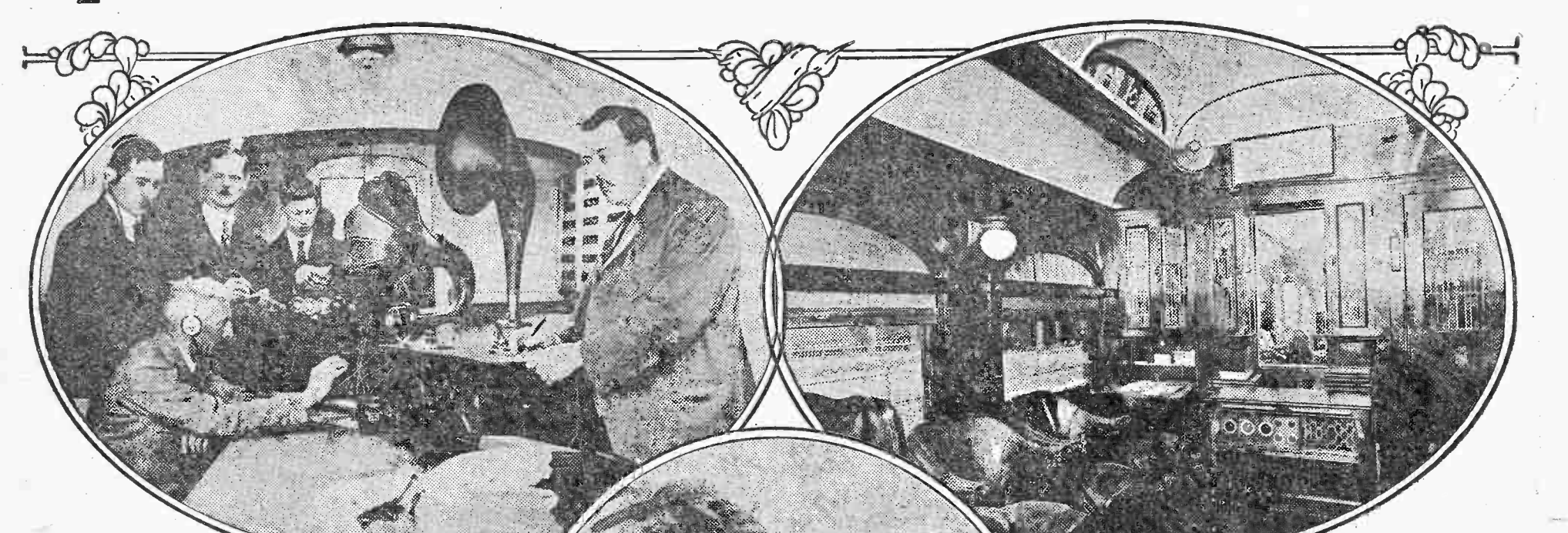
**AIR CONDENSERS**

VERNIER & VARIABLE

**THE RADIO EXCHANGE**

If you want to buy, sell or exchange your radio sets or parts the Radio Exchange will help you.

## Up-to-the-Minute News of Radio in Pictures



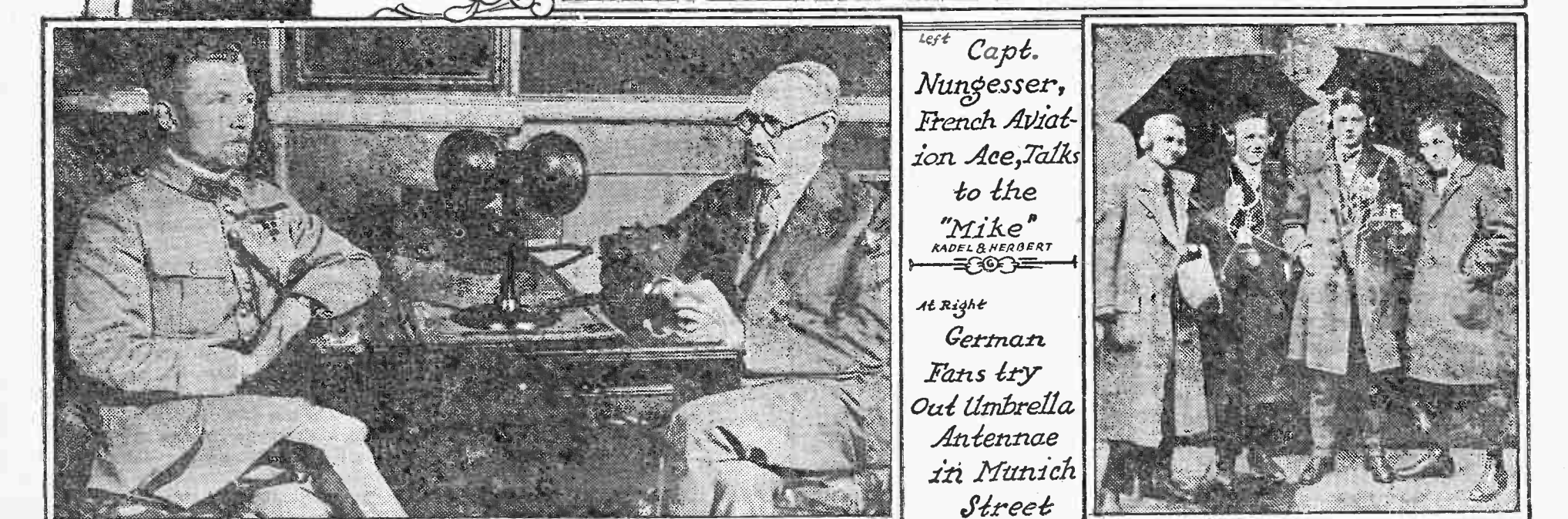
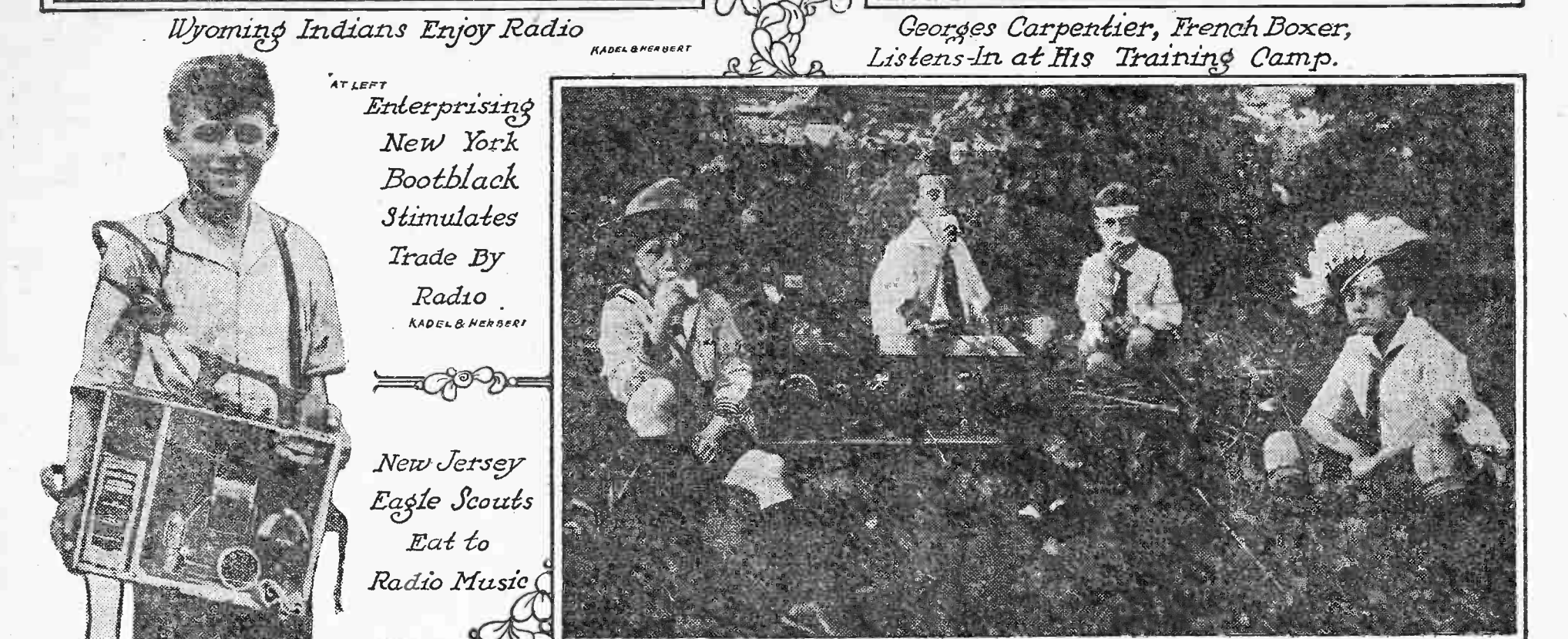
Radio Society  
Installs Receiver on London and  
Northeastern Railway Car (British)

Radio Install-  
ation on Great Northern Railway's  
Oriental Limited (American)



Margaret  
Listens-In  
For First  
Time at  
Salvation  
Army's Fresh  
Air Home  
WIDE WORLD

Georges Carpentier, French Boxer,  
Listens-In at His Training Camp.

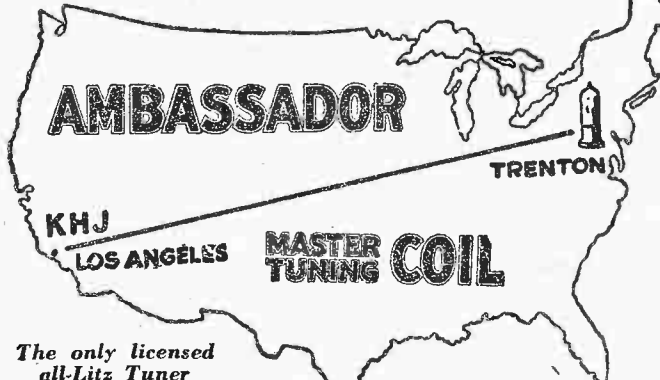


Capt.  
Nungesser,  
French Aviat-  
ion Ace, Talks  
to the  
"Mike"  
KADEL & HENBERT

At Right  
German  
Fans try  
Out Umbrella  
Antennae  
in Munich  
Street

## Trenton-Los Angeles

USING ONE WD 11 TUBE  
and the



**AMBASSADOR**  
KHJ  
LOS ANGELES  
MASTER TUNING COIL

The only licensed all-Litz Tuner

Quoting from a letter of W. L. Burt, of Trenton, N. J., to Broadcasting Station KHJ, Los Angeles.

"I tuned in your station with a hook-up consisting of an Ambassador Coil, .0005 variable condenser with vernier and a WD 11 tube without any amplification. I distinctly heard your announcer mention the following subject—'Is Bobbed Hair a Short Cut to Common Sense or Not?'"

Try an AMBASSADOR COIL in place of your variometer or variocoupler. If it does not improve your set one hundred per cent. bring it back within five days and your money will be refunded.

**BEWARE OF IMITATIONS—ONLY THE GENUINE IS GUARANTEED**

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World Radio History



A DEPARTMENT OF  
POPULAR DISCUSSION  
OF TECHNICAL POINTS  
USUALLY CONSIDERED  
TOO INTRICATE FOR  
GENERAL EXPLANATION.

## BEHIND THE PANEL

— COPYRIGHT BY —  
R. P. CLARKSON

THINGS never are quite so bad when they happen as you may have been led to believe. That is one of the glories of our imagination. If we get an inkling that the future will be unpleasant, and the future is far enough off, before it gets here the imagination has created in us an enlarged idea of just how bad it was supposed to be. The effect is a good deal as if you hold a coin out at arm's length and then bring it up near to the eye. When it is close it blots out everything else. Perhaps some such reflection was responsible for the oldtime slogan "They all look good when they're far away." Anyhow, here we are in midsummer, and radio reception is still pretty good. DX comes in with real volume, but somewhat noisy. Rarely does our old

wind blows strongly the branches sweep against that end or against the insulator out there and you have a fading effect which you lay to unknown causes. Perhaps that insulator got wet some time and covered with dust. Perhaps it is unglazed porcelain and takes up moisture in this kind of weather. Perhaps you bought some "Jersey mud" insulators and they worked O K up to recently, but now the heat of the sun has got after them and they have broken down or warped into such shape as to form pockets for the moisture and dirt to accumulate. All these things will help to give you consistent weak reception and you blame it on the summer.

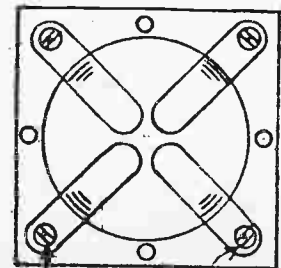
Then on the other end of your aerial, how about it? All the foregoing remarks

cumulating all over the set. The ground connection may be corroded. With the changes in temperature some of your binding post connections or any of the connections depending on nuts may have loosened up. You must go over the whole thing carefully every little while.

Another point of importance, especially in home built sets, is the question of insulation of the coils. Have the forms you wound them on taken up moisture? Are the windings themselves perfectly dry? With the exception of annunciator wire, almost all wire insulation is splendidly absorbing. It will soak up moisture like a sponge, cause leakage between adjacent layers and change the action of the set so that you wouldn't know it. The remedy,

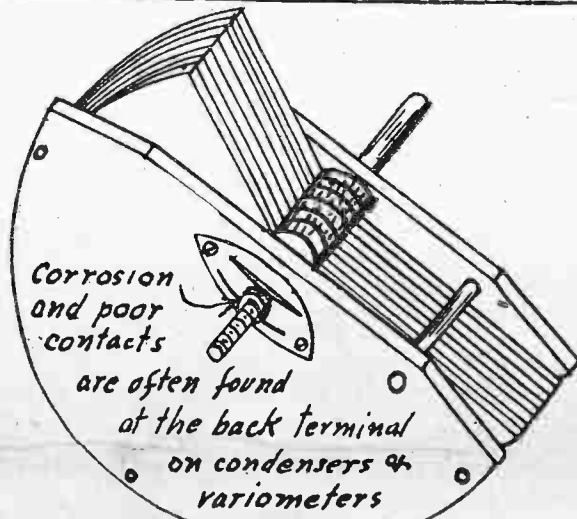
the negative terminals. If we have several of them wedged tightly together, they may be connected and cause leakage of their current and a consequent loss to the set. In the hot sun, B batteries are not improved any, especially if the sun shines through glass. One of the panel manufacturers tells me that, after a complaint from one of the dealers who mounted heavy parts on a light panel and put it in his show window, he made a little investigation and found that the temperature inside that window, by reason of the action of the plate glass, was unbelievably higher than he had ever believed would be found in practice anywhere except under artificial heating. No wonder the panel warped.

It might not be amiss to say here that



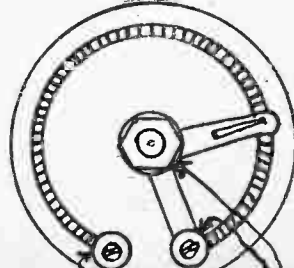
Where you find corrosion  
in cheap sockets, especially  
with steel screws or contacts.

TUBE SOCKET



Corrosion and poor  
contacts  
are often found  
at the back terminal  
on condensers &  
variometers

CONDENSER



The resistance  
wire must make  
contact with the  
screw here.

Look for  
corrosion  
at these  
places.

RHEOSTAT

friend "static" create enough disturbance to spoil the program. Those of you who put away your sets in moth balls for fear of poor reception this summer haul them out again, because there is nothing in it. Summer radio is here to stay, and the sooner the dealers persuade themselves of that fact the sooner their business will pick up. I suggest that some of these bob-tailed radio dealers' associations get up a slogan of all the year round for radio and proceed to put some punch in the slogan by helping the stations raise the standard of appeal of their summer programs.

There are some extra precautions that have to be taken in the summertime use of the radio set, and lack of this care causes some loss in volume and some of the noises we attribute to static. The three outstanding things to notice are the sun's heat, moisture in the air, which easily condenses on anything metallic and even moderately cool, and the condensed moisture which we call rain; also the fact that trees and plants are alive again with leaves out, branches and twigs growing and sap in them. These little changes in nature affect radio reception. They may affect the operation of your set, so that it may have fallen from its position as the pride of its owner to the more humble place of the curse of the family, but the fault is yours. It isn't the season; it's your failure to notice the fact that the season has changed.

Take, for example, the aerial. You put it up last fall, perhaps, and it worked well. Even now, as you look up at it, it seems to be just the same, but have you noticed that the tree you fastened it to has grown out and now surrounds the far end of the aerial, where special care in insulation is necessary because that is the high voltage end? Sometimes when the

will apply and perhaps a few more. Possibly the aerial is held up by ropes in place of wires and, as dry rope is a fair insulator, it was perfectly good until the rainy season came along and the rope soaked up moisture. Possibly the wetting and drying out of the rope permit the aerial to sag at times. Look also to the guy ropes and cables. Are they fixed so sagging or blowing will cause temporary contacts? Another possibility is that where you soldered the lead-in to the aerial the swaying and sagging have broken the soldered connection and now that is corroded just as badly as though it never had been soldered. This is the kind of weather that will cause almost no power of conduction.

Look well to the arrangement you are using to prevent the lead-in touching the roof or any part of the house. Did you tie it out with a cord which gets damp at night and offers a good leakage path? Did you push it away with a piece of lath which does the same thing? Did you use an insulator so arranged that it can fill up with water or get all covered with dirt and make a perfect connection to ground?

How about the place where you bring the lead-in through the side of the house? Can moisture get to it there and ground it to the house? Normally the rubbing against wooden frames does not have an appreciable effect, but in these damp days and those to come every precaution against leakage must be taken. Perhaps you are using one of those flat strips that you can shut the window down on. How about it? Is it soaked up with moisture when you get up in the morning? If so, it probably is when you are listening in.

Then inside the house there is likely to be moisture, and with the windows open there will be dust and dirt ac-

of course, is to dry them out in the oven or even in the hot sun, and then waterproof them with collodion, thin shellac or something similar, and you may have to do this several times. Even the best of the honeycomb coils are apt to soak up water so badly you can squeeze it out in drops by pressing your fingers on that fiber strip around them. If you are using honeycomb coils and they have fiber strips and your reception is poor, dry out the coils in the oven and dip them in collodion or thin shellac. You will find an uncanny increase in signal strength.

One of the secrets of good summer reception is unusual care taken in insulation and in good joints. Even the air is more conducting than usual. The base board of your set may be causing losses that would never be present in winter. It should be dried out thoroughly and soaked in paraffin, if the instruments are mounted on it. If your lead-in wire or your ground wire is not rubber covered or paraffin soaked it will pay to take that down, coil it up and soak it in paraffin or buy the proper amount of wire to replace it, being sure to get wire with moisture-proof insulation.

Of course, surrounding foliage may hurt reception considerably. To large extent, however, we hurt reception ourselves by being just a little more careless in the summer than we need to be. We can get away with almost anything in the dry season, especially when the snugg is going and everything inside is snugg and clean. In the summer, though, it is another story. We must then use conscious effort and continual watchfulness to anywhere near approach laboratory conditions.

Even our apparatus which we buy needs to be attended to. Dry battery covers get damp—those cardboard cartons that are such a nuisance in connecting wires to

panel mounting of instruments is the only all-season method of mounting that can be depended upon to give good insulation. Also, stiff wiring, such as bus bar wiring, unless all wires are spaghetti covered, is the only method of getting 100 per cent insulation in all seasons. On the other hand, stiff wiring flat against a bottom board is bad. If it is to be against the sub-panel, the sub-panel must be of good panel material.

Look also to your condensers. Clean them out between the plates, using pipe cleaners bent around into a loop. You can get two packages of cleaners for 5 cents in any cigar store and there are twelve cleaners in a package.

Look to the contacts on your variometers. What a time one make of variometer gave us last summer with corrosion of the spring contacts! Everywhere in any moving part in your set where there is sliding or frictional contact, look it over and keep it clean. You must realize that in radio not only is cleanliness next to godliness, but also that too much cleanliness and care is next to impossible. Your signal will repay you for every joint you clean.

Finally, look over your rheostat carefully. Is there any green on it or on the potentiometer? How about the spring contact arms on your tube sockets where the binding post screws go through? That is an occasional source of trouble. Then down at the storage battery. Keep the top dry. Keep water up over the plates. Dry the terminals bright and clean. Disconnect the clips and scrap off all the corrosion. If any binding posts go through wood, see that they are insulated. If the battery leads go through wood, unless the leads are rubber covered, put in insulating bushings.

In short, the idea now is to keep corrosion, dampness and dirt away from the set; to keep all joints soldered well, to keep all friction contacts bright and in every way for this next month or six weeks, conserve our signal strength. Then we will know that summer radio is just as pleasurable and important as winter radio ever was or ever will be.

## Last Week on the Radio

By Pioneer

WE HAVE before us a recent statement of Senator Arthur Capper in which he expresses very blunt opinions about that controversial subject, radio advertising. Although his conclusions are not especially analytical, they stimulate thought and we are moved to add a few lame remarks of our own which may or may not add more understanding as to the possible outcome of the present aims of broadcasters. First, let us present the words of the Senator, quoted from "Printers Ink":

Senator Arthur Capper was recently asked to state his opinions regarding the salient phases of the subject, and was emphatic in expressing the conviction that any attempt to take undue advantage of the public good-will toward radio, or to mislead or deceive the public to any extent, would call for prompt and drastic legislation.

"The radio industry," he continued, "has been marvelously built up on a liberal and open policy. Attempts to commercialize broadcasting, or make it directly profitable, have been based on the chicanery of the broadcasters. It is a wrong principle of business. But I have never talked with the purchaser of a receiving outfit who did not honestly believe that he had paid the price of admission to 'listen in' when he paid for his equipment."

"It is common knowledge that the manufacturers of equipment have largely supported the broadcasting stations because of the great stimulation to the industry offered by high-class entertainment and other features. It is also generally known that large stores, hotels and other places have been able to get the very best of the radio business by the use of the radio as a means of advertising. It is also generally known that the numbers are being furnished through their courtesy."

"The magnificent volume of the radio industry has been built up by healthy and honest competition in the broadcasting of quality programs. The manufacturers of equipment are evidently more than willing to spend large sums of money in order to furnish the only attraction that encourages the wide purchase and use of their receiving equipment. And it is perfectly logical to suppose that a reversal of their competitive policy would have a strong tendency to demoralize the entire business."

"Broadcasting stations, in developing the paid-for propaganda and advertising, will create competition which will lead inevitably to a letting down of the censorship bars. The necessity of getting the business, of selling the service, will encourage leniency of supervision, and that station will get the most business which offers the greatest liberality in passing on broadcast messages of the bought-and-paid-for service."

"It seems almost superfluous to comment on the obviously demoralizing and deceptive practice of broadcasting disguised indirect advertising for which the station has received a fee. For some years now it has been illegal for a newspaper or magazine to publish anything in paid-for space without indicating unmistakably that the matter is paid advertising. The laws were passed because the practice of disguising advertising as 'reading notices' or news matter was considered an imposition on the public and a deception. And the broadcasting of paid-for indirect advertising, without a clear statement of the fact at the beginning of every message, that the speaker has paid for the privilege of broadcasting, is no less a deception and an imposition so far as the public is concerned."

"The radio industry has been built up on the principle of giving the people what they want. Millions have bought receiving sets because they felt assured of the privilege of listening to broadcast information and entertainments designed entirely in their interests. Therefore, it is now ridiculous to suppose that the industry can be successfully developed further by a reversal of the policy. The broadcasters cannot hold or increase the interest of the public by using the entertainment feature as a lure to put over an increasing volume of paid-for propaganda and indirect advertising."

Although we have never been convinced that radio advertising is any-

thing but a passing phase of radio development and that it can do nothing but menace the artistic evolution of broadcasting while it does last, we believe that it is futile as well as unfair to compare advertising in magazines with advertising on the air. The Senator claims that the public is deceived inasmuch as the radio broadcaster of advertising does not label their output as such. We wonder if the good Senator has stopped to think about the thousands of tons of paper that is used every year in the production of magazines that do little but publish "reading notices." We wonder if he takes into consideration the millions of paragraphs of subtle publicity that is published in some of the best magazines every year? We could name a dozen and one publications that reek with propaganda all in the name of news, amusement and "human interest." The innocent reader seldom knows what he is reading so completely are some of the less substantial publications subsidized. That little word "Advertisement" at the top or bottom of a page does not always grace the sheet carrying a pure piece of publicity.

In the face of these indisputable facts, it is a bit unfair to call every advertising broadcast on the radio, propaganda or publicity, in the more subtle meaning of the word. We have always been inclined to compare it with what is known in advertising circles as "reader copy." This is copy with a story-like treatment of the subject. As we see it, radio can be charged with no greater crime than this when the broadcasting has been placed in the hands of the better broadcasters like WEAF. Here a very respectable censorship is maintained and on but few occasions have we had occasion to doubt the judgment of those responsible. We often rant wildly about insurance copy and the marketing of the salad dressing makers, but we confess that there is no great reason to feel insulted or incensed.

Our objection to advertising on the air is based on the fact that it may become general and thereby dangerous. It will also tend to rob broadcasting of prestige and interfere with its more artistic development. Such outspoken commercialism as advertising is a poor foster mother to so tremendously an important thing as radio. Associating advertising with it cheapens it and invites disaster. It is also a thing that can be very easily overdone. Already some of the smaller and less important studios are looking toward advertising as a possible source of revenue. One New York station has exploited its broadcasting facilities in such a flagrant manner that one cannot help but wonder where this unwanted offspring of radio will end. They have advertised for chorus girls and for dinners at Broadway hotels, openly mentioning the "best meal on Broadway for \$1.50." This is an extreme case, but it serves to show that broadcasting can very easily degenerate into one gigantic advertising scheme.

Advertising and radio are warm friends even in the smaller towns where the clothing stores, the ice cream manufacturers and dry goods shops hire talent at \$5 or \$10 a night for the privilege of having the much-sought-for courtesy line attached to the announcement. It would seem that radio is gradually falling back into the arms of a crafty exploiter, and that is the reason we look upon advertising by broadcasting as a real menace to what should be normal artistic expansion unshackled by the sign painters and ferved copy writers.

### Radio Experiment on Railway Tried in England

A successful radio experiment was recently conducted in England by the Radio Society and the L. & N. E. Railway. A wireless station capable of receiving and transmitting messages on a wave length of 185 meters was installed in a rear coach of the 7:30 express from King's Cross to Newcastle going at the rate of sixty miles an hour. As it sped along messages sent by various amateur experimenters according to instructions were received. Musical selections from broadcast stations were picked up.

The primary object of this experiment was to note the effect that tunnels, cuts, bridges, ore-bearing localities, etc., have upon wireless signals. Signals were entirely lost going through tunnels and passing over limestone rock.

## The World's Greatest Headset Value

ANYONE with even a superficial knowledge of workmanship, instantly recognizes the excellence that characterizes every detail of construction in the

## TOWER Scientific RADIO HEADSET (Navy Type)

Sold by the largest exclusive manufacturer of headsets with a money-back guarantee. Our production this season will be more than one million double headsets. These receivers are "Tone Twins"; each is built with the greatest precision and tested by licensed radio operators. The headset weighs only 8 ounces complete (lightest on the market) and most comfortable, too! Through huge production, we have been able to reduce the original selling price of \$6.00 to

**\$2.95**

Submit SCIENTIFICS to any test. Compare them in every particular with others, regardless of price. Examine a pair at your dealer's today!

**TOWER MANUFACTURING CORP.**  
Main Office: Boston, Mass. New York Office: 1133 Broadway

DEALERS—This product is available to all reliable dealers in this territory on a strictly consignment basis. Write for full particulars.

## MAIL ORDERS SOLICITED GREAT NORTHERN SALES CO.

**60 VESEY STREET**  
Bet. Church Street and West 4th Ave.  
CORTLANDT 4263

**NEW STORE**  
4 W. 43d St.  
Just West of 5th Ave., Penn. 7865

**127 W. 33RD STREET**  
Bet. 8th & 7th Aves.  
CHICKERING 0246

When Great Northern opens a new store it is truly a time for real Radio rejoicing. 4 West 43d, OUR THIRD STORE, will bring to its doors Radio enthusiasts who can afford to buy the Best. 5th Ave. needs Great Northern. We will cater to 5th Ave. as only Great Northern can do.

**THE NEW De Forest D-12 Reflex**

A Four Tube Long Distance Indoor Loop Receiver, with Self-Contained Batteries and Loud Speaker.

**HEAR IT—ON DEMONSTRATION AT GREAT NORTHERN**

**THE FAMOUS D-10 COMPLETE**

**NOTHING ELSE TO BUY**

**\$89.95**

4 Genuine De Forest Tubes.  
3 Burgess "A" Batteries.  
3 Burgess "B" Batteries.  
1 Loop, Carrying Strip.  
1 Instruction Book.  
1 Weston Plug.  
1 Perfect Loud Speaker.

These sets are slightly shopped, but so slightly that any defects are hardly noticeable. Absolutely guaranteed by us. Internally just like new. Purchase these sets on our say so. They are a truly remarkable buy.

### SUPER-HETERODYNE

Will be the biggest sellers in the fall. If you want to hear the best in Super-Heterodyne listen to the COMO or ACACRY at any of our stores. Reception always on demonstration.

**WHOLESALE AND RETAIL**

If you want to buy, sell or exchange your radio sets or parts the Radio Exchange will help you.

### Your Radiola Super-Heterodyne

IS DIRECTIONAL IN THE LENGTH OF THE BOX.

Turning the set toward the desired station eliminates interference—gets maximum distance. Get the benefit of this wonderful feature.

Put One of Our Special "SUPER-HET" Ball Bearing Mountings Under Your Set

And you can Rotate it with One Finger

SOLID AND SUBSTANTIAL ATTACHES PERMANENTLY IN 3 MINUTES AND RAISES SET BUT 1/4 IN. FROM TABLE.

**\$5.00 post paid ANYWHERE IN U. S. A.**

**HENDERSON and LATHROP, Inc.**  
P. O. BOX 575. AUBURN, N. Y.

## RUSONITE BLOWOUT PREVENTOR

At Last! Economical Tube Insurance

50 CENTS INSURES YOUR TUBES AND SETS. PREVENTS BLOW OUT OF TUBES. PREVENTS DAMAGE TO WIRES. PREVENTS EXCESSIVE VOLTAGE OR SHORT CIRCUIT RISKS.

Order from your dealer or from

**Rusonite Products Corporation,**

15 Park Road, New York.

### GO WHERE THE CROWD GOES

**COLUMBUS SHOP**  
874 Columbus Ave., (1024-1034)  
22 E. 125th St., nr. Madison  
Standard Merchandise  
Sale Now Going On

We have a following! BECAUSE—we have never been out of stock on advertised merchandise—You Are To Be the Winner, not have we ever made a promise that wasn't kept.

**OUR \$100 SPECIAL 5 TUBE SET**

10 DAY FREE TRIAL

Distance, Clarity, Volume Guaranteed—You Are To Be the Winner. Includes Yale storage battery, 6 tubes, Music Master Loud Speaker, Installation..... **100**



**ATLANTIC & PACIFIC RADIO CORP.**  
223 W. 34th St. Opp. Penn. Term.

**DEAL WITH THE MANUFACTURER**  
DIRECT AND SAVE MONEY  
Insure yourself for BETTER SERVICE and GREATER SATISFACTION, HIGH QUALITY and LOW PRICE.

**A & P NEUTRODYNE**  
THE STANDARD 5-TUBE SET  
THE BEST AND MOST POPULAR NEUTRODYNE IN THE WORLD WITH ITS UNCONDITIONAL GUARANTEE FOR ONE YEAR.  
Designed for both indoor and outdoor use. RECEIVES LONG DISTANCE ON INDOOR AERIAL. \$65  
Clearly and loudly. Times very easily, and always "picks up" stations on the SAME DIAL READINGS.

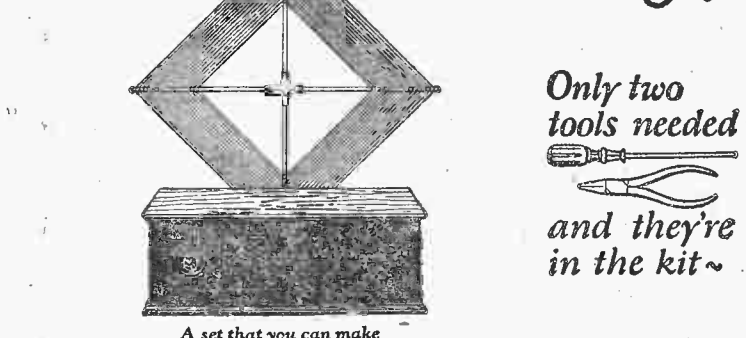
**A & P NEUTRODYNE**  
BREAKS ALL RECORDS  
FOR DISTANT RECEPTION ON A HOT SUMMER NIGHT  
James J. Comasey, 676 9th Ave., N. Y., owner of an A & P NEUTRODYNE, wrote us this week that he "tuned in" DX STATIONS, IT. WORTH AND LOS ANGELES clear and loud on the LOUD SPEAKER.  
Listened to Los Angeles for one-half hour on the Loud Speaker. The location is very poor—right in the heart of N. Y. C., facing an elevated train line.  
Mr. Comasey gave a party that evening. Some of those present who listened in are: Miss Helen D. Reilly, Mrs. Orvis, Quoque, L. J. John K. Cummings, Rose, land Ave. garage, Caldwell, N. J.; Mr. and Mrs. Harry Stett, 300 W. 34th St., N. Y. C.  
One of many testimonials proving the superiority of A & P Sets.

**KNOCK-DOWN**  
SPECIAL A & P KIT FOR 5-TUBE NEUTRODYNE  
EVERY part that is needed to BUILD this A & P NEUTRODYNE is included in this KIT at the REMARKABLY LOW PRICE OF \$25.95  
Postage Extra  
All parts to BUILD one like our STANDARD NEUTRODYNE. \$32.50  
Cabinet Extra

**IMPROVED**  
**SUPER-HETERODYNE**  
THE FAMOUS A & P 8-TUBE SET  
The important feature of this famous instrument is that it receives LONG DISTANCE on a LOUD SPEAKER without the use of any ANTENNA WHATSOEVER, like a LOOP—either EXPOSED or CONCEALED, nor GROUND. The only connections are from the set to the battery and the LOUD SPEAKER. LOCAL STATIONS can be Cut Out for distance even at the slightest difference in wave length.  
Practically FREE FROM INTERFERENCE BY CODE OR WEATHER CONDITIONS.  
Its operation is remarkably simple—only two dials control the tuning. It is the only set of its kind that reproduces MUSIC and SPEECH with just as CLEAR TONE as performed. Everyone who listens to this instrument agrees that it plays with a finer tonal quality than they have ever heard. It is as though you were present at the performance. A GREAT SET.  
\$150

**CASH OR DEFERRED PAYMENTS**  
Cheerfully Arranged  
OPEN UNTIL 9 P. M.  
GREAT  
**ATLANTIC & PACIFIC RADIO CORP.**

*At last—  
Radio set-building  
made easy!*



Anyone can put together an  
**ACMEFLEX KITSET**

WITH an Acme Flex Kitset you can put together the famous Acme 4-tube "Reflex" in one evening. Complete directions, simple and easy to follow, are given with the kit. No soldering, no workshop, no technical knowledge required.

All the parts needed are in the Kitset—wires, loop, sockets, drilled panel and baseboard—everything. The only accessories to get are tubes, batteries, loudspeaker and cabinet.

The set is so simple that your wife and the kiddies can use it. You can hear everything on a loudspeaker and have "all the year round radio." Price: \$65.00. Send for descriptive circular.

ACME APPARATUS COMPANY, Dept. 12B, Cambridge, Mass.  
Transformer and Radio Engineers and Manufacturers

**ACMEFLEX**  
KITSET

**"PAL" HEAD PHONES**  
AT LAST THE FORD IDEA HAS BEEN BROUGHT INTO THE RADIO FIELD.  
Only by tremendous volume and standardized parts is it possible to produce a pair of phones which have HIGH QUALITY AT LOW PRICE.  
Write or call for our New Complete Catalog.  
**MANHATTAN RADIO CO.**  
112 Trinity Pl., Cor. Liberty Street  
New York  
Reorder 2429.

**RADIO TUBE EXCHANGE**  
ALL TUBES REPAIRED AND GUARANTEED TO DO THE WORK.  
W. D. J. or 12  
U. V. 199-200-201A  
U. V. 202-203-204  
RADIO TUBE EXCHANGE, 200 B'way, N. Y.  
All Mail Orders Given Prompt Attention.  
Orders Sent Parcel Post C. O. D.

**AMATEUR KICKBACKS**  
By EVERETT M. WALKER-2CDR

THE amateurs are being severely criticized by radio enthusiasts because of their abbreviated linguistic manipulation. In other words, they are not understood, and as a rule most persons are suspicious of what they don't understand.

Our advice to those who are not already acquainted with radio shorthand is to learn it. These nicknames are evidence of familiarity with the radio art which was unknown to the past generation. Just as two or three slang words picture an idea better perhaps than a long paragraph, so does a mode of expression peculiar to radio more succinctly express what is meant.

Take, for instance, "broadcast listeners." Is it not much easier and simpler to get the thought over by merely saying "BCL"? The whole name for "amateur radio operator" may be expressed by the simple word "ham." If you are continually talking about your long distance reception you can save time by saying or writing "DX."

Besides these idioms there is a long list of "Q" abbreviations that are used in international radio telegraphy and may be applied equally well to radio telephone or broadcast reception. "QRM" designates interference, and "QRN" means interference from static. With a thorough knowledge of this shorthand the amateur and novice would understand each other and be living up to the rapid development of the age.

2CUA is back with more "pep" than ever. He is still using a CW set employing two five-watt tubes. For local work a chopper is used which has been found very convenient for calling local stations.

2CTQ has been trying to work amateurs in his vicinity on his receiver. He says several stations have been worked and 2EX reports him very loud. In the set a single WD-11 with a 22½-volt "B" battery was used.

2BAW does not regret the installing of a rectifier on his transmitter. With much less plate voltage on his fifty-watt tube he has worked every district but the sixth and seventh, and has been reported several times in the former.

Another station that has been handling considerable traffic lately is 2BGD. The transmitter used employs a pair of five-watt tubes connected in a reverse feedback circuit. With a medium plate voltage the tubes do not overheat.

2ADU has been experiencing difficulty in working stations in West Virginia, Kentucky and Tennessee. However, stations in Texas and other Western states have been worked with ease. Has any one else found this to be a dead spot also?

Vermont is going to have a state convention on the 9th of August and would like to have several second district amateurs present. It will be held at the town of Poultney, Vt. For further information regarding the above address a letter to radio 1AJG, Charles Kerr, Depot Square, Poultney, Vt.

2CQZ has been at Sea Girt for the last two weeks. An amateur transmitter, employing two five-watt tubes and operating under the call of 2WX, was installed in his tent. Also a Reinartz receiver was used. With an antenna about eighteen feet in height stations in the eighth and ninth districts were worked. However, it was found difficult to communicate with amateurs in the vicinity of Newark.

2BZJ has been spending the last few weeks at a Jersey shore resort. One walking along the Boardwalk would not have any difficulty in locating him, as he wears a sweater that has his call on the back in big red letters—MIM.

Another station that has been doing some very good work of late is 2CIL. With two five-watt tubes he has been able to carry on two-way communications with stations in the first and third districts in daylight.

2BBX is using what we believe to be a 250-watt tube. At the present

the air now with a 250-watt tube of his own.

If any stations have traffic bound for the west coast they should give it to 8BYN for quick delivery. He maintains regular schedules with a number of west coast stations, especially 6AHP.

Another ninth district spark station that is heard occasionally in the second district is 9CGX. An old-half KW transformer is used with a "sink" gap. This is one of the last of the ninth district sparks, and we heard him say he thought he would give CW a try in the near future. Mim.

The other night we heard 9DWX on a very short wavelength attempting to handle traffic. He said he was using one five-watt tube with 500 volts of rectified AC on the plate. A number of experiments on short wave lengths have been conducted at this station and reports are greatly appreciated.

## Beware of the Radio Gold Brick

By M. RANKIN

Radio is a marvelous discovery with almost unlimited uses, but in every age there are thousands of persons who grab frenziedly at any possibility of getting rich quick and who flood the country they happen to be encumbering with wild schemes, inventions that won't work, and worthless stock. They talk smoothly, produce facts, figures and affidavits that convince the gullible and impoverish a pathetically large number of innocent who, with the prospect of future comfort and perhaps luxuries, "invest" their small capital so securely that they never see it again.

It is astonishing the number of keen-minded men, with fortunes accumulated by years of hard work and thrift, who have thrown large amounts into so-called big-edged securities, or are financing some impossible plan for building radio apparatus at little cost but immense profit. Inexperienced enthusiasts get carried away with the idea that if one set can be built at a stipulated price, a number can be built for even less. Manufacturing and marketing problems must be solved before investments can pay back one cent on the principal.

Amateurs experimenting make "discoveries" already patented, and unless proper licenses are secured, the manufacturer finds himself involved in a complicated and expensive maze of lawsuits and counter suits that are ruinous. The patent situation is not to be given too careful scrutiny by a would-be investor. The stable manufacturers have their products thoroughly covered by all the patent protection the government affords. Although responsible designers have been too busy to undertake the prosecution of infringements, a day of reckoning is surely dawning when those opportunists who are madly trying to capitalize the public demand for radio will be obliged to answer for their violation of government-granted rights to existing inventions.

In a recent investigation it was estimated that nearly 2,000 corporations were organized in a few months to manufacture radio apparatus. It is obvious that all of these companies could not have the essential technical skill, and failure is the reward of ignorance and lack of expert knowledge.

The radio business is still too young to have a background upon which one may base comparisons. Last year was unlike the year before, this year is unlike last year and 1925 will be unlike any other year. The summer sales of 1922 were almost nil. Sales in the summer of 1923 were better. The political campaigns are making 1924 summer sales profitable. Portable sets for summer homes and camps, besides a number of things now unrealized, will keep 1925 sales even all year. There is bound to be a radio receiver in almost every home within the next few years. Not only in homes, but in schools, churches, auditoriums and hotels radio will take its place as naturally as the telephone.

There is a great deal of money to be made in radio just as there is in any worth-while invention that is honestly made—but there will be millions lost unless the investor is on the alert and doesn't allow himself to be inveigled into buying "gold bricks."

It is impossible to get something for nothing; and when a concern goes to the public for its financing, very careful investigation should be made.

The other morning we were rather surprised when 9ELL was heard saying that his counterpoise was only ten feet below his aerial. He was very qsa considering the antenna system used.

Some amateurs sure do have hard luck. 8FU borrowed a 50-watt tube from 8ZY and had the misfortune to turn it out. However, he is back on

## Radio Patent Up on Appeal

Lee and Hogan Carry Heterodyne Invention to United States Court on Priority Claim

By Thomas Stevenson

WASHINGTON.—The United States Court of Appeals has just been called upon to decide the question of priority on one of the most important radio inventions of recent years. The invention covers the most practical forms of heterodyne circuits.

The appeal was filed with the court by John W. Lee and John L. Hogan Jr., both of whom represent the Westinghouse Electric and Manufacturing Company, over the decision of the Commissioner of Patents in granting priority to Frederick K. Vreeland, whose patents are owned by the Radio Corporation of America, for the invention of "improvements in transmitting intelligence by radiant energy."

The case recalls the old struggle between the General Electric Company and the Westinghouse Electric Company for supremacy in the radio field and the means by which the Radio Corporation of America rid itself of its most dangerous rival.

The General Electric Company and the Westinghouse Electric Company have always been keen rivals in the electrical field. When the General Electric Company entered the radio field and helped to organize the Radio Corporation of America the Westinghouse company followed its example and formulated a new company, which was known as the International Radio Telegraph Company, to compete with the Radio Corporation.

The Westinghouse company was the first concern to erect a broadcast station, and although the apparatus which it then had was crude, it was enabled, late in 1920, to demonstrate to those interested in the radio industry that if proper transmitting and receiving apparatus could be designed and developed, unhampered by patent restraints, broadcasting would become a great public utility, and in anticipation of the patent situation being cleared up proceeded with the development.

But the Westinghouse company did not get far before it learned it could not sell the sets it manufactured because vacuum tubes were required for their efficient operation, and the Radio Corporation owned all of these patents.

### Westinghouse Sells Patents

Therefore, on June 30, 1921, the Westinghouse company sold the patents of the International Radio Telegraph Corporation to the Radio Corporation, and on the same day entered into an agreement with the Radio Corporation whereby it agreed to manufacture radio apparatus exclusively for the Radio Corporation.

In the case filed with the Court of Appeals Lee and Hogan claim the Vreeland application is an infringement on a patent granted them in June, 1915. Vreeland's application was filed on October 27, 1915. Interference proceedings were instituted by Lee and Hogan against the claim

of Vreeland on January 11, 1916. On October 13, 1921, the Examiner of Interference awarded priority to Lee and Hogan. On April 19, 1923, the Board of Examiners in Chief reversed the decision of the Examiner of Interference and gave priority to Vreeland. On April 4, 1924, the Commissioner of Patents upheld the decision of the Board of Examiners, whereupon Lee and Hogan filed an appeal in the Court of Appeals.

Here are the inventions covered in the case:

"1. The method of receiving oscillating current energy by first combining it with the energy of a separately produced auxiliary oscillating current whose frequency is slightly different from the frequency of received current, and then rectifying and utilizing the combined current to operate an indicator.

"2. The method of wireless signaling which comprises exciting a receiving circuit by the received wave energy and also by an auxiliary alternating current of a frequency so related to the frequency of the received energy as to produce beats therewith and then rectifying and using this composite current to operate a receiving instrument whereby to amplify the effect of the received signal.

"3. The method of wireless signaling which comprises the constant production of an auxiliary oscillating current of frequency similar to that of the received signal waves, combining such auxiliary current with the received current, electrically rectifying the combined current and utilizing it to operate an indicator.

"4. An amplifier and discriminator for wireless signal receiving apparatus comprising an auxiliary source of current adapted to excite the receiving circuits with a frequency near to and different from the frequency of the current of the received waves, means for electrically rectifying the current resulting from the combined effects of said two currents, and an indicator operated by the rectified current.

"5. A receiver for wireless signaling comprising an antenna, a cumulatively and proportionally responsive detector associated therewith, a current-operated indicator and an independent co-operating source of current also associated with the antenna and having a frequency differing slightly from the frequency of received signaling current, so as to produce beats therewith and thereby operate the indicator by the combined currents.

"6. In wireless signaling apparatus the combination with the receiving circuits, a detector and a current operated indicator of a local means to generate a co-operative current and produce beats with the current of the received waves whereby to control the character of the signal note during the receipt of messages."

Copyright 1924.

"Radio operator first to pick up SOS from rammed steamer Boston



The hero of what came near being a great sea disaster is the radio operator of the steamship Priscilla, the first vessel to pick up the radio call for help from the Boston, and the first vessel to reach the scene of the disaster. The radio operator, H. A. Dreisacker of the Priscilla, kept in constant communication with the Boston after picking up the SOS call for help, in this way enabling the Priscilla to pick up over 480 of the survivors.

The photograph shows H. A. Dreisacker, chief radio operator of the steamship Priscilla, and I. R. Wolfe, his assistant, in the operating room on board the boat.

**Summer is the time to build your FADA Neutrodyne Receiver**

DON'T miss the wonderful radio programs. Build a 5-tube FADA Neutrodyne Receiver now. The long evenings give you lots of daylight. Then, when it is complete, you can enjoy the concerts, the political events, take the receiver on your vacation and keep in constant touch with the latest happenings.

Even in summer static doesn't interfere with reception of local programs. Boys everywhere are making the most of summer vacation by building 5-tube FADAS to be ready for fall. Build now. Buy the FADA 5-tube knock-down Neutrodyne Receiver from your dealer and build it in spare time. It's easy.

The FADA book, "How to Build FADA Neutrodyne Radio Receivers," comes with every outfit or is sold separately for 50 cents. Complete detailed instructions with diagrams and pictures. Ask your dealer for the FADA Knock-down Kit No. 167-A. Price \$65.60.

**TO DEALERS**  
Exclusive FADA Wholesale Distributors for the Metropolitan District

<b>MANHATTAN</b> Manhattan Electrical Supply Co. 17 Park Place, New York Triangle Radio Supply Co. 120 W. 23rd St., New York	<b>North American Radio Supply Corporation</b> 1845 Broadway, New York	<b>NEWARK</b> North Ward Radio Co. 225 Halsey St., Newark National Light & Electrical Co. 289 Market St., Newark
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**BROOKLYN**  
Victory Electric Supply Co.  
1403 Bedford Ave., Brooklyn

**F. A. D. ANDREA, INC., 1581 Jerome Avenue, New York**

**FADA Radio**

**Cunningham**  
Type C-301A Price \$5.00

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## Why Your Receiver Squeals

An Explanation of the Chirps and Whistles Often Heard in Broadcast Receivers

By JOHN V. L. HOGAN

GENERALLY speaking, there are two types of whistling interference heard in broadcast receivers. One kind is caused when two broadcasting stations send simultaneously at wave frequencies (wave lengths) that are too close together. Their waves react on each other and produce a more or less uniform whistling note, often of very high pitch, in all the radio receivers within range. This sort of interference is not very bothersome, except occasionally when listening to 833-kilocycle (360-meter) waves. It is daily growing of less importance, and for the moment we need not consider it further, although it will be discussed in a future article in this series.

The second kind of whistling interference is caused by radiating receivers, or, in other words, by receiving stations that are so designed and so operated that they act as small radio transmitters. This kind of interference is now exceedingly troublesome and breaks up a great deal of broadcast reception. It is a particularly severe nuisance in localities where many radio receivers are set up close together, as in the cities; but even in the country this squealing and whistling interference often completely prevents satisfactory receiving.

It is safe to say that nearly every broadcast listener has often heard the chirp or whistle of rapidly varying pitch that is the mark of this kind of interference. Many listeners, however, do not know what causes the troublesome whistles and many do not know that their own receivers may be adding nightly to the general din of squawks and squeals.

### Chirps and Whistles

The reason why these chirps and whistles occur is equally a mystery to many radio listeners, although the scientific basis of the action is not at all complicated. It is merely another manifestation of the common phenomenon of "beats" that is frequently noted in acoustics. You may have observed that when two musical tones of neighboring pitch are sounded simultaneously, the combined tone flutters in intensity. This happens because the two sound waves interact or "beat" together, and the rapidity of the flutter is always equal to the difference in frequency of the two sounds. Thus, if two organ pipes of 32 and 36 vibrations per second, respectively, are blown at the same time, the sound heard will grow strong and weak (or flutter in strength) four times per second.

In the same way, if two radio waves or two radio-frequency currents of somewhat different frequencies are allowed to interact upon each other they will produce beats. Thus a carrier wave from station WEA, at the frequency of 610,000 cycles per second, might interact with the carrier wave from another transmitter at 611,000 cycles per second to produce 1,000 beats per second. When picked up and rectified, such beating waves would produce, in the listening telephones or loud speaker, a note of 1,000 per second pitch, corresponding approximately to the second C above middle C on the musical scale. Any change in frequency of either beating wave would produce a change in the pitch of the beat note, since this must always equal the difference in the two wave frequencies.

Unless you use a blocking tube the wise and considerate thing to do is to keep your receiver adjusted so that it is not in the oscillating condition that produces interference. Whenever you hear a whistle of this kind, stop your set from oscillating. If you will follow that rule and will impress its importance upon your radio friends you will find that great reductions in the amount of whistling interference can be made.

In the same way a carrier wave from any station will beat with waves or currents produced by its self-oscillating receiving set. The frequency of the oscillations in the receiver, and of the waves that those oscillations will send out if they are allowed to get into the tuning antenna, depends upon the tuning adjustments of the receiving set. As the tuning knobs are turned the frequency changes. Consequently the pitch of the beat-note produced also changes, and this is what gives rise to the bird-like chirps and whistles that are so often heard.

### Interfering Receivers

If you have a radio receiver of any of the types that can be made to cause oscillations in the antenna circuit, your set is one that may interfere with your radio neighbor's reception. The receiving sets that can be made to generate antenna-circuit oscillations, and thus to interfere

### "All-Lorain Night"

Concert From WTAM

A concert to be broadcast from WTAM, Cleveland, on August 4 might well be entitled "After the Storm," taking the name from that popular composition. This, in spite of the fact that the song will probably neither be sung nor played. The artists for the night are all Lorain, Ohio, people and the concert will be billed as "All-Lorain Night."

Radio listeners will remember Lorain as the Ohio city that was nearly wiped out by a tornado on June 28. WTAM at that time was instrumental in rushing aid to the stricken city when all other means of communication in and out of the city were wrecked.

First information to the world of the plight of Lorain was made public through radio amateurs sending word from the city and co-operating with WTAM in asking help.

Now, after the storm, a group of Lorain people, some of whom lost relatives or friends and some of whom were rendered homeless by the tornado, are coming to WTAM to entertain radio listeners.

It will be no easy task for some of these people to stand in front of the same microphone that told of the loss of their loved ones and summoned aid to the homeless and sing. But the spirit of devastated Lorain will be exemplified by them when they do just that.

### New Receiver Announced

"Electrovox," meaning electric voice, is the name given to a new and efficient radio receiver being manufactured by the American Specialty Company, Bridgeport, Conn. This is a five-tube tuned radio-frequency receiver incorporating many features, both electrical and mechanical, that are claimed to be new in radio. The tubes require only three volts filament potential, prolonging their life. Low "A" battery consumption is claimed and the use of dry cells with the highly efficient UV-201-A and C-201-A tubes is possible.

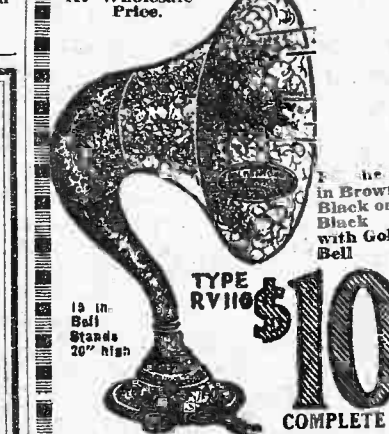
Neutralizing condensers or potentiometers are not required, overcoming what many radio engineers have stated was extremely difficult, if not impossible. It is stated that only five milliamperes of plate current is required, meaning very long life for the "B" batteries.

### Mystery Stories at WJZ

Stations WJZ and WJY, with the co-operation of a magazine, have lately inaugurated a new and interesting feature for their programs. These stations have recently broadcast several very gripping detective and mystery stories. This is a new departure and both the broadcasting stations and "Mystery Magazine," through whose courtesy these stories are furnished, are to be thanked for supplying the radio public with this novel form of entertainment. This magazine will continue to furnish WJZ and WJY with original manuscripts by well known writers. The stories are short, crisp and interesting and are well worth continuing.

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Contest is open to all Radio fans; for particulars address EDWARD E. PUGH, 104 W. 84th St., N. Y. C.

World Radio His

# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

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SECTION NINE

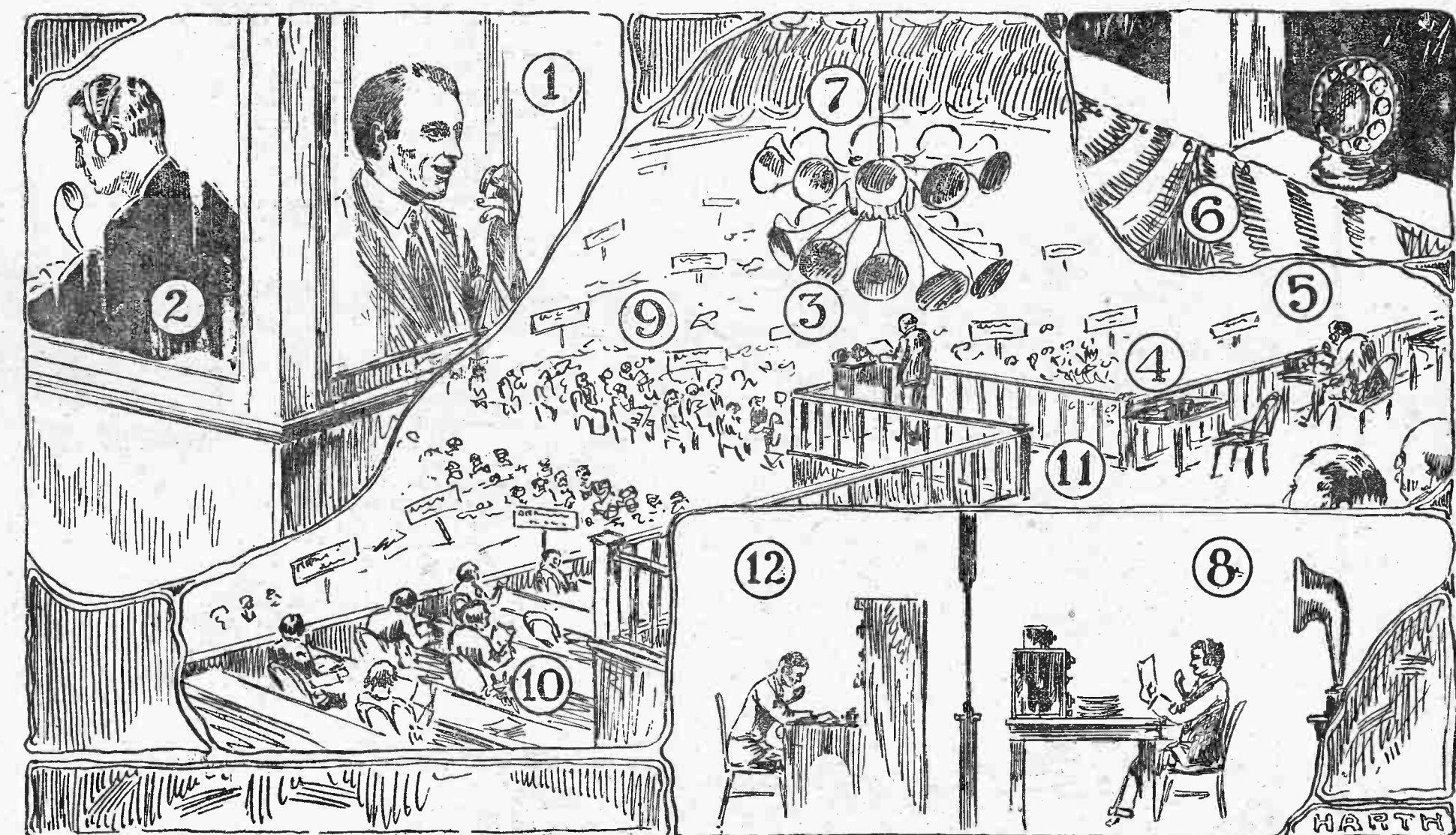
SUNDAY, AUGUST 3, 1924

16 PAGES

## Connecting Radio Broadcasting Stations By Land Telephone Lines Is a Big Job

Many Engineering, Technical and Practical Problems Must Be Solved to Enable Broadcast Listeners to Receive Important Speeches and Accounts of Interesting Events

By AMARANTH JOLLIFFE



Sketch showing details of transmitting speeches by land telephone lines to radio broadcasting stations. The reference figures are explained in the accompanying text

A NEW and vitally important element has entered politics. For the first time radio will be used to influence the voters of the country. The principal candidates of the Republican and Democratic parties as well as nationally known orators and numerous spellbinders not so well known will face the microphone and send out on the air their party policies, performances and pleadings.

It seems likely that a new type of orator will be developed during the campaign about to open. The old-fashioned, flag-waving, arm-slinging, belligerent, perspiring stump speaker will find, if he is permitted to try, that his former airs and wiles have no effect on the inanimate "mike" which can transmit nothing but his voice and his gasps for breath. The new orator will limit his speech to not more than fifteen or twenty minutes, as a rule, and he must have something interesting or worth while to say. Also he must say it clearly, distinctly and back it up with all the personality of which he may be possessed.

Neophytes at the broadcasting game will do well to consult with experienced station managers and announcers before undertaking a radio speaking tour. These men can tell in advance whether a speech will "get over" with the radio audience. After hearing a speaker's voice they can

tell him all about its quality for purposes of transmission. Their advice is worth following.

The managers of both the Republican and Democratic parties already have announced that broadcasting campaign speeches by radio will form an important part of their efforts to impress the voters of the country. Therefore, it becomes of interest to learn what we can of how this will be done.

Where it is designed to reach a comparatively local audience, say within a radius of a hundred miles, the facilities of the most favorably located broadcasting station will be utilized. If it is desired to reach a large section of the country at the same instant, it will be necessary to connect as many broadcasting stations as possible by land telephone lines. In some instances telegraph lines have been used to connect two stations.

The first attempt to transmit the proceedings of a political convention was that made at Cleveland recently when the sessions of the Republican National Convention were broadcast to a large part of the United States by about twenty stations. These were connected with the microphone in the convention hall by land telephone lines of the American Telephone and Telegraph Company. The result was eminently successful. Later, at the Democratic National Convention in

Madison Square Garden, New York City, the effort was repeated with even more satisfactory results.

The average broadcast listener has no conception of the intricate details involved in temporarily adapting commercial telephone lines to the purpose of connecting broadcasting stations with a common source of transmission. Taking as an example the Democratic convention in New York, an attempt will be made to throw a little light on this interesting, down-to-the-minute development of communication.

The following broadcasting stations were connected with Madison Square Garden during the recent Democratic convention: WEA, New York; WGR, Buffalo; WCAP, Washington; WRC, Washington; WNAC, Boston; WTAT, Boston; WJAR, Providence; KDKA, Pittsburgh; WTAM, Cleveland; WJAX, Cleveland; WLW, Cincinnati; WGN, Chicago; WLS, Chicago; WMAQ, Chicago; KSD, St. Louis; WDAF, Kansas City, Mo.; WDBH, Worcester, Mass.; WSB, Atlanta, Ga.

The numbered sketch herewith pictures the details of the installation at Madison Square Garden. The figures and their references are as follows:

1. Announcer in glass inclosed sound-proof booth, with microphone before him.

He is in complete charge of broadcasting details.

2. Announcer's assistant, wearing headphones and breast transmitter, connecting him with "order wire system," which enables immediate communication with all the elements of the broadcasting and wire system.

3. Microphones for speakers, serving radio input and public address system. Arrangement of chairs and railings assures that speaker will remain at the proper distance from the microphone.

4. Chairman's seat.

5. Radio observer's seat, connecting with order wire system. In this advantageous situation, he can give complete information as to the proceedings and keep the announcer and broadcasting stations thoroughly informed as to details.

6. Microphone in balcony to pick up the orchestra, as directed by announcer.

7. Loud speakers of public address system.

8. Input operator, controlling input amplifier supplying wire telephone lines. Loud speaker gives him reproduction of what is furnished the wires. Breast telephone and transmitter keep operator in touch with announcer, observer and broadcasting stations located in basement under delegates.

Continued on page three



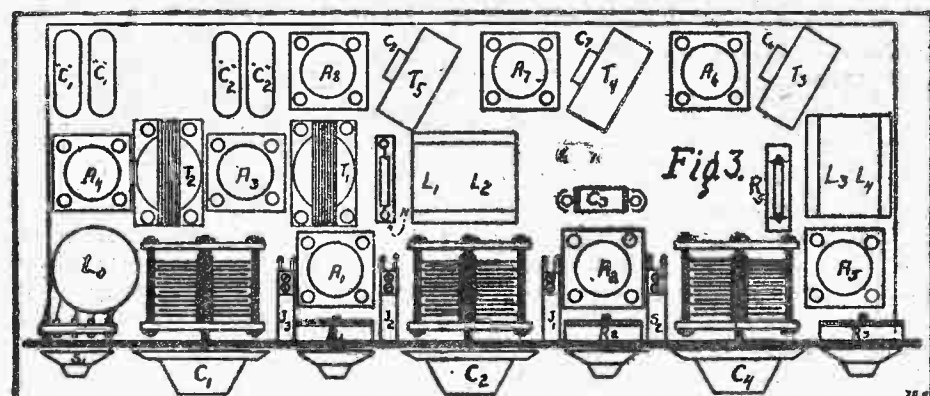
# How to Build a Radio Frequency Amplifier for the "Super-Heteroflex"

By Means of a Switch the Circuit Can Be Changed From a Four-Tube Set to a Super-Heterodyne

By J. E. ANDERSON

"WHAT kind of receiver is this, a super-heteroflex?" inquired a certain radio addict who was still struggling with radio nomenclature. He had reference to the receiver which is the subject of this article, and which is depicted in the three accompanying illustrations.

"Well," replied the writer, "that depends on the position of this double pole, double throw jack switch. Now, it is an eight-tube super-heterodyne; but now it is only a four-tube receiver, comprising one neutralized muffer stage, a detector and two stages of audio-frequency amplification." The switch in question is that one represented by S-2 in Figs. 1, 2 and 3. When this switch is thrown up (in Fig. 1)



the output of the detector tube A-2 passes through the primary of the intermediate frequency transformer T-3, and thus into the intermediate frequency amplifier and to the second detector A-8. The switch also causes the output of this detector to pass into the primary of the audio-frequency transformer T-1, and thus into the audio-frequency amplifiers A-3 and A-4.

But, on the other hand, when the switch is thrown down (in Fig. 1) the output of the first detector A-2 passes directly into the audio-frequency amplifier, and the upper tier of four tubes is thrown out of the circuit. Hence when the switch is up the circuit is an eight-tube super-heterodyne, but when it is down the circuit is an ordinary four-tube receiver.

When the super-heterodyne feature is not in use the filaments of oscillator tube A-5, the two intermediate frequency amplifiers A-6 and A-7, and of the second detector A-8 should be extinguished.

The input to the first, or muffer, tube A-1 is obtained directly from the antenna inductance coil L-0. This coil should consist of about 150 turns of No. 24 double cotton-covered wire wound on a 2.5 inch composition tube. It should be tapped at the 40th, 80th, 120th and 150th turns, and these taps should be connected to the switch points of an inductance switch S-1. The antenna circuit is tuned by means of this switch and by means of the primary condenser C-1.

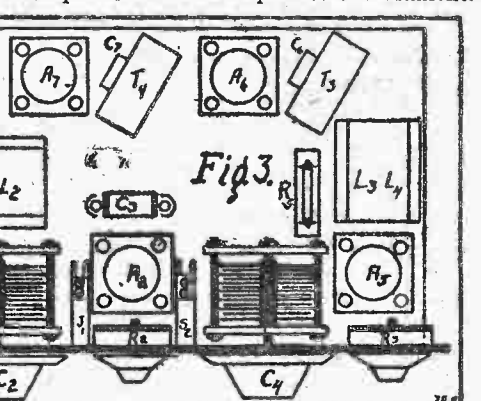
## Transformer Data

L-1 is a winding consisting of twelve turns of No. 24 double cotton-covered wire wound on a composition tube three inches in diameter. L-2 is a winding consisting of 45 turns of the same kind of wire on the same piece of tubing and wound in the same direction. A tap is brought out from this coil at the twelfth turn measured from the end nearest L-1. In connecting these coils the first terminal of L-1 should be connected to the plate of A-1 and the second, or inside terminal, to the positive of the plate battery; the inside terminal of L-2 should be connected to the negative of "C-1" and the outside terminal to one side of the coil L-3. The tap on L-2 should be connected to one side of the neutralizing condenser N. The other side of that condenser is connected to the grid of the first tube. The capacity of the tuning condenser C-2 across the secondary L-2 should be .0005 microfarad.

L-3 is a small coupling coil, by means of which the high frequency oscillations generated in tube A-5 are impressed in the first detector A-2. It consists of eight turns of No. 24 double cotton-covered wire wound on an insulation tube three inches in diameter. L-4 is the oscillating coil,

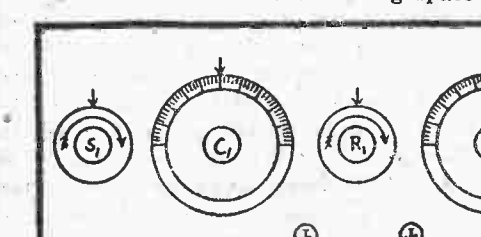
which consists of 45 turns of No. 24 double cotton-covered wire wound on the same tube as L-3. The two windings should be separated by a distance of about one-fourth inch. L-4 should have a tap at the middle turn, to which the positive base bar from the plate battery is connected. The tuning condensers C-4 connected across coil L-4 should have a maximum capacity of .0005 microfarad, and it should preferably be provided with a geared vernier for fine adjustment.

C-5 is a .001 microfarad mica blocking condenser which prevents the high plate voltage from reaching the grid of the oscillator; and R-5 is a 12,000-ohm grid leak used to maintain the grid at a negative potential with respect to the filament.



T-3, T-4 and T-5 are intermediate frequency transformers adjusted to a frequency of about 50 kilocycles. The condensers C-6, C-7 and C-8 connected across the secondaries of these transformers are high grade mica dielectric condensers having a capacity of .0001 microfarad. These condensers taken with the secondaries form the filter system which selects the intermediate frequency.

The three transformers may be made as follows: The cores may be made of paraffin treated hardwood. The inside diameter of the spools should be 2 inches, and the dimensions of the winding space



should be 1 inch long and 3/4 inch deep. This makes the overall diameter of the spools 2 3/4 inches. The thickness of the spool heads should not be less than 3-16 inch, so that the total length of the spool will be 1 1/4 inches. Two binding posts should be fastened to each end of the spools, and soldering lugs should be placed under them so that the coil terminals may be soldered to the posts.

The primary windings should each consist of 220 turns of No. 36 double cotton covered wire wound in even turns and even layers. On top of the primary should be a layer of thin paraffined paper to insulate this winding from the secondary. The secondaries should each consist of 1,100 turns of the same kind of wire and wound as evenly as possible. When the terminals have been soldered to the binding posts put another layer of paraffined paper over the winding, and over this, a layer of bookbinders' cloth or other protective covering. The condensers are then connected across the secondary terminals.

It may be that the three transformers will not be in tune with the same intermediate frequency on account of possible variations in the values of the tuning condensers C-6, C-7 and C-8 and variations in the distributed capacities of the coils and the self inductance of the secondaries. This will be evidenced by poor selectivity when tuning with condenser C-4 and by lack of volume in the output of the second detector.

It may be remedied by changing the secondary condensers or by connecting small variable condensers in parallel with them and varying these until the

tuning is sharp and the volume large. Condensers C-3 and C-9 are by-pass tubes in the plate circuits of the first circuit of the first and second detectors, respectively. The first may have a value of .001 microfarad, while the second should be twice that capacity.

## Tubes Used

For the best results UV-201A, C-301A, or similar tubes should be used throughout, except that 216A tubes may be used in the audio frequency stages to good advantage. Smaller tubes may be used with fair results in all positions.

J-1 is a double circuit jack which is used as a common listening post for both detectors. When the switch S-2 is up the telephone is in the output of the second detector; when down, it is in the output of the first detector. J-2 is a similar jack in the output of the first audio frequency amplifier, and J-3 is a single circuit jack in the output of the final stage.

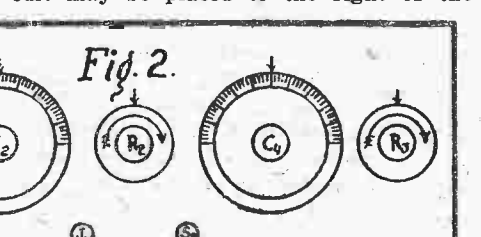
## "A," "B" and "C" Batteries

There are two grid biasing batteries employed in the circuit, C-1 and C-2. Nine volts negative bias is used on the grids of the two detectors and on the grids of the two audio frequency amplifiers. On the grids of the remaining tubes, save A-5, a negative bias of 4.5 volts is used.

The plate voltage on the two audio frequency amplifiers is 120 volts and that on the other tubes 60 volts.

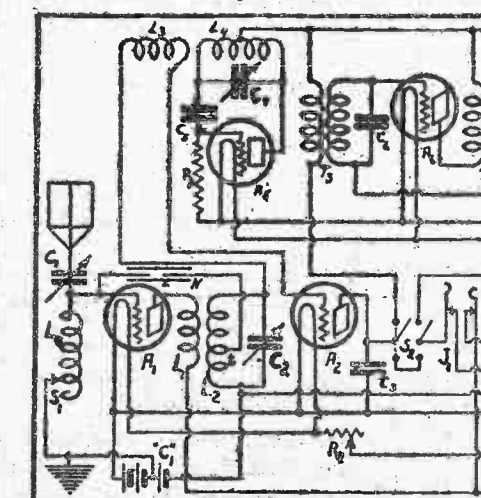
The negative bias method of detection is used on both detectors because it is more stable in operation and of about equal sensitivity. The required negative bias on the grids when 60 volts plate potential is used is about 9 volts.

In regard to the arrangement of the various pieces of apparatus in this receiver, three methods may be used. A very long panel may be employed so that the super-heterodyne portion of the circuit may be placed to the right of the



ordinary tuner and the audio frequency amplifier. This, however, is not very convenient. Another method is to build the receiver in two tiers, with the four super-heterodyne tubes, the intermediate frequency transformers and the high frequency oscillator coil and condenser placed above the other portion of the circuit.

This has certain advantages, but the lower tier is not conveniently accessible. The third method is to build the receiver in two rows, one back of the other, as is shown in Fig. 3. Here all the tuning controls are conveniently accessible from the



panel without using "arm extensions," and all the parts inside the cabinet may be reached from the top of the box.

The antenna tuning coil L-0 is placed in the extreme left hand corner of the cabinet, directly behind the antenna inductance switch S-1. The axis of this coil is mounted in a vertical position in order that space may be conserved and

that stray coupling may be minimized. C-1, the antenna tuning condenser, is mounted directly to the right of this coil. Condenser C-2 is mounted at the middle of the panel, and the coils L-1 and L-2 directly behind C-2. The axis of L-2 is placed in a horizontal position at right angles to the panel.

The oscillator is placed at the extreme right hand end of the cabinet, and the oscillating coil L-4 is so mounted that its axis is at right angles to both L-0 and L-2. The blocking condenser C-5 is not shown in Fig. 3, but it may be connected between the stationary plates of condenser C-4 and the nearest end of resistance R-5. The common point between C-5 and R-5 is then connected to the grid terminal of the oscillator tube.

The position of condenser C-9 is not indicated in the drawing. It should be connected between the plate terminal of tube A-8 and the negative filament terminal of that tube by the shortest leads possible. The locations of all the other parts are indicated by symbols corresponding to the same symbols on Fig. 1 and Fig. 2.

Fig. 2 shows the panel arrangement of the set, based on a panel 7x26. Four-inch dials are used for the three tuning condensers, because this not only improves the appearance of the set but it facilitates tuning.

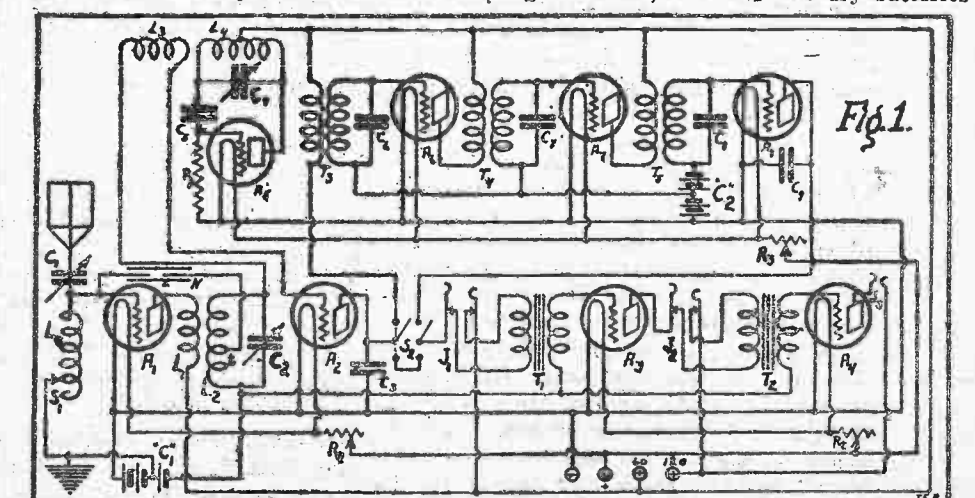
A shield should be used back of the panel and another between the oscillator and the remaining portion of the set in order to reduce body capacity effects and undesirable coupling between the oscillator and the tuner. Neither of these shields are shown on the drawing. They should preferably be made of 1-16-inch copper or brass sheet.

## Equipment Needed

Parts required for the construction of the set: C-1, one 43-plate variable air condenser (or 23-plate); C-2, C-4, two variable air condensers, 23-plate; C-3, C-5, two fixed mica condensers, .001 microfarad; C-6, C-7, C-8, three fixed mica condensers, .0001 microfarad; C-9, one fixed mica condenser, .002 microfarad; N, one neutralizing condenser; half a pound of No. 24 double cotton covered wire for winding coils L-0, L-1, L-2, L-3 L-4; bakelite tube 2 1/2-inch diameter and 5-inch long for L-0; bakelite tubes 3 inches in diameter and 2 1/2 inches long for L-1, L-2, and L-3, L-4; three wooden spools for intermediate frequency transformers, T-3, T-4, T-5; half a pound of No. 36 double cotton covered wire for these transformers; T-1, T-2, two audio frequency transformers; J-1, J-2, two double circuit jacks; J-3, one single circuit jack; S-1, one inductance switch with five switch joints; S-2, one double pole, double throw jack switch; R-1, R-2, two 10-ohm rheostats; R-3, one 6-ohm rheostat; R-5, one 12,000 ohm grid leak with mounting; eight UV-201-A tubes with eight sockets; four 4 1/2-volt dry batteries

are mounted directly under the sub-panel, thus entirely hidden from view. This permits the use of short straight line connections between the different points and keeps the resistance of the circuit the lowest possible, thus increasing the efficiency. The panel also provides a base for seven sockets.

For the individual who wishes to duplicate the receiver described herein, the sub-panel may be purchased from the Freshman people, completely drilled with sockets and springs eye-



for C-1 and C-2; six binding posts; three 4-inch dials; one panel 7-inch x 26-inch x 3-16-inch; one baseboard 9-inch x 3-16-inch x 2 1/2-inch; one cabinet to match panel and baseboard; one 6-volt storage battery; one 120-volt plate battery, with a tap at about 60 volts; one shield 6 inch x 25 inch x 1-16-inch and one 6-inch x 6-inch x 1-16-inch, brass or copper.

# How to Build a Simple and Efficient Five-Tube Receiver

THE owner of the receiver to be described in this article will enjoy a radio set that excels in volume and clarity on both local and long distance stations and one that is easy to tune and operate. All details of the construction of the set, as you will note in the accompanying cut, have been carefully worked out so that there is a minimum amount of labor involved in assembling the various units.

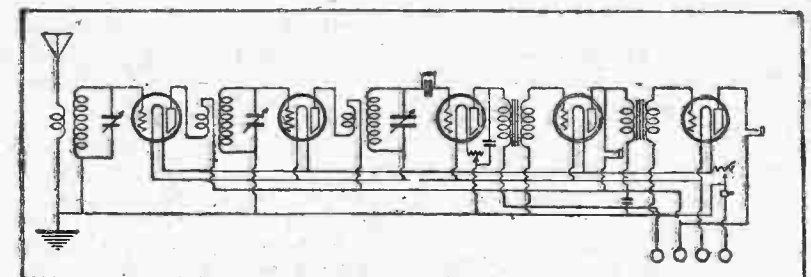
This receiver was designed by A. W. Franklin, chief engineer of the Charles Freshman Company, and is being placed on the market under the trade name of "Freshman Masterpiece." The directions given in this article will make it possible for any radio fan to duplicate the commercial product.

The circuit will be found in Fig. 1, and from this it can be seen that the receiver is a five-tube radio frequency set employing two stages of

letted thereto. This sub-panel is not entirely necessary, however, and good results may be obtained without it.

The radio frequency units are the next things to be described. These units may also be purchased completely assembled or may be constructed by the reader if he follows carefully the directions to be given. The tuning unit in the radio frequency unit may be any well designed 23 plate (.0005 Mfd.) variable condenser and this is attached to the radio frequency transformer, as shown in Fig. 4.

Fig. 3 gives the reader a clear conception of this transformer and shows how it may be wound at home. First, procure wooden disks 3 1/2 inches in diameter and 1/4 inch thick. Draw a circle 1 5-16 inches in diameter; upon the circumference of this circle drill fifteen holes evenly spaced. These holes provide a snug fit for 1/4-inch wooden dowels. Cut wooden dowels into pieces 1 3/4 inches long, rounding off the free end with sandpaper. These pegs should be glued in the holes. The recess on the periphery

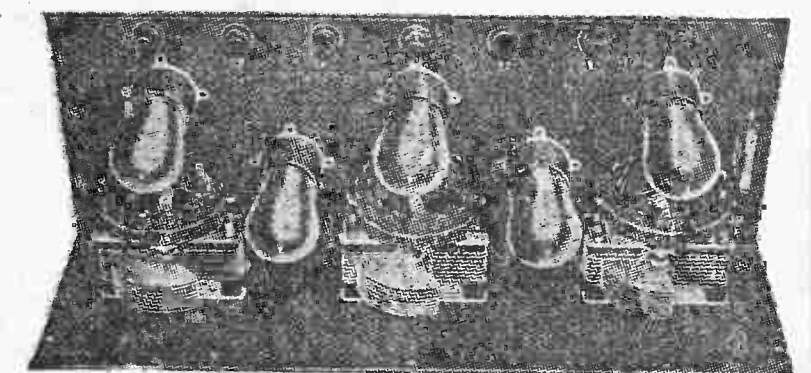


tuned radio frequency, detector and two stages of audio frequency amplification. There are three tuning controls, one to each stage of radio frequency, and one to tune the aerial circuit. The controls are evenly matched, so that in tuning all dial readings will be practically the same. This also makes it possible to log the receiver.

It will be noticed from Fig. 2 that the only apparatus visible when the cabinet is opened are the three tuned radio frequency units, the grid condenser and leak and the tubes. All of the wiring, transformers and rheo-

of the disk are to facilitate the interlacing on the outside of the coil.

After the form is finished proceed with winding the coil as follows: Hold the form in your left hand with the pegs pointing toward you and lay the wire over pegs 1 and 2, then inside of 3 and 4, over 5 and 8, then under two pegs and over two pegs until you come back inside of 15 and 1, after which the second turn is started, which is over two pegs and then under two and so forth until the third turn is completed over 15 and 1, then the fourth turn is wound in a similar manner.



Now we have on the form a complete cycle of four turns. You will now note by studying Fig. 3 and following the arrows, one arrow for the first turn, two for the second, and so on, that no two wires are parallel to each other and that they are a considerable distance apart. This is the reason that distributed capacity is so very low. In winding the second cycle of four turns, the fifth turn is laid over and inside of the same pegs as the first turn. The sixth turn is laid the same way as turn

the first. This is very simple, and all that is necessary is to follow the wiring diagram. You will notice that in order to simplify the wiring the phone jack which is used when tuning in distant stations is connected across the plate circuit of the first audio tube. This permits the use of the phones while the loud speaker is in operation. Also notice in Fig. 1 that the primary of the radio frequency coils are reversed. This is very essential, as it prevents the set from oscillating.

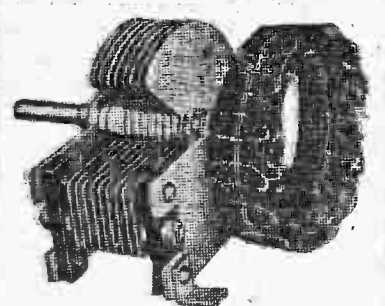
In tuning a set of this type it is best to set the two dials in the radio frequency circuit to the highest point usually used, which may be on 90, and then try to tune in a station by turning the first dial, which is in the aerial circuit, slowly until the station is heard. If there is no station broadcasting on that particular wave length the two dials should then be turned down two divisions and the antenna dial turned again approximately within ten divisions of the same setting as the other dials. This should be continued, setting the dials two divisions lower each time until all the stations on the various wave lengths are logged, after which it is a very simple matter to tune in the same stations by simply referring to the previous log.

Transmits 200 Miles With A One-Tube Receiving Set

Some stations sure do some surprising work with exceptionally low power. The latest is a record established by 8DXQ. He worked 200 miles with the detector of his receiver, which had only forty-five volts on the plate.

No. 2. Seven follows the same path as turn No. 3, while turn No. 8 goes over the same pins as the fourth turn. This cycle of turns again creates a magnetic field, which is staggered from the field made by the first four turns.

The coils of wire are each separated by a space equivalent to the thickness of the wire and its insulation, thereby suffering practically no absorption losses through the adjacent wire. Hence the maximum



amount of inductance is obtained in this form of winding.

Proceed winding the required number of turns as above, and after the winding process is completed cut the wire, leaving it long enough for a suitable lead. In order to interleave the inductance so as to be able to slide it off the form without collapsing, secure a medium sized binding needle and a spool of white thread and guide the needle through the corner next to peg 1 from the top of the coil. Recess A on the bottom of the



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It publishes about the right amount of human interest stories and contains the largest proportion of text matter, in relation to advertising, of any Radio Section in any newspaper.

## Policy of Station WFBH Announced

The new station WFBH, New York City, "The Voice of Central Park," has laid down "14 points" on which it will broadcast. Features that are planned and that will be adopted in a very short time are:

1. Public medical advice from the world's famous authorities.
2. Educational topics of public interest.
3. Humorous discourses on events of the day.
4. Children's lullabies.
5. Competitive lyric suggestions for songs.
6. Competitive contests for one-act plays.
7. Cameo operettas.
8. Memory tests of old songs.
9. Military training lessons.
10. Sunday evening concerts.
11. Daily luncheon music (6-8 p. m.).
12. Daily dinner music (6-7 p. m.).
13. Midnight rendezvous (11:30 p. m.-2 a. m.).
14. Orchestra dance music.

John Niles is chief announcer. The rest of the personnel of the station, including James Lockwood, Alvin Hauser and Pat Kiley, are other reasons why the station should gain a good deal of time from the public's ears. These supervisors are trying hard, as shown in their outline of the fourteen points, to give the public what they want.

There is one thing that Mr. Hauser asks of the public for the service that he is going to render, and that is to forgive the mistakes that may be made while the station is in its infancy.

"We may not be as good as other stations at the start," Mr. Hauser said, "but it will all come in time. Improvements, arrangements, systems and small details will be taken care of as soon as we have the chance." He also invited suggestions and criticisms at a real get-together dinner given to radio editors recently.

The transmitting apparatus of the station is located on the roof of the Hotel Majestic. It is a 500 tuned grid circuit operating on a 273-meter wave length. The aerial is 210 feet above ground and 72 feet above the roof. The distance between masts is 110 feet, having an inverted "L" three-wire antenna.

The studio of the station can be seen from the outside. The walls and ceiling have especially been draped with velour hangings to strengthen the acoustics for broadcasting.

The most unusual feature is that the artist can stand in the room and sing, forgetting all about the microphone, which eliminates the so-called "microphone fright," because they are concealed in the room.

Broadcast controls and signals are original, permitting constant communication between the broadcast studio and the operating room on the roof. The studio is equipped with two grand pianos.

The artists can be seen, at all times, through a double plate glass partition which separates the studio from the reception parlor. All artists, or visitors to the station, are received and comfortably cared for in this reception parlor. Artists are paged in their turn of performance, that no one, other than the announcer, is permitted to be in the studio but the performing artists.

## WJZ's New Children's Hour Meets With Approval

About six weeks ago station WJZ, New York, omitted from its program the daily radio bedtime story hour in an endeavor to determine just how popular that feature of broadcast programs is with the listening youngsters, and substituted instead the Sunday morning children's hour from 9 until 9:30 o'clock. To date the number of requests for the reinstatement of the bedtime story on the daily program has been practically negligible, indicating that the day of the "Peter Rabbit" broadcasting has passed, at least so far as the desires of New York children are concerned. The substitution of the Sunday morning hour, in which noted writers tell their own original stories, celebrities in child circles speak, and the leading cartoonists explain the antics of their comic characters, has met with decided favor with both parents and children.

## 100 Amateur Stations in Spain

Fernando Castano, of Madrid, Spain, in a letter to the American Radio Relay League, advises that organization that there are now about 100 amateur radio transmitting stations in his country following decision of the government to permit amateurs the use of wave lengths below 150 meters and up to 100 watts power. The leading radio organization is the "Radio Club de Espana."

## The New Week on the Radio

By Pioneer

The bedtime story has passed. Yes, the bedtime story has passed, and one of the most solidly entrenched traditions of broadcasting is rolling down the skirts of forgotten events into what appears to be certain oblivion.

The bedtime story was invented in the early days of WJZ's history, and like all traditions it hung on for no apparent reason, eating up its usual half or three-quarters of an hour at dinner time with more propitious programs standing by.

WJZ rather daringly abandoned its bedtime story about a month ago. There was barely a ripple of disapproval, and another fond theory of our broadcasters exploded quietly. With this evidence of its previous folly before it WJZ has decided to permanently forsake this form of child entertainment, except for Sunday mornings, when it will broadcast a juvenile program at 9 a. m.

Good choral singing is an inspiration to many and we cannot refrain from mentioning Dr. Charles W. Allen's Church Community Chorus. It will sing this afternoon from WJZ. There is something restful and uplifting about this type of music when it is well broadcast.

A short time ago the second concert given by the students of the music course of the New York University Summer School was broadcast through WJZ. Like the first concert, we enjoyed it immensely, and it measured up to the standards of a very high type of broadcasting. On Tuesday, August 5, the third of the series will be broadcast from the same source, Judson Memorial Church, Washington Square, and through the same station, WJZ.

The Goldman Band concert from the Mall in Central Park has grown to be an institution in broadcasting—all of this in the short space of two months. Goldman's program this week is interesting in that it will include only English music. It will be broadcast Wednesday evening at the usual hour.

WEAF appears to be staging a revival for the new week, for we notice a number of events that should make good listening matter. On Wednesday evening the Romos family orchestra will broadcast. We have never missed the opportunity to say kind things about this capable orchestra and we have yet to meet the listener who thinks little about our opinion of their playing.

Although we would advise Dr. Sigmond Spaeth not to waste his perfectly good lectures on the Common Sense of Music on summer air, we find that he continues his series and will broadcast directly after the above. A great deal of this summer lecturing over the radio is done in vain, and we are always disturbed to see such splendid lectures as those given by Spaeth broadcast without doing their maximum amount of good.

On Tuesday evening WEAF makes another valuable contribution to the entertainment of the week by broadcasting a concert of the Pavilion Royal Orchestra. Although this orchestra has not broadcast before, it is well known and there is not the slightest possibility of a disappointment. It plays for many of the state affairs at the national capital. It will play both a classical and a popular program.

On Monday evening, the 4th, the U. S. Marine Band will play again from WEAF. We do have a lot of band music during the summer months, but as long as we have to listen to nothing worse than the U. S. Marine Band and the Goldman Band broadcasting will not suffer a great deal.

We have long since known that the "Radio Franks" (Frank Wright and Frank Bessinger) are professional "song pluggers," but this has not interfered with the enjoyment we have received as a result of their work. The fact remains that they are two of the best popular song artists on the air at the present time. They are on the new program of WEAF. (This is not intended for an expose.)

On Saturday evening, August 9, the celebrated Kudisch will play from WJZ. This, too, is a disappointment, proof affair and we can recommend it wholeheartedly.

All considered, the program for the new week looks a little better than normal. More than the usual number of features smile at us from the advance notices and not a few of them are quite new, although not entirely untried. This is a favorable report to give in the very middle of our hottest season.

WOR does not hold out such promise for the new week, and it seems that it is limping along on its sumner schedule, making no undue effort to release itself from bondage. However, one little bright spot manages to sparkle on its program for Monday night. The Newark Philharmonic Concert Band will play at 8:15 o'clock.

Those who have consistently patronized the "Polies" cannot help but remember Roy Cropper. He will sing some of his hit numbers Wednesday evening, and this with the Romos family orchestra should give WEAF a pretty full program. Let's see, that is also the night of the Goldman concert; Wednesday certainly looks pleasant.

Two early factors combined to produce somewhat more prepossessing radio receivers. One was the commercial ship set designer, who was forced to produce reasonably rugged and neat-looking sets. The other was the mature amateur, with a mechanical bent, who was capable of building apparatus of fairly attractive appearance. Accordingly the panel type of set came into existence. In this set all parts were mounted on a vertical panel of insulating material, which also formed the front of a wooden box. Such sets came into wide use and were found to be comparatively easy to wire and to maintain in good condition that they have survived up to the present. One of the changes, not externally visible, which helped to improve the sets was stiff or "form" wiring. Instead of flexible and rambling wires, stiff wires were bent sharply into correct shape and used to connect the various electric parts of the set. Such wiring was not only neater but more permanent. It is now used widely in high-grade receivers.

The panel type of set had the additional advantage that all adjustments were concentrated into a single vertical plane and were therefore readily accessible. The

knobs could be arranged symmetrically and all metal parts polished, thus presenting a fair appearance. Such receivers always look like scientific apparatus rather than furniture, and they do not merge readily into a handsome living room any more than would an uncovered sewing machine. There is also the temptation to multiply adjustments on such sets past all reasonable limits. It is recalled that at a certain radio exhibit in Boston a receiver costing \$100 was shown which was provided with no

fewer than nineteen adjustments. Engineers viewing it were rather puzzled as to how such a mechanism could be successfully driven through heavy radio traffic.

Another problem encountered in the panel type of set was the proper location of the binding posts or terminals, the batteries and the loud speaker. Binding posts on the front panel were conspicuous and generally led to frowny wiring. Placed at the back of the set, they were relatively inaccessible and required special construction of the box. They could not be eliminated, however, from any but self-contained unit type sets, which did not then exist. Storage batteries, such as were necessarily used with the earlier panel sets in the absence of the present efficient dry battery radiotrons, and plate batteries in the form of large assemblies of individual dry cells or flashlight units were very unsightly and difficult to locate in an unobtrusive position. The telephone headset was also not particularly ornamental, and the loud speakers which later succeeded the headset were still not very aesthetic. Panel type sets, therefore, look ship-shape, scientific, and business-like, but they are not particularly artistic, nor in full consonance with the remainder of the domestic furnishings.

Photographs of the various types of receivers under discussion accompanying this article indicate clearly the nature of the problem of adopting radio receiver design to the beauty of the music produced and to the atmosphere of the home. As long as radio was an experimenter's pastime and nothing more, the development of radio receiver cabinets was slow. But when radio broadcasting became a great public service, and in place of a few thousand experimenters there came into existence millions of daily listeners, the problem of appearance became more acute. There was a marked incongruity in having a delightful concert, played by a leading orchestra, come out of an arrangement that reminded one of the oldest portable swinging horn phonographs, now happily obsolete. There was the same discrepancy between a tastefully furnished living room and a crude piece of machinery placed in the midst of it. An artistic unity was demanded by the more discriminating broadcast listeners, and this unity has now been achieved in a variety of ways.

The first step was obviously to place the batteries, terminals, loud speaker and all previously external parts into the receiver cabinet so that (except possibly for the antenna and ground) the entire set was self-contained. This disposed of casual parts formerly scattered over a table or desk top. It also enabled mounting such parts once and for all in the most favorable relative positions for easy use.

Since the panel mounting for the control handles still had to exist in one form or another (although it is indeed tremendously simplified and improved in appearance in well designed modern sets), it was natural that the next step was the designing of a suitable wooden cabinet to contain the whole receiver, which cabinet would conceal the operating panel unless it was desired to uncover this panel for adjustment purposes. At once the entire field of elaborate cabinet design was opened up and both plain and "period design" cabinets were tried in a great variety of shapes and sizes. Vertical cabinets and horizontal cabinets or consoles have been used. Cabinets resembling phonographs have disputed the field with cabinets resembling jewel chests or desks or grandfather clocks.

An undertaking of this kind also requires the use of a telegraph circuit during the testing periods and during the speech to co-ordinate the work at the transmitting end with that at the broadcasting station and all intermediate repeater stations.

For the ordinary transmission of a telephone message a degree of intelligibility entirely satisfactory for the purpose is secured by transmitting a relatively narrow band of speech frequencies. For satisfactory radio broadcasting such a band of speech frequencies is inadequate to convey the degree of naturalness upon which the personality of the speaker depends. In order to transmit a band of frequencies of sufficient width for this purpose, it is essential to use special

methods, special apparatus and a trained personnel.

In broadcasting a speech of national importance involving the use of the toll plant a failure or interruption would reflect upon the Bell system. It is necessary, therefore, to take every precaution to insure that the facilities will be available at precisely the time set for their use and that no interruption of any sort will occur during the speech. This means the provision of two complete circuits over separate routes. These two circuits are so arranged that the entire speech simultaneously flows over both of them, and they are so terminated at the broadcasting station that the operator at this point can immediately transfer from one to the other practically without the loss of a syllable. Not only must duplicate circuits be provided, but all work along both of the routes that might in any way interrupt or interfere with either circuit must be suspended.

The length of time the circuits are required for an undertaking of this kind and the costs involved have but little relation to the time taken to transmit the speech itself. For example, to prepare for the transmission of a speech from Washington to Chicago it is necessary to make tests and adjustments which require that the two circuits be removed from their regular service for a total period of some six hours, in order to precisely determine the electrical characteristics upon which is dependent the success of the project. Since such circuits cannot be released from regular business without seriously interfering with it at any time other than the late evening and the early morning hours such testing as is done at these times involves overtime work. Actually, the circuits are set up and tests conducted for a period of three hours the night preceding the speech, and again for another three hours immediately preceding the speech.

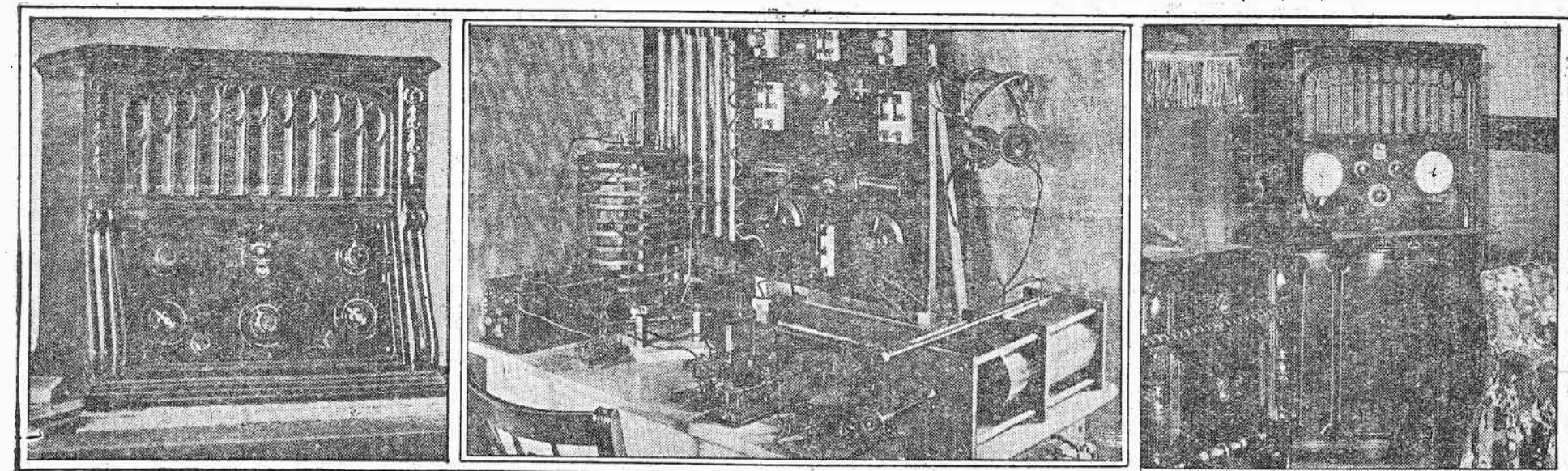
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# How Radio Receivers Have Changed in the Last Twenty Years

Broadcasting Has Made Necessary a Set for the Living Room

By ALFRED G. GOLDSMITH, Ph. D.

Chief Broadcast Engineer, Radio Corporation of America



THE amateur receiving set of fifteen years ago would astonish many modern broadcast listeners. Mounted on a board were coils, condensers, primitive detectors and a variety of electrical switches and parts, all connected by straggly wiring, which had apparently been spun over the equipment by a disorderly and demented spider. A multitude of adjustments assisted in confusing the user and afforded the experimenter-owner great pleasure, since he rarely knew what was going to happen when any particular knob was turned. To the inquiring and experimental turn of mind such sets were quite satisfactory. Certainty of operation and handsome appearance were neither present nor desired. Of course there were some exceptional sets which were both carefully constructed and easy to handle, but they were not as highly regarded by the average experimenter as the "junk pile" variety of set.

Naturally radio could be of interest only to a comparatively limited group in the community under such conditions, and radio receivers of this primitive type were capable neither of rendering a public service nor yet of beautifying the homes of their owners. An occasional message of no general interest was all that one could hope to receive on the frequencies or wave lengths devoted to commercial traffic. Amateur operation was relatively unorganized and commercial and amateur transmitting sets were chiefly distinguished by their amazing capabilities in producing bad interference. As to appearance, a radio set in the home in those happily distant days was a constant source of dispute, since the domestic authorities naturally endeavored to have the enthusiastic owner locate it in some remote and inaccessible corner of the garret, rather than in a living room, where the eye would be continually offended by it.

Two early factors combined to produce somewhat more prepossessing radio receivers. One was the commercial ship set designer, who was forced to produce reasonably rugged and neat-looking sets. The other was the mature amateur, with a mechanical bent, who was capable of building apparatus of fairly attractive appearance. Accordingly the panel type of set came into existence. In this set all parts were mounted on a vertical panel of insulating material, which also formed the front of a wooden box. Such sets came into wide use and were found to be comparatively easy to wire and to maintain in good condition that they have survived up to the present. One of the changes, not externally visible, which helped to improve the sets was stiff or "form" wiring. Instead of flexible and rambling wires, stiff wires were bent sharply into correct shape and used to connect the various electric parts of the set. Such wiring was not only neater but more permanent. It is now used widely in high-grade receivers.

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Another problem encountered in the panel type of set was the proper location of the binding posts or terminals, the batteries and the loud speaker. Binding posts on the front panel were conspicuous and generally led to frowny wiring. Placed at the back of the set, they were relatively inaccessible and required special

construction of the box. They could not be eliminated, however, from any but self-contained unit type sets, which did not then exist. Storage batteries, such as were necessarily used with the earlier panel sets in the absence of the present efficient dry battery radiotrons, and plate batteries in the form of large assemblies of individual dry cells or flashlight units were very unsightly and difficult to locate in an unobtrusive position. The telephone headset was also not particularly ornamental, and the loud speakers which later succeeded the headset were still not very aesthetic. Panel type sets, therefore, look ship-shape, scientific, and business-like, but they are not particularly artistic, nor in full consonance with the remainder of the domestic furnishings.

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Another problem encountered in the panel type of set was the proper location of the binding posts or terminals, the batteries and the loud speaker. Binding posts on the front panel were conspicuous and generally led to frowny wiring. Placed at the back of the set, they were relatively inaccessible and required special

construction of the box. They could not be eliminated, however, from any but self-contained unit type sets, which did not then exist. Storage batteries, such as were necessarily used with the earlier panel sets in the absence of the present efficient dry battery radiotrons, and plate batteries in the form of large assemblies of individual dry cells or flashlight units were very unsightly and difficult to locate in an unobtrusive position. The telephone headset was also not particularly ornamental, and the loud speakers which later succeeded the headset were still not very aesthetic. Panel type sets, therefore, look ship-shape, scientific, and business-like, but they are not particularly artistic, nor in full consonance with the remainder of the domestic furnishings.

Photographs of the various types of receivers under discussion accompanying this article indicate clearly the nature of the problem of adopting radio receiver design to the beauty of the music produced and to the atmosphere of the home. As long as radio was an experimenter's pastime and nothing more, the development of radio receiver cabinets was slow. But when radio broadcasting became a great public service, and in place of a few thousand experimenters there came into existence millions of daily listeners, the problem of appearance became more acute. There was a marked incongruity in having a delightful concert, played by a leading orchestra, come out of an arrangement that reminded one of the oldest portable swinging horn phonographs, now happily obsolete. There was the same discrepancy between a tastefully furnished living room and a crude piece of machinery placed in the midst of it. An artistic unity was demanded by the more discriminating broadcast listeners, and this unity has now been achieved in a variety of ways.

The first step was obviously to place the batteries, terminals, loud speaker and all previously external parts into the receiver cabinet so that (except possibly for the antenna and ground) the entire set was self-contained. This disposed of casual parts formerly scattered over a table or desk top. It also enabled mounting such parts once and for all in the most favorable relative positions for easy use.

Since the panel mounting for the control handles still had to exist in one form or another (although it is indeed tremendously simplified and improved in appearance in well designed modern sets), it was natural that the next step was the designing of a suitable wooden cabinet to contain the whole receiver, which cabinet would conceal the operating panel unless it was desired to uncover this panel for adjustment purposes. At once the entire field of elaborate cabinet design was opened up and both plain and "period design" cabinets were tried in a great variety of shapes and sizes. Vertical cabinets and horizontal cabinets or consoles have been used. Cabinets resembling phonographs have disputed the field with cabinets resembling jewel chests or desks or grandfather clocks.

An undertaking of this kind also requires the use of a telegraph circuit during the testing periods and during the speech to co-ordinate the work at the transmitting end with that at the broadcasting station and all intermediate repeater stations.

For the ordinary transmission of a telephone message a degree of intelligibility entirely satisfactory for the purpose is secured by transmitting a relatively narrow band of speech frequencies. For satisfactory radio broadcasting such a band of speech frequencies is inadequate to convey the degree of naturalness upon which the personality of the speaker depends. In order to transmit a band of frequencies of sufficient width for this purpose, it is essential to use special

methods, special apparatus and a trained personnel.

In broadcasting a speech of national importance involving the use of the toll plant a failure or interruption would reflect upon the Bell system. It is necessary, therefore, to take every precaution to insure that the facilities will be available at precisely the time set for their use and that no interruption of any sort will occur during the speech. This means the provision of two complete circuits over separate routes. These two circuits are so arranged that the entire speech simultaneously flows over both of them, and they are so terminated at the broadcasting station that the operator at this point can immediately transfer from one to the other practically without the loss of a syllable. Not only must duplicate circuits be provided, but all work along both of the routes that might in any way interrupt or interfere with either circuit must be suspended.

The length of time the circuits are required for an undertaking of this kind and the costs involved have but little relation to the time taken to transmit the speech itself. For example, to prepare for the transmission of a speech from Washington to Chicago it is necessary to make tests and adjustments which require that the two circuits be removed from their regular service for a total period of some six hours, in order to precisely determine the electrical characteristics upon which is dependent the success of the project. Since such circuits cannot be released from regular business without seriously interfering with it at any time other than the late evening and the early morning hours such testing as is done at these times involves overtime work. Actually, the circuits are set up and tests conducted for a period of three hours the night preceding the speech, and again for another three hours immediately preceding the speech.



# What Every Fan Should Know About Radio Receiving Circuits

There Are Few Standard Circuits, but Many Variations

By SIDNEY ELBER

## Part II

WHILE searching for a suitable filament for the electric light Edison noticed that one of his little glass bulbs possessed rather strange characteristics. The one in particular contained not only an experimental filament, but also a small metal plate suspended within the vacuum but separated from the delicate filament wire. He found that by connecting the positive side of a battery to this plate and the negative to one side of the filament a galvanometer inserted in the battery circuit would indicate an actual flow of electricity, despite the fact that there was no complete metallic circuit. The great inventor at the time was seeking to perfect an electric source of illumination, and although this strange phenomenon interested him, he passed over it casually and did not interrupt his now famous filament investigations.

The "Edison effect," as the strange action became known, developed into a scientific novelty and gave physicists much to talk about, but it was hardly dreamed two decades ago what an influence it would have on the newly born science of wireless telegraphy and telephony. It revolutionized both arts and made radio what it is to-day, the Eighth Wonder of the World.

A famous English scientist, Fleming, took one of Edison's queer two-element electric lamps over to England, and there succeeded in making them act as "detectors" of high frequency radio oscillations. Now, a detector of radio waves is a device which allows the electricity to flow through it more readily in one direction than in the other. Certain natural minerals, such as galena, silicon and carborundum, possess this property, for reasons unknown to man. It is frequently assumed that peculiar molecular arrangements are responsible, but this is only a hazard. Certain chemicals in contact with platinum wires also exhibit this ability. Crystal and electrolytic detectors had been used with fair success, but the announcement of Fleming's valve marked a most important step in the radio art and set the entire scientific world agog.

## The Detector

The detector is the heart of any radio circuit, and here was a radically different detector, which held forth great promise. Practical engineers, though, found it sadly disappointing, as it proved to be little better than a crystal in sensitiveness, and even inferior in the matter of tone quality. What it did do was to open to science a virgin field for experiment, and it was not long before startling discoveries were forthcoming.

As two-element tubes are used even today in certain reflex hook-ups in place of a crystal, because of their greater stability, some typical circuits for the Fleming valve are given as a matter of interest. The first is shown in Fig. 1. Here we have a coupler, which might be any loose or vario-coupler, whose secondary is shunted by a variable condenser for tuning and whose primary is tapped for the same reason, the earphones and the valve.

Notice that the plate and filament are connected to the tuner just the way a crystal is. Owners of "diode" tubes (mod-

ern Fleming valves) should try this circuit; they will then fully appreciate the worth of a good piece of crystal.

A decided improvement results from the addition of plate battery, as shown in Fig. 2. In the batteryless set the current flowing through the phones is the weak one picked from the passing radio waves, but here it is a strong battery current, which is modulated by the received impulses. The signals are thus much louder than before, but still nothing to become ecstatic about. The condenser "Cp," by the way, does not perform the same function as a grid condenser in a

using it. The simplest receiving circuit it can be used in is the one of Fig. 3. Here we have the inevitable coupler and condenser for tuning purposes, the tube, and its accessories, such as the A and B batteries and filament rheostat. A grid condenser, "Cc," is also shown, though it really can be omitted from such an elementary circuit, with slightly less efficient operation.

This arrangement should be tried merely for the sake of the experiment. The circuit is a simple, non-regenerative, detecting affair, and is about as useful for practical purposes as a good crystal receiver. It represents the foundation on which a thousand and one other circuits are built.

becomes more sensitive to weak signals, and also tunes more sharply.

So much for theory. Regenerative feedback can be produced in three ways. One is to couple the plate to the grid circuit magnetically; that is, through a coil of wire placed near the grid coil (the secondary of the tuning coupler). Another is to use a condenser common to both circuits; this may be formed by the condenser effect of the elements of the tube itself. The third method is to directly connect the plate and grid circuits. This is the least desirable of the three.

The simplest regenerative circuit is that of Fig. 4. Here the plate is tuned by a coil and condenser, and the circuit is known as the "tuned plate regenerator." The feed-back of energy takes place through the tube itself, as the grid and plate, being metallic bodies, act together as a small condenser.

Tuning the plate is a favorite and widely used method of obtaining the desired regenerative effect. In practice, though, a fixed coil in conjunction with a variable condenser is rarely used; a single variometer does the same work instead. A practical circuit is shown in Fig. 5. This will immediately be recognized as a rather familiar one. Indeed, the coupler, condenser and variometer receiver need little introduction to radio fans, as it is one of the most satisfactory ones ever devised. It tunes sharply, gives good volume and faithful reproduction and is gratifyingly sensitive to distant stations. Its one bad feature, one that is common to all regenerative sets, no matter how they are disguised, is that it radiates and causes squeals and whistles in other sets when being tuned by the average broadcast listener. This one uncondonable fault is rapidly driving it and other regenerators out of existence.

## Tuned Plate

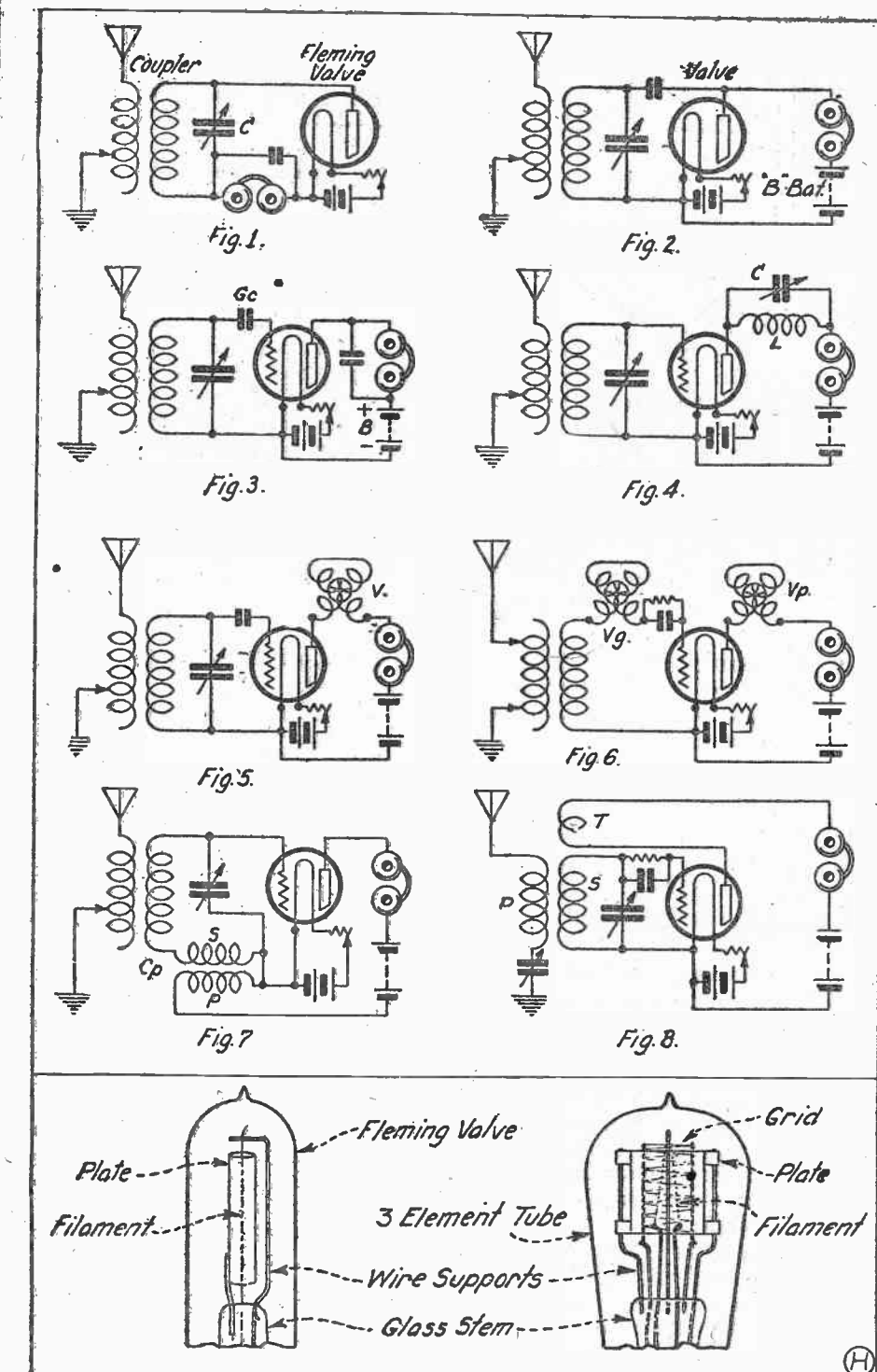
As long as the plate is tuned it makes little difference how the grid is controlled. Either a condenser can be employed, as in Fig. 5, or a variometer ("Vg"), as in Fig. 6. The latter set is probably even better known than the condenser one, for the "two-variometer outfit" has been used everywhere since Paul Godley designed it nine years ago. Either of these two circuits can be considered as fundamental "tuned-plate" ones for practical purposes. In the next article will be shown how variations of them are devised.

Not one bit less popular than the tuned-plate system is the "tickler" idea of regeneration. This comes in the magnetic feed-back class. The basic circuit is shown in Fig. 7. Here we have the pertinacious tuning coupler and condenser, and also another coupler, which serves an entirely different purpose. The latter is marked "Cp" and consists of a fixed secondary, "S," and a primary, "P," which can be moved to and away from "S."

From the connections it can be seen that the plate current flows through the primary of the coupler. Due to a magnetic action which is thereby set up, part of the plate energy is fed back to the grid and the amplification process takes place as explained. This is a simple and obvious scheme, and in practice works to perfection. Tickler circuits in general are more flexible than tuned-plate ones and have many variations. Some of the most notorious ones, the ones which have been heralded so blithely as "new" and "astounding" circuits, will be discussed in the next article along with tuned-plate adaptations.

The most noteworthy example of a tickler circuit is the three-honeycomb affair. It rivals the two-variometer receiver in general excellence, and is about as popular. Here the tickler coil is directly coupled to the secondary of the tuning-coil system. The primary, secondary and tickler ("P," "S" and "T") are all honeycomb coils, supported in a suitable mounting. This circuit in particular should be kept closely in mind, as it is the one that has been most adroitly manipulated.

Now, the strength of a received radio signal depends on the plate current, and also the extent of the variation or change in that current. It can therefore be seen that an increase in strength is had by the use of a regenerative "feed-back." Incidentally, the set



regular tube set. It is merely a stopping condenser which prevents the plate battery from short circuiting through the tuning coil. At the same time it does not obstruct the alternating radio current.

## The Third Element

It was not until Dr. Lee de Forest, a Yale graduate, and an active engineer, put the third element, the grid, into the two-element valve that things began to happen. Volumes upon volumes have been written on the wonders of this Aladdin's Lamp of modernity, but it is sufficient to say that it does everything claimed for it, and a lot more. The tubes in all present-day sets are three-element tubes, and they are too familiar to warrant detailed explanation, also purely theoretical considerations dealing with the electron stream and its caprices will be left to the textbooks on the subject.

Now that we have a tube, let us begin

## Last Week on the Radio

By Pioneer

Since writing our last weekly column no less than three new studios have come to the air in New York City. They have added nothing to the prestige or the entertainment value of the ragged art of broadcasting. For the life of us we cannot understand what manner of purpose causes a street railway to seek the ether as an outlet for music and speechmaking. Is it merely a substitute for a "Subway Sun," or can it be that it is an act of pure altruism? It is difficult to believe that it is the latter. Perhaps the purpose will be revealed as time goes on and we shall find, as we have found in all other cases, that the value of the ether as a grinder of axes has been overestimated by ambitious officials.

It seems that the time is ripe for the institution of some gigantic movement whereby broadcasters will continue only by public indorsement. The results of a national vote would prove to be a sad blow to the majority of the lesser lights who unload all manner of truck into the horribly mutilated ether of space. We could name no less than seven broadcasters in New York City alone who would not survive such a test by hundreds of thousands of votes.

Charles B. Popenoe, manager of Stations WJY and WJZ, corrects a recent statement of ours, and in justice to WJY we publish his letter:

"Sir: In looking over your column in the Herald Tribune of July 17, the second paragraph, first column, is called to my attention. I am referring to Irving Selzer and his orchestra, who have been broadcasting for us quite a while. 'This is not a remote control event, but is done directly from the studio here, so that the clause in this paragraph relative to poor wire transmission does not apply. If there was any difficulty on transmission of this event it was done in the station here, but as far as I can ascertain from the engineering staff they experienced no trouble. I am very glad to have noted in your columns recently that you have enjoyed the New York Philharmonic Orchestra, and I think I am safe in saying, after four years of broadcasting, that to my mind it is the best event that has ever been put out by a radio broadcasting station anywhere. 'Trusting that when you have an opportunity you will drop into this station and see us, and with all good wishes, I am cordially yours, 'CHARLES B. POPENOE.' We still stand by our guns and insist that the music on this occasion was not received in good condition by us. Of course, this may or may not have been the fault of the broadcaster. Reception was so noticeably bad that we just naturally assumed that it was due to wire trouble. However, if Mr. Popenoe wishes to howl indictment in this way we have no objection. Our receiver is not infallible, and on the other hand we have yet to find the transmitter that can lay claim to crowning perfection.

"As a matter of fact we don't care who was in whose blood on the highway. We have been 'Dan-McGrewed' and 'Gunga-Dined' so much that we simply bolt when people are murdered on the highway and left there in their own blood. Morbid recitations never did appeal to us and lady 'dramatic readers' make a very wide detour around our organs of appreciation when they come before the microphone with semi-suitable bunk about some terrible murder. Such recitations fit the atmosphere of afternoon teas, but they are not in joint with radio studios. That's that.

## A. R. R. L. Directors Meet

The annual meeting of American Radio Relay League directors, called by President Hiram Percy Maxim, was held in Hartford, Conn., the morning of July 25. The directors represent all of the A. R. R. L. divisions in the United States and Canada.

The directors listened to reports of amateur progress during the past year and discussed radio legislation, international amateur radio and kindred subjects.

All of the directors were present with the exception of Allen H. Babcock, of the Pacific Division, and Harry F. Dobbs, of the East Gulf Division. H. L. Reid, of Atlanta, Ga., sat in at the meeting as Mr. Dobbs's alternative. The following were present: George L. Bidwell, Washington, D. C.; Clyde E. Darr, Detroit, Mich.; Cyril M. Jansky, Jr., Minneapolis, Minn.; Benjamin F. Painter, Chattanooga, Tenn.; L. Boyd Lature, Kansas City, Mo.; George H. Pinner, South Manchester, Conn.; Karl W. Weingarten, Tacoma, Wash.; Fredway Gravely, Danville, Va.; Paul M. Segal, Denver, Col.; Frank M. Corlett, Dallas, Tex., and A. H. K. Russell, Canadian general manager, Toronto, Canada.

## Cuban Amateurs Use Short Wave Lengths

Aside from the fact that no amateur spark stations are permitted in Cuba, regulations regarding amateur transmitting stations are very liberal and somewhat similar to those in the United States, according to F. W. Borton, of Havana. In a letter to the American Radio Relay League he says that amateurs are allowed use of wave lengths from 75 to 200 meters.

"I hope to arrange a program that will be devoid of hackneyed numbers, in this way hoping to keep my listeners awake until the end of the group, or at least to put them to sleep in a more peaceful frame of mind than usual. 'And so, I turn to the 'Pioneer' in his field to aid me. May I count on your assistance? Many thanks in advance. Yours very truly, 'W. H. P.'"

They said it couldn't be done!

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Clarity  
Beauty  
Volume  
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Selectivity

## A 5-TUBE SET

built of the finest low loss material and in a beautiful genuine solid mahogany cabinet at only sixty dollars.

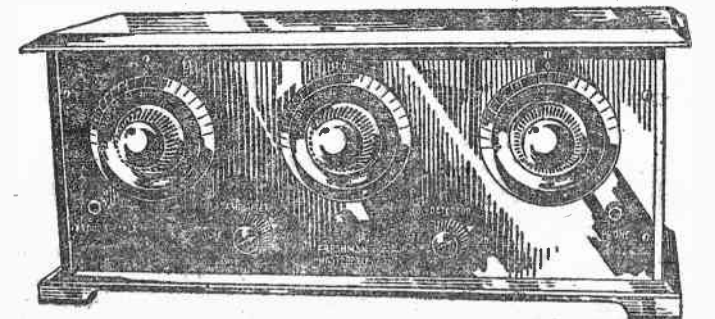
Ask your dealer for a free demonstration. Complete literature gladly sent on request.

## FRESHMAN MASTERPIECE

## A Tuned Radio Frequency Receiver

that will bring even the most distant stations to your home with surprising clarity and volume. So selective that you can pick up any station you want—night after night—at the same dial settings, and, what's more, it is the easiest set in the world to operate.

Chas. Freshman Co., Inc., 106 Seventh Ave., New York



Grandfather says:—

"ALWAYS thought radio headsets were too clumsy; that they pinched your ears and mussed your hair. Now I've found one that just fills the bill—light as a Panama hat and so comfortable, you forget they're on." It's a

## TOWER Scientific RADIO HEADSET (Navy Type)

Built and guaranteed by a \$200,000 company (the largest exclusive headset manufacturer). By producing more than one million double headsets this season, we have been able to reduce the price from \$6.00 to \$2.95. These receivers are "Tone Twins"—each is tested, with exhaustive precision, by licensed radio operators.

Compare Scientifics in workmanship and performance with any on the market—regardless of price. See a set at your dealer's today!

DEALERS—This product is available to all reliable dealers in this territory on a strictly consignment basis. Write for full particulars.

## TOWER MANUFACTURING CORP.

Main Office: Boston, Mass.  
New York Office: 1133 Broadway

\$2.95



## Radio Extends Audibility Range

Broadcasting Stations Enable Man to Hear Events Beyond Normal Limits

By R. H. LANGLEY

THE ordinary house fly, as every one knows, has thousands of eyes. Each of them gives him a different picture of his surroundings. All his eyes, however, are bunched together, and every eye sees almost the same scene. The only way Mr. Fly can see something new is to go to the new place and take his generous supply of vision along with him.

Man is pretty much in the same fix. His two eyes see just about as much as the fly's many eyes, and he has to move his whole body around the world if he wants to feast his eyes on some new picture. Photography and the printing press have, of course, done something for man. They bring him more or less faithful reproductions of distant scenes and things, and the motion pictures put a measure of animation into these images.

But the fly can see the pictures, too, so man is not much better off, so far as seeing is concerned. The pictures may not mean much to the fly, he may misinterpret them, but man frequently makes the same mistake, and no one would choose to

be found, and some of us can go and hear them. But here again most of us cannot hear things, or could not until radio came.

Radio broadcasting extends our ears. Even to-day, with this new art starting its fourth year, we can send our ears into a dozen different places of amusement almost any time we wish to. We can send them to the great cities to hear the symphony orchestras; we can send them into churches to hear the famous preachers; we can send them into the studios where carefully chosen artists have come to sing or play for us. We can send them into the hotel dining rooms where dance orchestras are playing, and we can send them to banquets and conventions.

### Radio Range

To-day our ears can go to many places where we cannot go. They can go out across the miles and listen in places where, even if we had the time and the means, we could not gain admission. They can enter the great national conventions, for example, and without inflicting any discomfort on the rest of our body that stays at home, they can hear the deliberations of the political parties and the speeches of the political leaders.

They can even go into the White House and sit beside our Chief Executive when he reads his message. The great convention halls that have recently attracted our attention are very large, as such places go, but it would have been quite impossible for even a thousandth part of those who sent their ears to these places by radio to have been there themselves. Radio not only takes your ears and mine to these places, but everybody's, and there is no crowding.

Each evening we have hundreds of electrical ears, carefully placed for us in the most interesting places in the country. We sit quietly and comfortably at home, and we make any one of those ears our own. We listen

where we please, and if we do not like it we change. If the ear at the Chicago hotel is not entertaining us we change to one in Philadelphia, or Montreal. The miles between us have lost their meaning.

### Brandes Official Returns to England After Conference

W. A. Bartlett, managing director of Brandes, Limited, England, who came to this country to attend the annual conference of the executives of the Brandes Companies, has left for home. He is accompanied by I. W. Staunton, advertising manager of C. Brandes, Inc., who has gone abroad to consult with the advertising agency of the English company with a view to co-ordinating the Brandes international advertising.

Mr. Bartlett first went to England in September, 1922, to found a branch of Canadian Brandes, Limited, which last January became Brandes, Limited, and which is now operating a new plant for the manufacture of "Matched Tone" headsets and "Table Talkers," at Slough, Buckinghamshire, England. The executive offices of the company are at 296 Regent Street, London.

Before going abroad for the Brandes Company, Mr. Bartlett was attached to the New York office of the Westinghouse Electric and Manufacturing Company on the radio sales force. He is optimistic over the radio situation in Europe and says the broadcasting has improved greatly. Upward of one million receiving set licenses have been issued, and very successful tests have been made in London in rebroadcasting KDKA and WGY on short wave lengths.



# RADIO for summer days



Below are listed Manufacturers and Dealers who can supply your wants.

**Long Island Radio Shop**  
139 Ashland Place, B'klyn  
At Long Island R. R. Station.

WE SPECIALIZE IN  
1-2-3-4  
TUBE ERA REFLEX SETS

These sets give finest results during summer months. No static. No distortion. The Cole Collapsible Loop will operate a 4-tube Era Set.

(Come in and hear it).

**Radio Headquarters**  
WASHINGTON HEIGHTS  
3 YEARS

Sets to meet the capacity of any pocket-book sold with six months service and one year's guarantee.

NEW DE FOREST D12 WONDER SET  
Now on Demonstration.  
DE FOREST AGENT

**BACH RADIO CO.**  
601 West 145th St.  
Between Broadway and the Drive  
Telephone Building  
Tel. Bradhurst 4485.  
FOR THE BEST IN RADIO SEE US

**BRING US YOUR BROKEN OR BURNED OUT RADIO TUBES**

ALL MAKES REPAIRED AND REBUILT LIKE NEW. We Save Half Your Tube Cost. A Written Guarantee With Each Tube.

If you have no burnt-out tube we will fill your order for genuine repaired tubes for \$2.75.

Room 525,  
**Radio Tube Mfg. Co.,**  
154 Nassau St., New York  
Mail Orders Given Prompt Attention All Makes.

**TUBES**  
REPAIRED AND EXCHANGED \$2.50

ALL TYPES  
CUNNINGHAM R. C. A., ETC.  
We will either repair your tube or give you a brand new tube at the same price. Price without old tube, \$2.75. All tubes shipped same day order received.

SATISFACTION GUARANTEED OR MONEY REFUNDED

**RADIO TUBE HOSPITAL**  
DEPARTMENT 2  
206 BROADWAY NEW YORK  
Cor. Fulton St., Room 418

For best concerts tune in the  
**MUNICIPAL RADIO BROADCASTING STATION**

For best prices on radio supplies and sets come to the  
**Municipal Radio Company**  
No. 1 Park Place, N. Y.  
Tel. Barclay 0382

**RADIO**

SEND FOR OUR COMPLETE MONEY SAVING CATALOG

**TIMES SQUARE AUTO SUPPLY CO.**  
INC.

**MAIL ORDER DEPT.**  
1743 BROADWAY at 66th STREET  
NEW YORK, N. Y.

### Shall I Buy A Radio This Summer?

Some thousands of prospective radio fans are asking themselves this question. From their friends they have "caught the bug" and are thoroughly determined to have a set of their own, but are laboring under the mistaken impression that they won't need it until the fall season sets in.

Much more than in previous years the summer of 1924 offers entertainment for those who are privileged to listen to things in the air.

The recent national Republican and Democratic conventions were enjoyed by many thousands who never before had come to a realization of what a wonderful miracle radio really is. There is no question but what thousands of new recruits were added to the ever growing list of fans to whom life would be dull and incomplete without their radio.

Even more thrilling than the conventions will be the campaign speeches. These warm weather days are stirring days in the political field, where party lines are being strained and broken.

Entertainment for those interested in sports is also plentiful. Baseball scores from the big leagues and prize fight returns are among the attractions in the athletic world.

All things considered, if one is contemplating a radio at all, there is everything to justify getting it now.

A glance at the following list of things available by radio now will further support this conclusion.

Things You Will Miss By Not Having a Radio This Summer

Presidential campaign speeches, baseball scores, prize fight returns, church services, camping and motor talks, hotel dance orchestras, Philharmonic and Goldman concerts, dinner music, hot weather food suggestions, children's programs and fashion talks.

**AIR-KING**



DISTANCE and selectivity are a sure thing when you build your set around AIR-KING!

The AIR-KING is a three circuit tuner—the most efficient type of tuner made. It is 180° non-radiating, wound with Litz wire on genuine Bakelite forms. Only six wires to connect and NO switch points.

YOUR DEALER HAS FREE HOOK-UPS

Metropolitan Distributors  
**RELIANCE RADIO SUPPLY CO.**  
57 Dey Street, New York  
Mfd by EXCELSIOR RADIO CO.  
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**FOR BETTER RADIO CABINETS**

Manufactured to order in all sizes—of every description.

Can supply dealers or jobbers with any quantity. Factory capacity 4,000 per week.

Mail Orders Promptly Filled.


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ALL TUBES REPAIRED AND GUARANTEED TO DO THE WORK

W. D. 11 or 12  
U. S. 205  
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RADIO TUBE EXCHANGE, 300 B'way, N. Y.  
All Mail Orders Given Prompt Attention  
Orders Sent Parcel Post C. O. D.

**Cyclone**  
FAMOUS



WORLD'S BEST "A," "B" AND "C" BATTERIES GUARANTEED FOR DISTANCE, CLEARNESS AND LONG LIFE. Insist on Cyclone Standard Electric Novelty Co. New York and Chicago

**Are You Tired of Your Old Radio Set?**

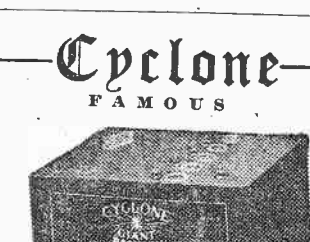
MODELL'S will make a liberal allowance on your obsolete receiving outfit and you can apply it to the purchase of a new advanced type of any of the following makes:

Freed-Eisemann	Fada
Neutrodyne	Eagle
Atwater-Kent	Thompson
Polydyne	Federal
Collins B. Kennedy	De Forest
Ambassador	Radiodyne

Super-Heterodyne  
Bring your set in as soon as possible.

**Modell's**  
ESTABLISHED 1912  
EXCHANGE SET DEPT.  
71 CORTLANDT ST.  
New York City

**Cyclone**  
FAMOUS



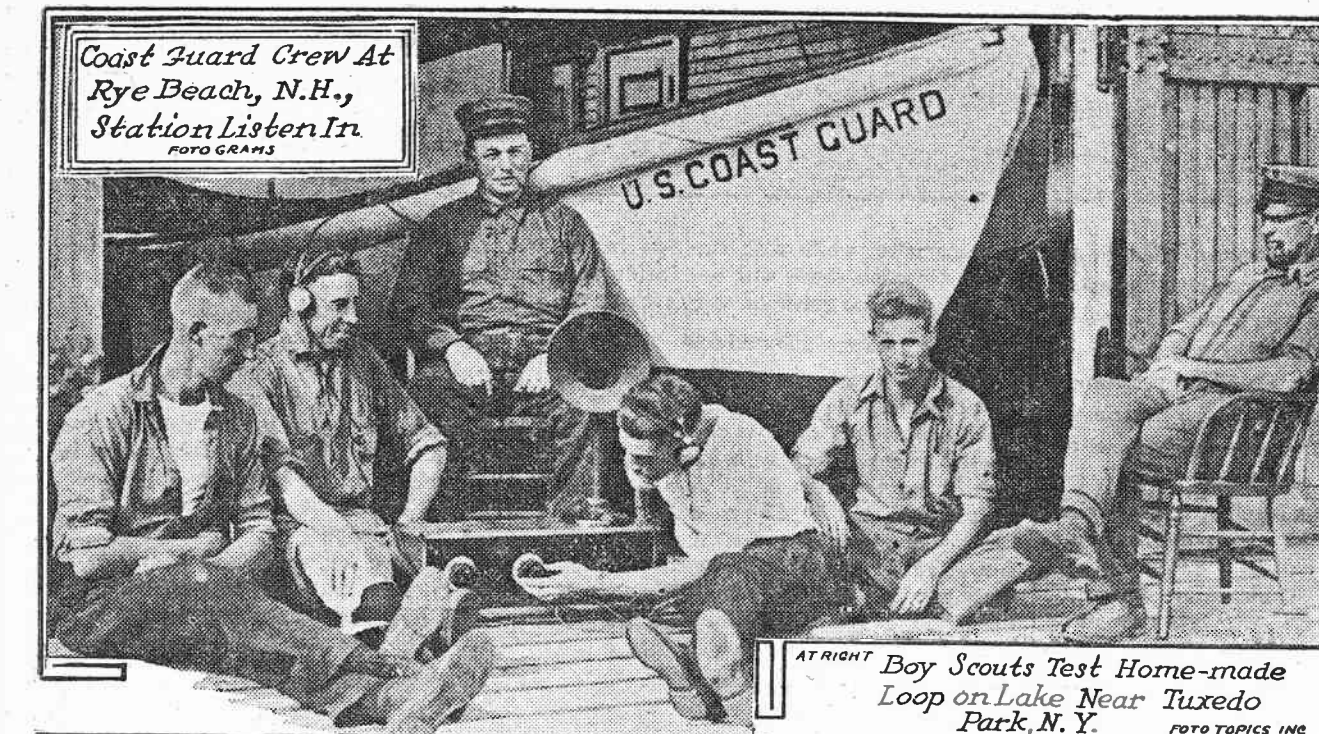
WORLD'S BEST "A," "B" AND "C" BATTERIES GUARANTEED FOR DISTANCE, CLEARNESS AND LONG LIFE. Insist on Cyclone Standard Electric Novelty Co. New York and Chicago

**Cortlandt Panel Engraving Co.**

Standard and Special Sizes  
CUT, DRILLED, ENGRAVED  
"Can't Lose 'Em"

Bakelite, Engraved, Nickel-plated with Lens  
WHOLESALE AND RETAIL  
Mail Orders Promptly Filled  
21 Cortlandt St.  
Rector 2568

## Up-to-the-Minute News of Radio in Pictures



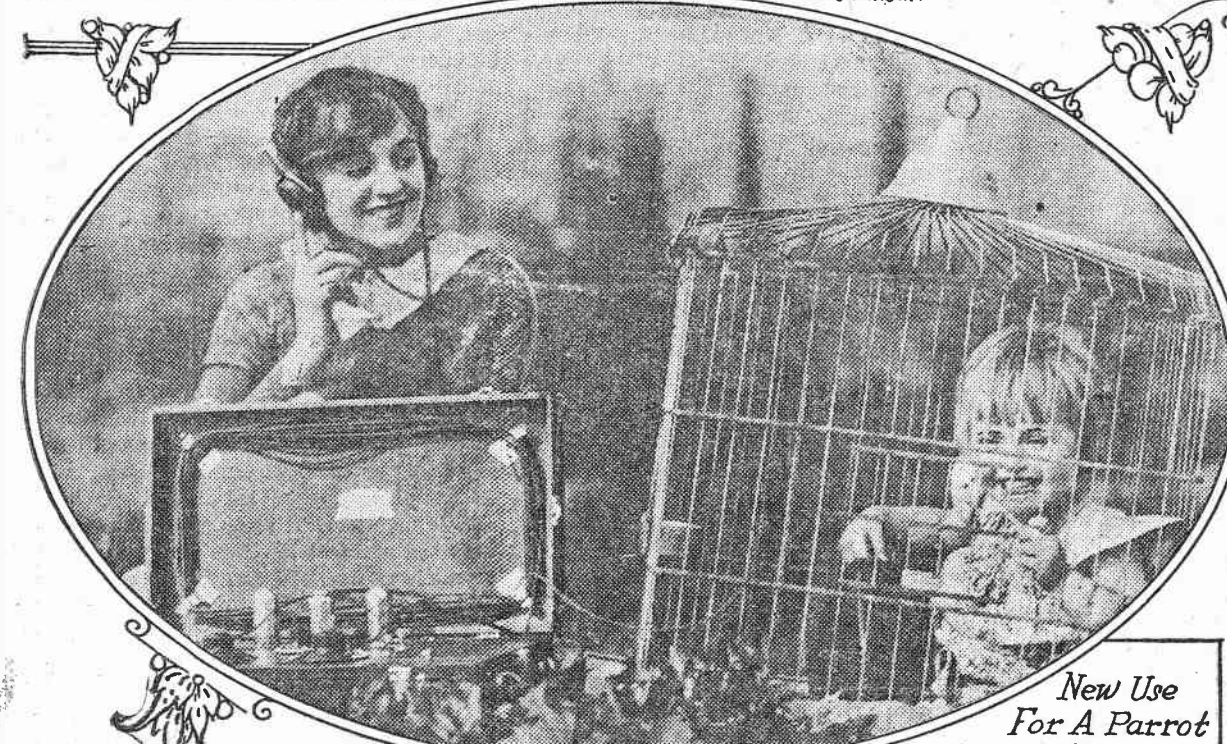
Coast Guard Crew At Rye Beach, N.H., Station Listen In

Boy Scouts Test Home-made Loop on Lake Near Tuxedo Park, N. Y.

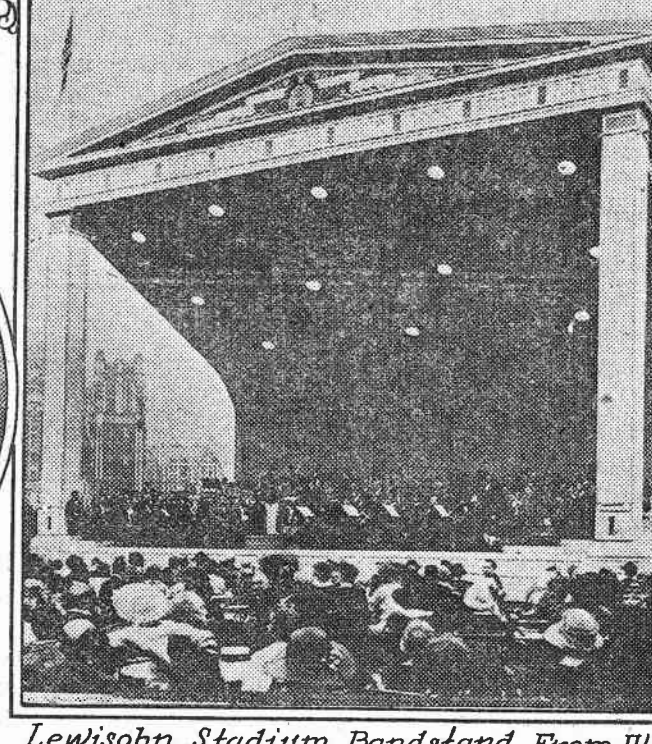


Boys Use A Kite to Raise Antenna Wire

Youngsters On The S.S. Paris Enjoy Radio Programs At Sea



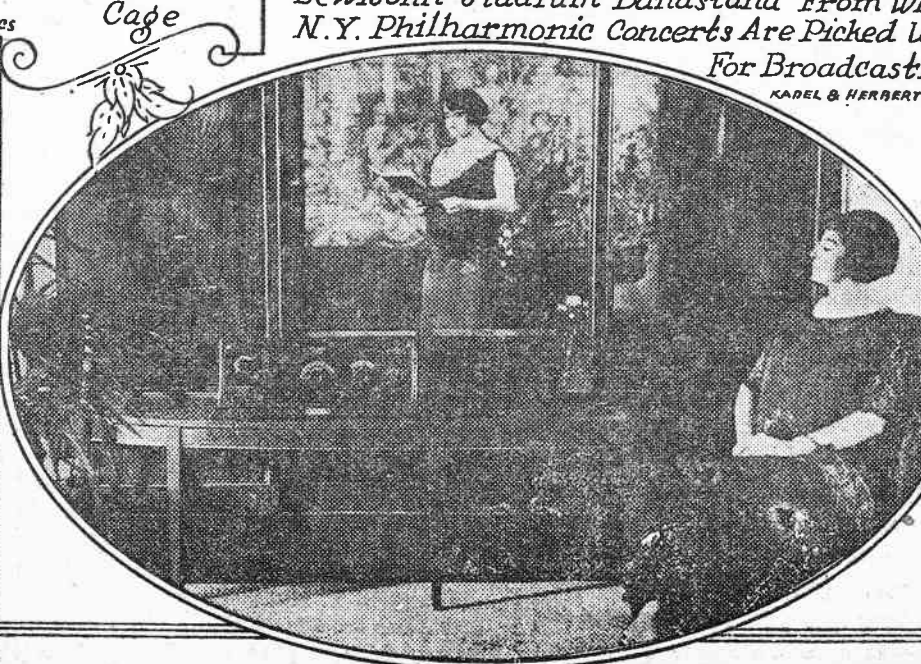
New Use For A Parrot Cage



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German Blind Children Have A Radio Treat



Glass Enclosed Studio Of Station WFBH, N. Y.



A DEPARTMENT OF  
POPULAR DISCUSSION  
OF TECHNICAL POINTS  
USUALLY CONSIDERED  
TOO INTRICATE FOR  
GENERAL EXPLANATION.

## BEHIND THE PANEL

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R-P-CLARKSON

NOW is the time to experiment a bit with your crystal receiver if the tube set is laid aside or is being overhauled in preparation for the big doings this winter. Almost any one can afford a crystal set. In fact, if you have a pair of ear phones there is almost no expense involved. All you need for the crystal set is some form of tuning device, a variety of crystals and a holder for them, and a fixed condenser. This is old stuff, of course, but those of you who have been working with tube sets so long have

hydrogen when the current tries to go one way and the resistance is too great for the current to overcome, while when the current goes the other way no film is formed and the circuit is of low resistance. Then there are various thermoelectric explanations depending upon currents set up within the crystal combination. There are also contact theories based on the fact that two dissimilar materials in contact may, if the contact is moist, form a tiny battery. Whatever is the explanation, the current passes only one way. If you have access to a sensitive galvanometer you

galvanometer, while with the flow in the other direction there will be considerable deflection, if the galvanometer is sensitive.

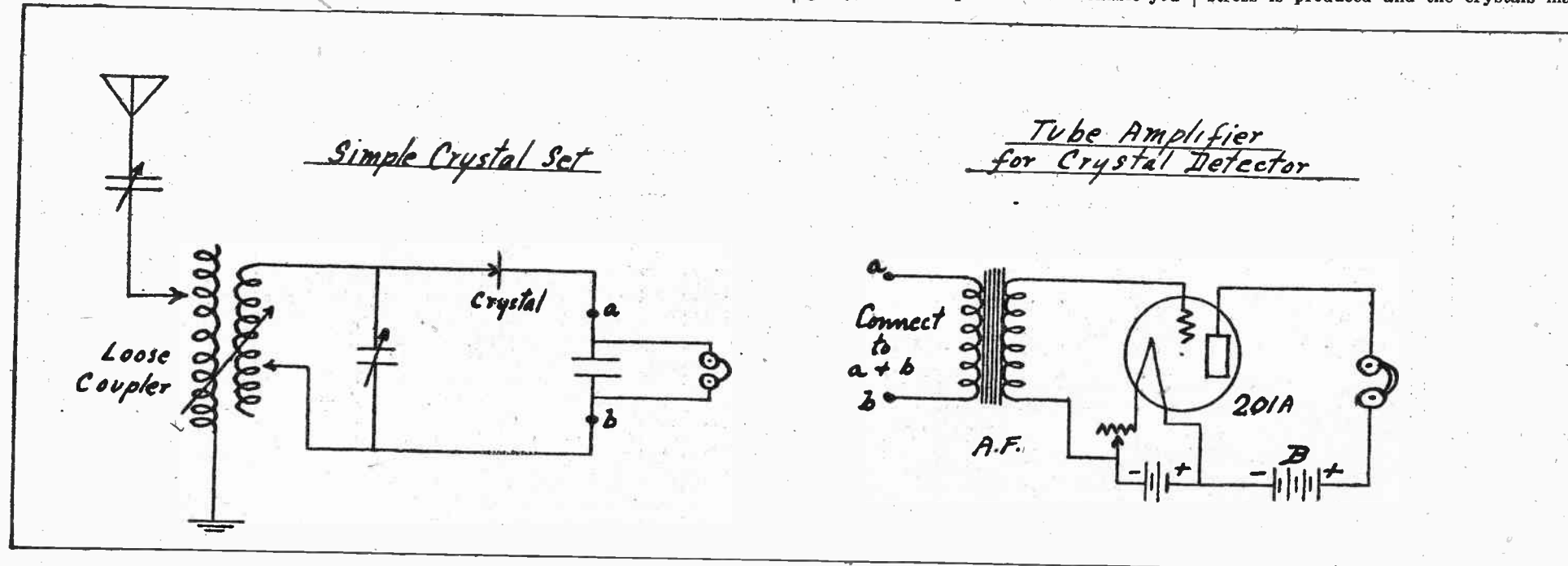
### Piezo Electricity

This has no connection, of course, with that other crystal phenomenon we hear so much about, and which is called the piezo electric effect. Very little has been done in utilizing the piezo effect in commercial instruments, but in experimental laboratories there have been most marvelous results. It is worth experimenting with while playing with crystals, and although there are but few experimental data to go by, a little explanation will enable you

crystal purposes, silicon is used with a small potential across it.

### Special Crystal

For the piezo electric effect, however, none of these is a suitable crystal. "Piezo" is a Greek word which conveys the meaning of pressure or squeezing. The effect to which this name is given refers to the property of certain solids to develop electricity when subjected to a twisting or torsional action. Most of these crystals have the reverse property that when electric potential is applied to them at the proper points a stress is produced and the crystals may



probably forgotten how simple the crystal set is.

For a tuner there is nothing better than the old fashioned loose coupler and you can pick them up for almost nothing nowadays, as they appear to be a drug on the market. In fact, for playing around experimentally, the two slide tuning coil isn't so bad and those which sold for \$3 and \$4 a couple of years ago, I see are marked down as low as 75 cents now. Use a 23-plate condenser across the secondary even if it is tapped or even if you use a slider. I like a condenser in the primary, too, for convenience.

Then for the hook-up almost any way of arranging the parts will be satisfactory. The most obvious and common way of using them is to place the secondary, the crystal and the fixed condenser all in series in a closed circuit and connect the phones across the condenser. This arrangement is shown on this page and can be used as a starting point for your efforts. Sometimes a fixed condenser is put across the crystal and the claim is that this increases the signal strength very materially.

On the crystal set it is just as important that the low voltage points should go to ground, as on any other kind of set, so be sure the rotary plates of the tuning condensers go to the ground side and be sure the fixed condenser across which you put your phones is on the ground side of the crystal.

### Crystal Action

As we know, the crystal is simply a rectifier. No one has given an accepted theory of how it acts to rectify. Some scientists have an idea that because of the internal construction of the crystal itself it can conduct in only one direction, but most of the experimenters feel that the one way conduction has something to do with the fact of the contact between two dissimilar materials, either the catwhisker and the crystal or the two different crystals. There is a thought that the point of contact heats up and we have somewhat the same effect as in the electrolytic rectifier, where one plate gets covered with

can see this for yourself. Connect the crystal, the galvanometer and a battery in series and arrange to reverse the connections on the battery, remembering that the carbon pole (at the center) of a dry cell is the positive pole and the zinc pole (at the outer periphery) is the negative pole. Outside in the circuit the current is supposed to flow from the positive pole around through the hook-up to the negative pole. Only by reversing the battery connections, therefore, can you reverse the direction of the current flow through the whole circuit. By reversing the crystal connections, of course, you can change the direction of flow through the crystal. With the flow in one direction there will be almost no deflection of the

to have considerable fun in connection with your radio experiments.

In the crystal sets we use for the crystal either the manufactured product produced and sold under all kinds of trade names, or such crystals as galena for sensitiveness, or carborundum, where a more rugged material is essential. Usually where carborundum is used a battery is connected in the circuit to impress half a volt or so across the crystal and thereby make it more sensitive. Another combination is the zincite-pyrites arrangement, really the doing away with the catwhisker and using another crystal in its place. In place of plain copper pyrites, the crystal boronite, which is a copper ore, is substituted. Sometimes, for

actually have a sort of swelling or distention.

The difference in the action of the crystals used in a radio receiver and those used in obtaining the piezo electric effect may thus be made clear by talking about the effects in terms of energy. In the radio set the crystal merely permits current to flow in one direction and absorbs the energy in the other direction, so that no current flows. The piezo crystal, on the other hand, is not a rectifier of energy, but is a converter of energy. It will convert mechanical energy into electric energy or electric energy into mechanical energy. Such piezo crystals also have remarkable optical effects and will rotate the plane of vibration of light waves passing through them.

### Many Piezo Crystals

The piezo electric effect appears to be undoubtedly a property of the structure of the crystal and its growth. There are many of the common substances, such as camphor, quartz, sugar and the like, which have marked piezo action, but probably the greatest effect is obtainable with Rochelle salt crystals and, strange to say, so potent is the effect of growth that by careful preparation effects have been obtained twenty times that of the natural or normally prepared crystal.

To observe the phenomena it is desirable to mount a crystal of Rochelle salt in metal tips. These tips should be of a low melting point alloy, such as Woods metal, and should be located at the ends of the principal axis of the crystal. A metal girdle is placed around the central portion of the crystal and a twisting strain set up between the ends, whereupon very considerable potentials are developed between the girdle contact and the pole tips.

The usual way of using this form of crystal is to arrange a diaphragm so that singing or speaking against the diaphragm tends to twist the crystal. Even this effect causes a potential of 12 or 15 volts on open circuit, and a current of upward of 18 microamperes will flow.

For many purposes the crystals may be arranged to work in parallel, and thus the effect produced by them may be built up. Many stunts between radio programs may be readily arranged by the fan to amaze the inhabitants. The most natural arrangement and that most written about is the use of the crystals as amplifiers, using the microphone suggestion in the previous paragraph.

## AMATEUR KICKBACKS

By EVERETT M. WALKER-2CDR

THE bureau of navigation of the Department of Commerce has received a large number of reports to the effect that amateur stations are operating on wave lengths below 150 meters, which is a violation of the terms of their licenses.

In some of these cases the amateurs have admitted doing so and gave as their excuse that they received information that there was no objection to their using the wave lengths below 200 meters. This is an entirely wrong impression and should be corrected at once.

It appears that in some cases where the amateur was reported he did not violate the terms of his license, but was received on his first harmonic. This condition is not only found in amateur stations, but in all kinds of transmission. The amateur should, however, make every reasonable effort to eliminate such harmonics, as often times much energy is lost through them.

The bureau also states that few of the amateurs knowingly violate the law, and where they are found to violate and continue to disregard the law after being notified the license is usually suspended for three or more months. This is done to protect the law-abiding amateur and all should be willing to co-operate.

2CBC is another station with a new CW transmitter. Although the plate supply is sixty-cycle AC unusual results are being obtained. No difficulty is experienced in carrying on two-way communication with stations in the first and third districts in daylight.

2CXE has been overhauling his CW transmitter for the coming fall. He promises that the sixty-cycle CW note will not be heard long, as a new chemical rectifier is almost near completion. He also says he has the parts for a good filter system. FB OM.

2AWT is still burning up watts with his old spark set. However, good work is done on it and the operator has a good "fist." He expects to have the CW set in operation before long.

2WR has been complaining that he can't get a good CW note, notwithstanding the fact that six microfarads of condenser and a fifty-henry choke coil are used. Judging from the way it sounds the apparatus is doing its work quite efficiently.

2CNJ has rewound the coil for his short wave tuner with No. 12 wire. A marked improvement was noticed on the first trial. We also understand the power of the transmitter has been increased.

Another station using a temporary receiver is 2EX. He says with a bunch of coils lying on the table all districts have been copied within a few hours.

2ASY is another station doing excellent work in spite of the summer static. The CW transmitter employs a single five-watt tube, with either a high or low plate voltage for high and low power, respectively.

2BBE recently erected a new 18-inch cage aerial, which is higher than the one previously used at that station. He says his antenna current dropped to about half what it was before. However, he seems to be doing better DX work than ever. FB OM.

2CYQ reports hearing WNP. He says he was using a low loss tuner that has been giving good results on amateur wave lengths. CYQ also has a new transmitter in operation and is trying hard to work him. Go to it, OM.

Another old timer who recently returned to brass pounding is 2AZY. The transmitter has been completely rebuilt, but still employs the same five-watt tube that made the station famous last winter.

2AIC, a promising new station, has just appeared on the air. The equipment used at present includes a lone five-watt tube with three-hundred volts of AC on the plate. Good results are being obtained in spite of the power and plate supply.

2SY changed his former cage antenna to a five-wire flat top, with a five-inch cage lead-in. He says with the old cage it was impossible to work south further than Washington, in spite of the fact that all other directions were worked with ease. With the new aerial, however, he works fourth district stations like locals.

Rumor has it that 2BQZ is going to start up again in the fall with a husky spark set. What is the matter with the tubes, OM? A little five-watt tube would carry twice as far and still wouldn't be as expensive as a good spark set.

2WA is another station doing good work on phone. At times he is able to filter his generator hum out entirely and other times not so well. He blames it to the brushes.

2KR had a fifty-watt tube in operation for only two weeks and then it went "west." For a short time a UV 201-A tube was used with 350 volts on the plate. With only eight watts input he was heard by 6EB and English 6LJ. On phone he worked amateurs in most every state this side of the Mississippi. At present a single five-watt tube is used and good results are being obtained. He contemplates installing a fifty or one-hundred-watt transmitter tube, with "S" tubes as rectifiers, before fall.

2BMR recently installed a "sink" rectifier for his five-hundred-watt outfit. Although the note obtained is not pure DC at local points, reports show it to be good at a distance. However, it is much better than the old AC plate supply, and we understand a good filter is in the course of construction.

After a short silence 2CGS returned to the air with much more pep than ever before. He still uses the same five-watt tubes with the spark coil plate supply.

2CG is building a new speech amplifier for his CW and phone outfit that is to employ a two-hundred and fifty-watt tube as oscillator. He says with the new set he ought to be able to work local stations. GN, we'll say so.

We have just learned why 2RM is not heard so often as he used to be. He works in the Alamac Hotel at nights and sleeps all day. He expects to have a fifty-watt tube in operation by fall.

2BFF is doing some good work with two fifty-watt tubes on both phone and CW. With an absorption loop for modulating the output he has good modulation. He expects to have another fifty-watt tube in the course of a week or so to operate in parallel with the other two.

Another station that seems to be getting good results with "S" tubes as rectifiers is 2CZX. With two five-watt tubes remarkable distances are being covered.

2GC took a trip to Lake Hopatcong last week, and along with him was a portable receiver made up of a single circuit tuner and one step. Using an indoor aerial, stations within a radius of 100 miles were copied with surprising audibility. On his trip GC also had the misfortune of being involved in an automobile accident.

An old-timer who has recently started up again is 2BQC. At present 60-cycle AC is used on the plates of his tubes, because of trouble that was experienced with the rectifier. The rectifier will be in operation again, however, in a week or two.

2BXG is using a 500-cycle plate supply on his new transmitter. According to reports, fine results are being obtained, and much traffic is passing through the station.

9DYT has come to the conclusion that there is nothing like the short wave lengths. He may be heard working both coasts almost any time of the evening with a lone five-watt tube. This station also has many other remarkable records to its credit.



## Summer is the time to build your FADA Neutrodyne Receiver

DON'T miss the wonderful radio programs. Build a 5-tube FADA Neutrodyne Receiver now. The long evenings give you lots of daylight. Then, when it is complete, you can enjoy the concerts, the political events, take the receiver on your vacation and keep in constant touch with the latest happenings.

Even in summer static doesn't interfere with reception of local programs. Boys everywhere are making the most of summer vaca-

tion by building 5-tube FADAS to be ready for fall. Build now. Buy the FADA 5-tube knock-down Neutrodyne Receiver from your dealer and build it in spare time. It's easy.

The FADA book, "How to Build FADA Neutrodyne Radio Receivers," comes with every outfit or is sold separately for 50 cents. Complete detailed instructions with diagrams and pictures. Ask your dealer for the FADA Knock-down Kit No. 167-A. Price \$65.60.

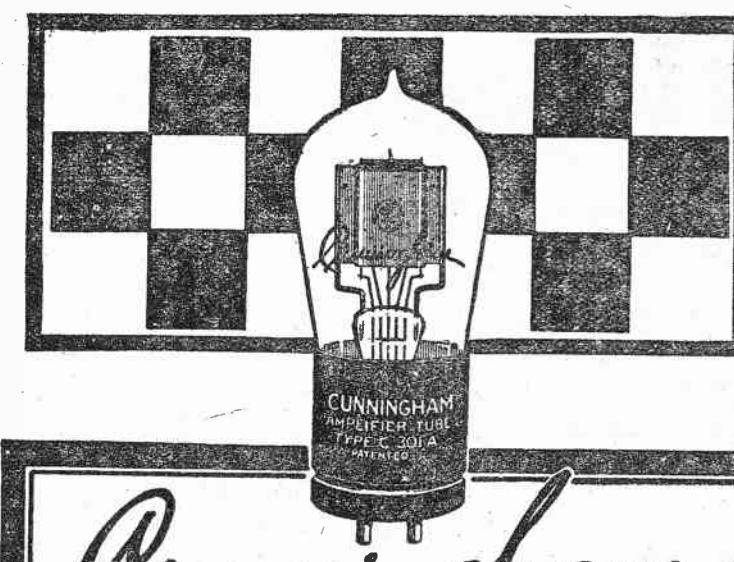
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# QUESTIONS/ANSWERS

This Week's Most Interesting Question

P. F. Sneed—I have recently been advised that in order to install an outside aerial on a house it is necessary to notify the insurance company and that an increase in premium rate on the policy takes effect with the installation. Kindly advise if this is so.

Answer—The Board of Fire Underwriters has certain rules that must be complied with in the installation of an outside aerial. When these rules have been adhered to and an aerial is installed properly, then one of the three things must be done. First, the owner of the house can notify his insurance company that an aerial has been installed on his house and that he wishes to have an inspection made by them. When the inspection has been made, and if the aerial passes inspection, a warranty is issued which is attached to the policy. No increase in insurance premium is charged. Second, the house owner can notify the Board of Fire Underwriters, located at 123 William Street, New York City, for New York State, that he desires an inspection of the aerial which he has installed. This inspection costs \$1, and if the aerial is perfect a certificate will be issued, a copy of which is then sent to the insurance company and attached to the policy. This copy is made by a notary public. Keep the original.

Third, the owner may just write to the Board of Fire Underwriters and state that an aerial has been installed and ask for the list of rulings that must be followed to protect the house. If these have been complied with, then the certificate sent with the rulings should be filled out and sent to the insurance company. In either case no charge is made in the way of an increased premium, nor does it decrease the value of the original policy.

For suburbanites all communications to the Board of Fire Underwriters should be made to the Suburban Department of the Board at 123 William Street, New York City. Address all communications to the Electrical Department of the board.

**45,000-Cycle Super**  
James Gray—The diagrams in my copy of The Radio Magazine for the 45,000-cycle super-heterodyne are very difficult to read. Is there any possibility of getting clearer ones? Kindly tell me where to get a loop as described in the article.

Answer—If the diagrams in your copy of the magazine are not clear, suggest that you get another from the circulation department of this paper. Any good loop will operate the set efficiently. These may be bought in large radio stores.

**Three-Circuit Trouble**  
John Burroughs—I have a three-circuit tuner, variocoupler, 0005-mfd. variable condenser and a variometer with one stage of audio-frequency amplification. It is only possible for me to use about half the condenser—above that no signals are heard. The signals are not clear, but seem to be foggy. Can you suggest a remedy for this?

Answer—A series condenser, fixed, in the aerial circuit probably will enable you to use the variable condenser throughout its range. Too large a variometer, too much "B" battery or too large a grid leak will cause foggy signals, and also a grid condenser that is not of the right capacity.

**Super Heterodyne Unit**  
James L. Shaw—Will the four-tube unit as described in The Radio Magazine for making may set a super-heterodyne operate with a generative receiver having an untuned primary coil and tickler feedback? Will it work with dry cell tubes such as the WD-12? The article states that condenser C3 is used to complete the oscillating circuit. There is only one C3, and that is not in the oscillator circuit. Is this a typographical error? Can the intermediate frequency selector be obtained on the market?

Answer—This unit may be used on any set by making the connections as specified in the article. The tubes you mention are not good radio-frequency amplifiers, and therefore, though the set would operate with them, full efficiency would not be obtained. C3 is the condenser that completes the oscillating circuit. It has a capacity of .005 mfd.

## Radio News From Our British Correspondent

LONDON—Graphic and lurid pictures as to what broadcasting was going to do in the next war were painted this week by Captain C. A. Lewis, the famous "Uncle Caractacus" of the British Broadcasting Company. Propaganda, he predicted, would be developed by the new engine of science to lengths undreamed of in the last great conflict.

"Broadcasting will be a valuable means of propaganda in the enemy's country," said Captain Lewis. "High power stations will soon be erected which will cover half of Europe as easily as 2LO (the call letters of the B. B. C.) now covers London. "The director of broadcasting service will become automatically the director of propaganda. Tales of the unworthy enemy will be told by the very men who had suffered at his hands, news of the progress of events, of actions stubbornly fought and bravely won, of incredible air duels two miles above the earth—of everything, in fact, that will foster pride and admiration in the hearts of those 'who only stand and wait' will be retailed daily to the listening public."

"Mobilization," according to Captain Lewis, "which in the past has been secret, will become open and urgent." He conjured up a vision of men all over the country being instantly and simultaneously summoned to the colors by a voice speaking from general headquarters. But he said this operation would not be allowed by the foe to be carried on unimpeded. "Enemy stations tuned exactly to the broadcast wave length will send out a steady succession of X's to jam out transmission. We shall be doing likewise. A race for higher and higher power stations will begin, each trying to swamp the transmissions of the other by this means. Within our coasts oscillators friendly to the enemy will attempt to spoil reception by howling throughout the transmission."

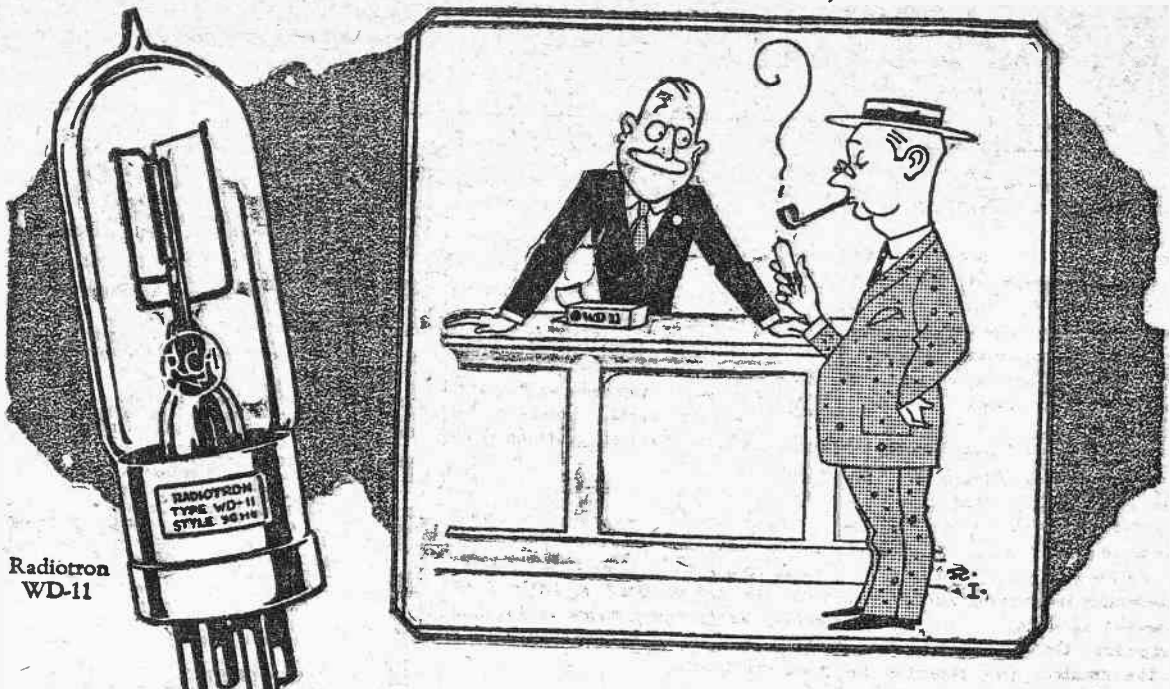
"The air menace will be the greatest danger. Enemy raiders, besides concentrating on munition factories and dumps, will have special orders to locate and destroy transmitting centers. So all studios and gear will be installed underground, only the aerial on a pair of flimsy masts, difficult to bomb and easy to replace, showing above ground."

The Marconi Company is developing a crystal set which will fit into a vest pocket like a cigarette case. It is designed for use with portable aerials which are likely to be installed in the near future on omnibuses, trains and streetcars for the benefit of the public. The telephone earpieces are about the size of a ten-cent piece, so that passengers as they approach their destination can just unplug from the aerial and pocket the set and phones before alighting.

Speaking of Marconi recalls the new angle that Godfrey Isaacs, the Senator's man Friday, revealed recently on the possibilities of the new beam system. Mr. Isaacs predicts that in the future transmission will be less interfered with by the increasing air traffic owing to the directional transmission. "The other under existing conditions has been getting too full, but under the new system you use the ether only for the beam along which you are communicating, and that should make an enormous difference. The possibility now opened up of innumerable stations operating without interference from one another is very important at a time when interference has become rather a serious problem."

Radio is going to improve the King's English, said J. C. W. Reith, director of the B. B. C., speaking before the World Power Conference at Wembley. "In fact, just as long ago Chaucer," ran his optimistic forecast, "standardized the English tongue and later Chorton standardized English spelling, so it is not inconceivable that broadcasting may standardize English pronunciation."

**WRW Temporarily Closed**  
During the installation of a 500-watt transmitter and higher antenna towers WRW, Tarrytown, N. Y., will be off the air. Service will be resumed about August 10. The owners of this station are said to be arranging to locate a studio in New York City.



## Don't Buy Just Tubes!

If you go into a reliable store and ask for a vacuum tube, you will probably get a genuine Radiotron, because most reputable dealers carry nothing else. And most buyers mean "Radiotron" when they say "tube." But the wise man says "Radiotron." And he takes the precaution to look for the name on the base, and the RCA mark on the glass. Those names have a history of invention, research and development back of them that has resulted in the production of the finest tubes possible to-day. And they have a history of best performance right within every fan's experience. That's why knowing fans buy by the name: Radiotron.



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## From a Broadcast Announcer's Viewpoint

Human Frailties Pass Him in Daily Review, but a Sense of Humor Leavens All

By ONE OF THEM

THE police see potential criminals in each one of us; lawyers, clients in legal difficulties; doctors, malady victims; but the announcer is praying for artists who will divert him as well as you listeners and kindle anew in him the spark of enthusiasm. Incidentally, the French system of justice prevails with us—every broadcasting applicant is a suspicious character until proved an artist.

Naturally, established reputation is quick proof for our purposes, yet oftentimes, like paupers' titles brightly beribboned, newspaper clippings may with their apparent freshness conceal a musty artist. "Cave canem" is stamped on every request of the following type: i. e., that we mention the wonderful work done by Mue. Highnote in the Grand Prix Chorus at Aix-les-Bains (no year mentioned), or that Senor Lavocce was the leading soloist in the Cosmopolitan Opera Company. In other words, "Tell them (meaning you) how marvelous I am, before they hear me." Afterward—well, you who read have suffered. What further comment is needed? Moral: Sprinkle such statements with salt, let them momentarily slip your mind; after the first selection there will be time for eulogy.

**Human Frailties Divulged**  
We announcers see human frailty in every form, and we grow correspondingly prouder of our own poise and radio stature. Each day brings tears, giggles, lack of originality, nervousness, egotism and occasionally artistic temperament, which includes all the failings mentioned. From the collarless, perspiring orchestra boys to the dignified, stiff-shirted statesmen, the world passes through our hands.

As in the home, so in the studio, the good and the bad of human nature are reviewed by our alert eyes and are commented upon silently. "Lovely work, Miss Lyrico." "Your voice was splendid, Mr. Highhat." "Your selections were so different, Miss Monotony." How they drink it in, these governors, statesmen, doctors, lawyers, bankers, pugilists, actors, songsters and prodigies! For how may they know what anguish or pleasure they afforded? Their friends would not tell the truth, anyway—neither could we. Send them away with a smile! We'll need them again!

**A Friendly Welcome**  
The manufacturer of new selections, even though poor ones, is welcomed. Ditto for the one who doesn't want letters, who is satisfied with a Miss or Mr. as an introduction, who quits when the time is up, who brings extra numbers and will use them if necessary, who likes the piano, who doesn't want to talk to mother, and the speaker who doesn't cough. Occasionally, just prior to opening his address, a speaker will release a well pitched cough, evidently believing that our microphones are trained to operate the chaff from the wheat. But you have heard the walrus bark.

Every artist of the fair sex is a Miss to us until otherwise instructed. The young artist blushing requests a Mrs. we immediately lay long odds that she will sing of love and springtime. Then hubby telephones and we catch the words, "You did? I'm glad. Yes, for you." To us she says "A friend just said it came over fine." Theoretically the artist knows music, its composers and correct pronunciation. In practice we are better guessers. With Chinese a dead radio language we can face the future bravely.

While keeping the artist smiling and allaying inevitable nervousness, we ascertain from those to follow their selections, their composers, arrange an orchestra, take balance tests, keep visitors quiet, answer questions and incidentally answer telephone requests also must be answered, and, apropos of these, to comply with even a part of them would entail great genius or a vast music library.

For you folks out there: We realize you consider us legitimate curiosities. And how well you know our voice! Just ours—when there are three or four of them! You get us perfectly out there in Four Corners on your little seven-tube set. But for all that we, too, are human and enjoy the crushed apples just as the performers do our offerings. But there is this difference, we think we don't.

Enfin, why ask us to announce that the little dog Jo Jo is lost? We are very sorry, but dog announcements fall short of even threadbare selections. Pocketbooks, children and even lovers must go astray occasionally, but our charity begins in the studio. One night we were asked to announce that a social club with a brand new radio receiver would welcome ten young ladies, there being some ten lonesome males, as guests. Certainly a worthy cause!

We enjoy a good joke. Sometimes we have to—we are announcers. Laugh and the world laughs with you, announce and the world laughs at you. But don't forget that we have our joke daily, sometimes oftener.

## Marconi's Short Wave System

Inventor Assumes Presidency of Italo-Radio Company, Which May Adopt His Directive Devices

By AGNES R. MACKENZIE

ROME.—Senator Guglielmo Marconi's lecture regarding his new system of transmission by short wave was very warmly greeted by all radio experts, especially as he had just been appointed president of the Italo-Radio Company. Senator San Martino, the former president, while a man of importance, is not a radio expert, and the company during his six months' presidency was not very successful. As Marconi is, from an Italian point of view, the only man who knows anything about radio, his appointment will have a good effect on the workings of the Italo-Radio. Whether the company, which was formed of French, Italian and German capital, will adopt Senator Marconi's new system remains to be seen. As both Caltano and San Paolo have been newly furnished with the Telefunken installations, from an economical point of view it is not likely that they will spend large sums in pulling down the recently installed stations, even though eventually they would save money in transmission. The Italo-Radio Company was formed when the Duke di Cossato was Minister of Posts and Telegraphs in the first Fascista Cabinet. This contract, made between the company and the government, was signed even though the Minister of Posts and Telegraphs had already received notification from Senator Marconi that his experiments with a new system had been successful.

As everyone knows now, the Marconi experts in the laboratory in England had been working along certain lines to discover a cheaper method of radio installation. Their experiments reached a successful conclusion in January, 1923.

**Marconi's British Experiment**  
They were able to hand over to Senator Marconi the results of these experiments for him to make the final tests. The system consisted of a simpler installation, by which with a smaller aerial combined with a short wave wonderful results of transmission could be obtained with a minimum cost in energy. Senator Marconi started his experiments four months later, in May, 1923. With his full results, which he himself admitted were marvelous, he felt it his duty to notify the Italian government of the possibilities of the newer and cheaper method of radio transmission. This report was sent to the Minister of Posts and Telegraphs, and Senator Marconi was convinced that as the Italian government was then discussing the possibilities of founding a radio company it would at least consult him in regard to the new concession. But, evidently, the Senator had no friend at court or in the ministry, for the government soon after gave the concession to the combined interests of French, German and Italian capitalists. Marconi, though considered a genius, had less pull with the government than the representatives of the German Telefunken, who eventually obtained the concession of installing their system at Caltano and at San Paolo, Rome.

A Marconi expert who has been Marconi's right-hand man in Italy explained to me the reason for the low cost of installing Marconi's new system and the very great advantages which would accrue to the Italo-Radio Company if the older system were replaced by the new. Of course it would mean pulling down the present installation, as a smaller aerial of quite a different shape is used and simple wires instead of the grouping which is necessary for the longer wave length. The distance between each antenna is relative to the length of the wave, thus obviating huge monster installations as were planned for the stations of the imperial chain in England. It is possible to send energy in whatever direction the operator wishes, and only in the sense desired, by a flash width of 1,200 degrees amplitude. The wave used is very short—about 100 meters.

## "Health by Radio" Lectures Popular

WASHINGTON.—Radio offers an unparalleled opportunity to render aid at a nominal expense to a great mass of people hitherto inaccessible through the broadcasting of health information, according to Surgeon General Hugh S. Cumming, of the Public Health Service. General Cumming believes inestimable value has already resulted from the dissemination of health lectures through the ether.

Broadcasting health information was first attempted by the Public Health Service in July, 1921, when General Cumming delivered what is believed to be the first health message ever sent by radio telephony. On August 16 of the same year General Cumming authorized Assistant Surgeon General C. C. Pierce, Dr. Charles Boldman and Louis J. Heath to confer with representatives from the office of the Director of Communications of the Navy Department regarding Public Health Service broadcasts. As a result of these conferences, arrangements were made whereby the Director of Communications of the Navy Department assigned to the Public Health Service two fifteen-minute periods each week for the transmission of popular lectures on health topics. Following this arrangement, on December 31, 1921, the "health-by-radio" service was formally inaugurated.

"The unique character of this radio service, the first of its kind," says General Cumming, "created such widespread interest that during the following six months six commercial broadcasting stations located in different parts of the United States and Canada applied for the privilege of these lectures. The number has steadily increased until at present there are forty-seven co-operative stations in all, and it is anticipated that others will be added in the near future.

"On March 26, 1922, arrangements were concluded with the Foreign Language Information Service, whereby that service was furnished with copies of these radio lectures for translation and use in the foreign language newspapers in this country and abroad, having a potential field of 25,000,000 readers. These broadcasts have been translated into sixteen different languages. As an example of their extensive use it may be noted that during the month of January, 1924, 286,698 words were published from radio health lectures as against 7,740 words from all other Public Health Service publications during the same month.

"Beginning January 1, 1924, the broadcast schedule was placed on a weekly basis, one lecture being mailed from Washington to all co-operating stations every Saturday morning throughout the year. These lectures average about 1,200 words in length and the time required to deliver them is approximately ten minutes.

"The value of this service is well established and, judging from past experience, radio offers an unparalleled opportunity to render aid to a great mass of people hitherto inaccessible. Educational material has come to have a definite place in the air, and plenty of evidence is at hand that health information released by radio is having a very definite effect. School teachers have copied these broadcasts in shorthand and used them in schools, and local organizations have installed receiving sets for the purpose of receiving the information sent out by the Public Health Service. It has been impossible in many instances to supply the demand for copies of these radio health lectures requested by members of the vast radio audience."

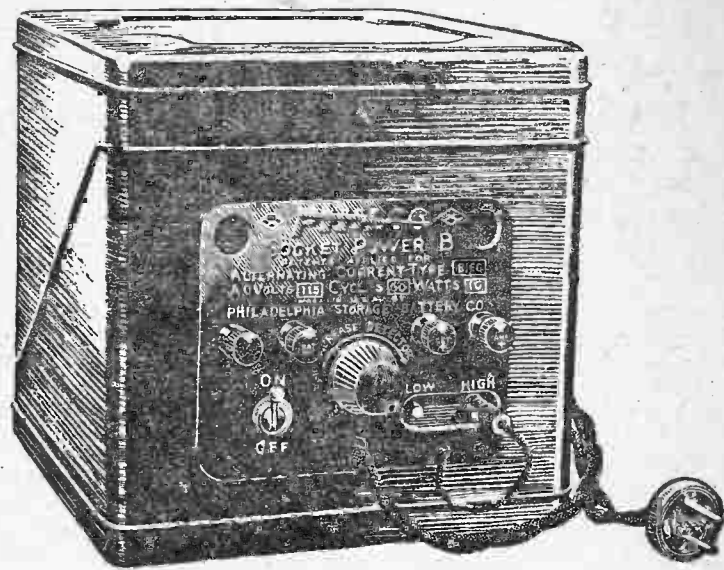
**Van Zile to Talk From WOR**  
"Presidential Campaign Novelties" is the title of a non-partisan talk to be broadcast from WOR on Wednesday evening by Edward S. Van Zile. Mr. Van Zile is a poet and lecturer and during the World War was a correspondent attached to the French army, receiving an important decoration for his extraordinary services.







# Every radio set in America should have Philco socket power B



Eliminates dry cells and "B" storage batteries.

Can be used on any set—in any home where ordinary alternating house current is available.

Plugs permanently into a lamp or wall socket. Snaps "ON" and "OFF" like an electric light.

Gives full-wave rectification—therefore clear, strong, hum-free reception, at a cost of only 1/4c a day

No tubes to burn out—no water to add—no acid to corrode—no high voltage transformers—no moving parts to get out of order.

Use Socket Power "B" on 6-volt tube sets in combination with Socket Power "A" (see on right) or with a good storage "A" battery and charger.

Sold by leading radio and music stores and by Philco Diamond-Grid Battery dealers.

Philadelphia Storage Battery Company Philadelphia

New York Office—824 Liggett Building, 41 E. 42nd Street

(Phone: Vanderbilt 1051)

## PHILCO RADIO A AND B SOCKET POWERS

Philco also builds rechargeable batteries, unique because they may be permanently connected to your radio and safely charged in your living room without changing any wires. Easier (and far cheaper) than the periodic rewiring and rewiring of dry cells.

Buy a Philco Diamond Grid Battery for your automobile

Philco "A" Batteries in acid-tight glass cases—four dry cell tubes, \$8; 6-volt tubes, \$16. Built-in charge indicators. In rubber cases, subdued mahogany color, \$14.50 and up.

Philco Socket Power "B" smooths out your bumpy house current, making it equal to the absolutely smooth current of a "B" storage battery. Gives better reception than dry cells because its voltage does not fall off with age. Price for 50-60 cycle 105-125 volt alternating current .....\$47.50

For one-switch control and the best possible radio reception, use BOTH "A" and "B" Socket Power

For 6-Volt Tube Sets, either "A" or "B" Socket Power may be used alone, but for one-switch control, use both together. Plug the "B" into the built-in socket on the "A." Plug the "A" into your house current. Both "A" and "B" (and the radio set as well) are then controlled by the one SOCKET POWER "A" switch. Snap it "ON" and enjoy your radio. Snap it "OFF" and go to bed.

Socket Power "A" is a complete "A" power unit. It supplies "A" battery current automatically—without any thought about recharging.

Socket Power "A" for 50-60 cycle 105-125 volt alternating current.....\$42.50

For 3-Volt Tube Sets, such as Radiola Super-Heterodyne, use Socket Power "AB." Both "A" and "B" power are built into one cabinet, satin-finished in brown mahogany. Everything controlled by one switch—your "A" power, your "B" power, even the radio set itself. Snap it ON and enjoy your radio. Snap it OFF and go to bed.

Socket Power "AB" for 50-60 cycle 105-125 volt alternating current.....\$65.00

(Prices complete—no rectifying tubes to buy)

# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

SECTION TWELVE

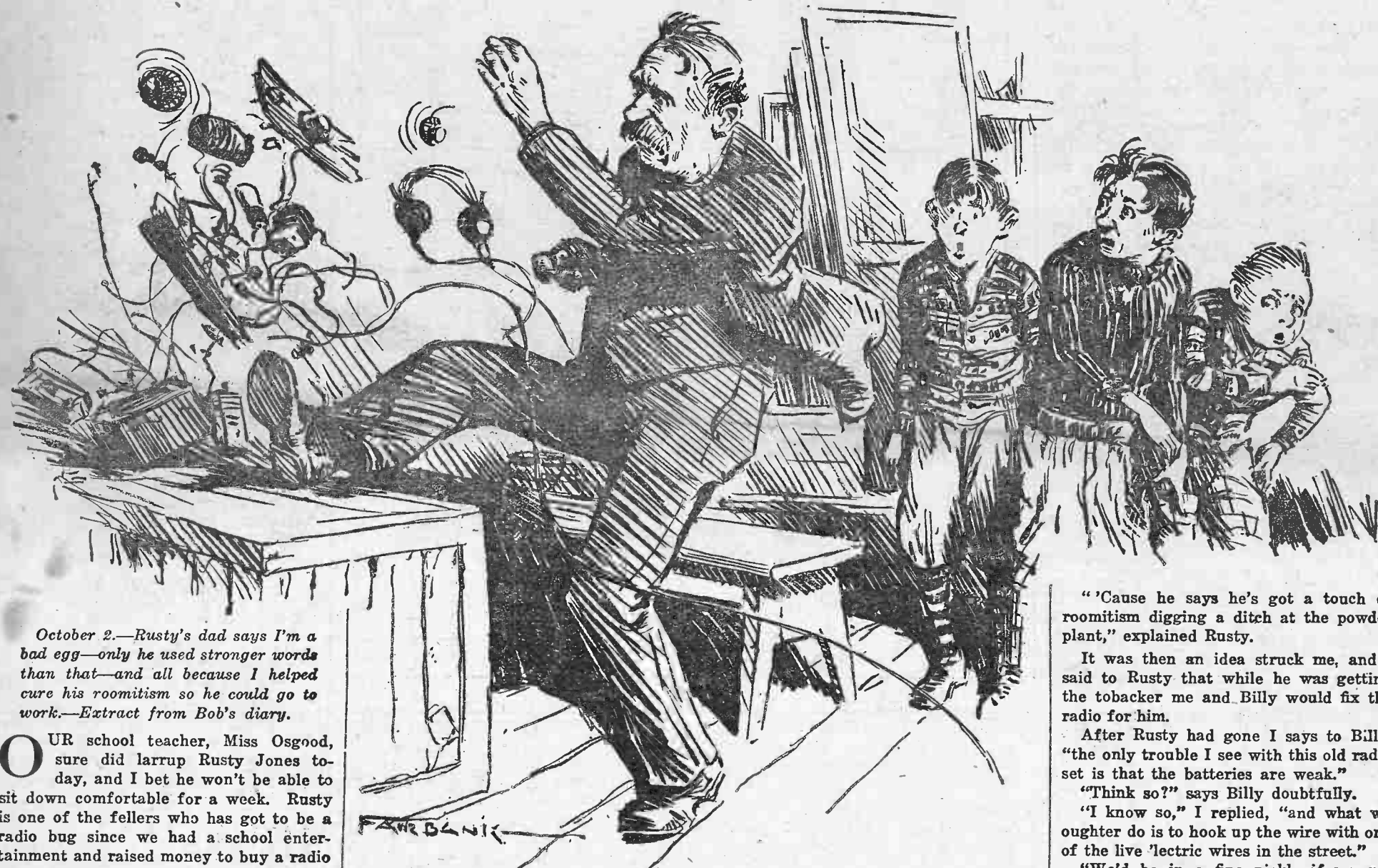
SUNDAY, DECEMBER 6, 1925

16 PAGES

## Bob's Radio Cure for "Roomitism"

The Boy Radio Fiend and His Chum Discover That the Batteries in Rusty's Radio Set Are Weak; Their Remedy Proves Surprising to Old Man Jones

By H. L. VAN DEUSEN



October 2.—Rusty's dad says I'm a bad egg—only he used stronger words than that—and all because I helped cure his roomitism so he could go to work.—Extract from Bob's diary.

OUR school teacher, Miss Osgood, sure did larrup Rusty Jones today, and I bet he won't be able to sit down comfortable for a week. Rusty is one of the fellers who has got to be a radio bug since we had a school entertainment and raised money to buy a radio set.

This morning Rusty came strolling in to school, after being out all week, and Miss Osgood asked him where his written excuse from his parents was.

"I ain't got any," says Rusty.

"Why were you not in school?" asked Miss Osgood sharply.

Rusty rubbed his eyes with his fist and says: "You remember my dog Snappy?"

"Yes," she replied. "What of it?"

"Well, Snappy died and I had to stay home and dig a grave to bury him in," exclaims Rusty.

"Do you mean to stand there and tell me that it took you four days to dig a grave for your dog's body?" said she.

"Yes, marm," says Rusty.

"Four days to dig a dog's grave. How do you account for that?" snapped Miss Osgood.

"I struck rock," says Rusty.

And that was when the teacher larruped him.

After school me and Billy Rich walked home with Rusty, and I told him he oughter have padded his pants good before he came to school and then it wouldn't have hurt him so much when the teacher lambasted him.

The other day Rusty's father was busy with some other men digging a ditch when the superintendent came along. He had an unlighted cigar in his mouth, which he kept rolling from one corner to the other as he talked.

"There's lots of things we think of when it's too late," says Rusty with a grin.

"Where was you, anyway?" asked Billy.

"I was building a radio set," says Rusty.

"Radio set?" says I.

"Yep," says he. "I had been wanting

"The last we saw of Rusty's dad he was kicking the daylight out of Rusty's radio set"

one of my own ever since our class got one for the school, but I didn't have the money to buy a store set."

"How does it work?" I asked.

"Petty good," says he, "only I can't seem to get the squeal out of it."

"What you need," says Billy, "is a pair of experts like me and Bob to look over your set and tell what's wrong with it."

"Gosh, will you?" he asked.

Well, as we had nothing particular to do just then we walked over to Rusty's house to look his radio set over. Rusty's father was home, in fact, that is where you generally find him. My dad says Rusty's father is the champion job holder, having held more jobs than any ten men in Ponckhockie.

Rusty explained that his father had just threw up a job at the powder plant. It seems that the men who work there are not allowed to carry any matches in their clothes on the job, and smoking is strictly prohibited.

The other day Rusty's father was busy with some other men digging a ditch when the superintendent came along. He had an unlighted cigar in his mouth, which he kept rolling from one corner to the other as he talked.

"Pretty hard digging, Jones?" he asked.

"Nope, nothing unusual," says Rusty's father.

"Got a match?" asked the super, as he removed the cigar from his mouth.

"Sure," says Jones, reaching in his pocket and handing one to the super.

"Report at the office and get your time. You're through," snaps the super, and that's why Rusty's father is not working just now.

Rusty says that his dad was thinking some of getting a job in a radio plant until he told him about the radio waves Miss Osgood was explaining to us the other day, and Rusty's father said that job was off, as one reason why he hadn't been a sailor was because the waves always made him sick.

A Good, Light Job

Rusty said he didn't know just what kind of a job his dad would look for next, and any way he wasn't overstrong.

"Maybe he could get work in the electric plant. That oughter be a light job," said Billy with a grin.

Then before Rusty could get mad I asked him where his radio was and he showed us.

While we were tinkering with it Rusty's dad came out to the woodshed after Rusty to go to the store and get him some tobacco.

"Just when I am busy the most he wants me to do something," grumbled Rusty, "even if it is only across the street to the store."

"Why don't he walk over and get his own tobacco?" asked Billy.

"'Cause he says he's got a touch of roomitism digging a ditch at the powder plant," explained Rusty.

It was then an idea struck me, and I said to Rusty that while he was getting the tobacco me and Billy would fix the radio for him.

After Rusty had gone I says to Billy, "the only trouble I see with this old radio set is that the batteries are weak."

"Think so?" says Billy doubtfully.

"I know so," I replied, "and what we oughter do is to hook up the wire with one of the live 'lectric wires in the street."

"We'd be in a fine pickle if we got caught," observed Billy.

"I mean just a temporary hook-up to see how it would work," says I. "Rusty's got enough wire here to run a cable across the Hudson River and back."

"But we might get an awful shock of 'lectricity," objected Billy.

"Who's afraid of an old shock?" says I. "I ain't if you ain't," retorted Billy, "but we oughter have some rubber gloves or something on our hands."

"There's a pair of rubber gloves on the nail back of you," says I.

Billy Shins the Pole

We got the gloves down and then we nearly had a fight to see who should shin up the pole and hook up the wire, and we tossed up a cent. Billy won and shinned up the pole after I had attached one end of the wire to Rusty's radio set.

"Gosh," says Billy after he had shinned down the pole, "I bet there's a million billion volts in that wire."

"I hope there is," said I, as I saw Rusty's father coming out to see what was keeping Rusty.

"Ding, dang that boy!" said Rusty's father; "he's always stringing wire around where I am apt to trip over it"; and then he swings a lusty kick at the charged wire.

Well, there may not have been a million billion volts in it as Billy said, but there was enough, for Rusty's father let out one yell that could be heard for ten blocks. Then, as he picked himself up from where

(Continued on page seven)



# Four Types of Amplifier Arrangements for Magnifying Radio Signals

The Author Says All Systems Should Be Tried When in Doubt as to Which Is Best

By ROBERT HERTZBERG

THE adoption to broadcast reception of certain types of audio amplifiers which heretofore have existed only in a few laboratories and in engineering textbooks has been of material advantage in the attainment of clear reproduction of voice and music; but it has also served to bring about a general confusion of the circuits themselves, of the apparatus used in them and of the designations applied to the systems and their components. The perennial transformer amplifier has never caused much trouble, but with resistance amplifiers, choke coil amplifiers, impedance amplifiers and auto-transformer amplifiers now commanding a good deal of public respect, the untechnical experimenter not infrequently tangles himself in a maze of diagrams and instruments that appear deceptively alike in outline, but are actually considerably unlike in construction and operation.

An excellent example of this confusion centers around the auto-transformer and choke coil types of circuits. The hook-ups are identical except for the difference that the choke coils have two connections on them and the auto-transformers have three. This is a slight variation, which radio fans are prone to dismiss as the work of some prolific circuit-changing "bug," but actually it marks the difference between two circuits that are entirely unlike in electrical operation.

## Four Amplifier Arrangements

There is a total of four audio amplifier arrangements if the mechanical features of the group are compared, and only two systems if the fundamental theories of operation are considered. This may sound strange to the fan who reads the radio publications and recalls the diversity of circuits he has seen in them, but it is the unquestionable technical truth.

The quartet comprises the transformer coupled amplifier, the resistance coupled, the choke coil and the auto-transformer. The omission of the "impedance" type is not an error, for the terms "choke coil" and "impedance," when applied to audio amplifiers, are synonymous and indicate the same instrument. "Impedance" is a characteristic of certain electrical devices, so the term "choke coil," designating the tangible apparatus used in the circuit, is the correct one.

The transformer amplifier, as it has been employed for many years, falls in the same category as the auto-transformer amplifier, and, despite some evident differences in their wiring diagrams, the two work in exactly the same fashion. The auto-transformer system is frequently and entirely erroneously referred to as a "choke coil" or impedance system, even by people who ought to know better, but it is not anything like the choke coil.

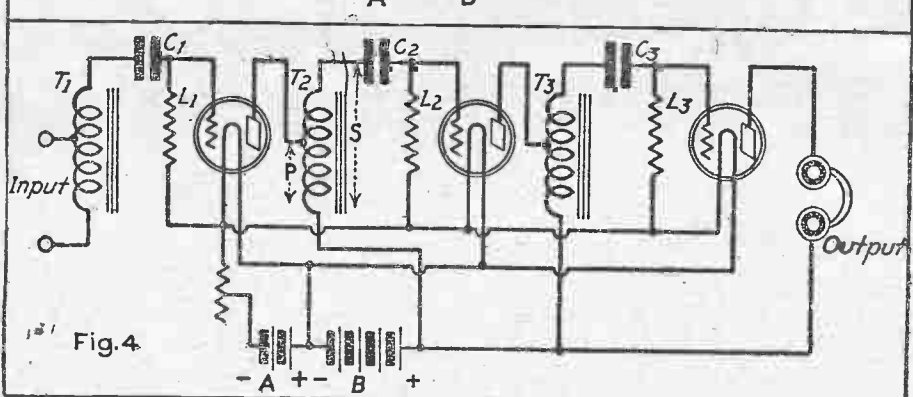
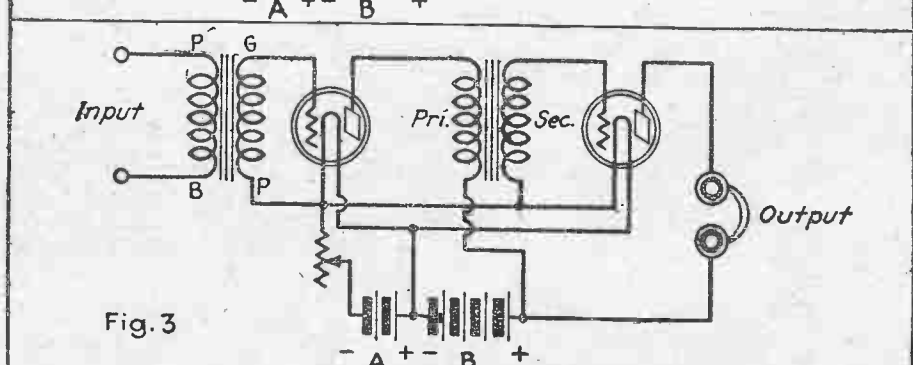
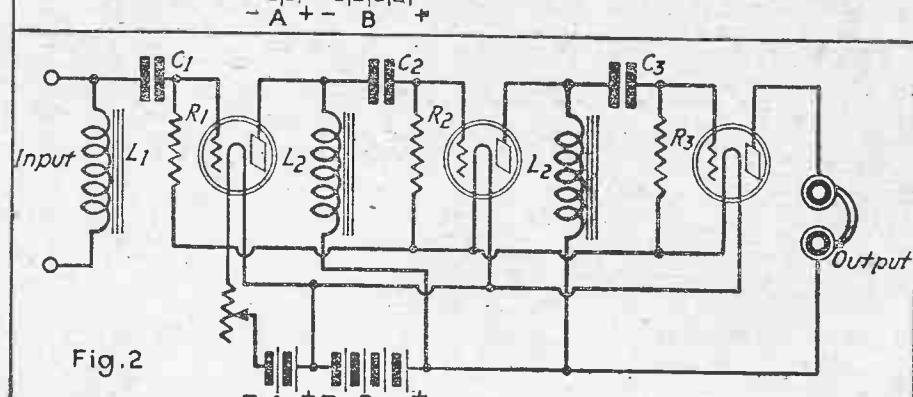
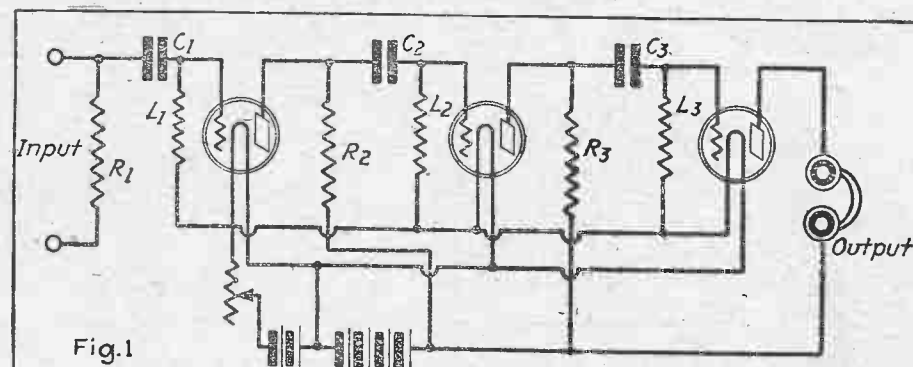
Similarly, the resistance and the choke coil amplifiers fall into a second class and also perform in a like theoretical manner.

## Theory of Transformer Amplifier

The theoretical action of the transformer amplifier is fairly well known, as it involves a rather basic principle of electricity. The current flowing from the detector tube of a set into the primary of the transformer sets up a fluctuating magnetic field in the iron core of the instrument, and the magnetic field in turn generates a current of electricity in the secondary winding, which is wound on the same core and which is therefore susceptible to the magnetic impulses.

The electrical voltage or pressure developed across the secondary depends directly on the ratio of the number of turns in the primary coil to the turns in the secondary coil. The ratio may be anywhere from 2.1 to 6.1 in standard transformers, which means that the transformers bring about an increase in the voltage from two to six times its original value. The vacuum tube is a voltage operated device, so the transformer is responsible for a decided amplification of the original radio signal as represented by the voltage fed the input of the amplifier system.

The usual transformer amplifier consists of two transformers, two tubes and



The above figures 1, 2, 3 and 4 show the wiring diagrams for resistance coupled, choke coil, transformer and auto-transformer coupled amplifiers respectively

the associated incidentals, as shown in Figure 3.

The auto-transformer amplifier, pictured diagrammatically in Figure 4, operates on exactly the same principle of voltage step-up by virtue of turns ratio. Here, however, the voltage transformers, as they truly are, are not constructed with separate primary and secondary windings, but instead have the primaries arranged as parts of the secondaries. Actually the auto-transformer consists of a single straight coil of wire, wound on an iron core, with two connections leading from the ends of the wire and a third from some predetermined turn somewhere in the winding. Auto-transformers can

always be distinguished from choke coils because they unfailingly are equipped with three binding posts, while the chokes have only two. Likewise they need not be confused with straight transformers, because the latter have four terminals.

## Step-Up Voltage

As with the double winding transformer, a step-up in voltage is invoked by difference in size between the primary and secondary coils. The current flowing through the "P" section of T2 of Figure 4 sets up a fluctuating magnetic field around the whole coil, and a voltage is induced across the entire winding. The secondary voltage, as measured across the extreme ends of the coil, depends on the ratio that

exists between the whole coil and the section from where the tap is taken down to the lower terminal.

The grid condensers, C1, C2 and C3, of the auto-transformer amplifier are necessary to keep the high voltage of the B battery off the grids of the tubes, where it otherwise would completely paralyze the bulbs. These condensers block the direct current of the battery, but they offer little resistance to the fluctuating currents that carry the sound of the amplified voice or music. The grid leaks, L1, L2 and L3, are required to prevent the condensers from being blocked by a peculiar building-up action of the grid circuits.

If the primary taps of the auto-transformer are moved up to the tops of coil, the auto-transformers will become choke coils and the circuit will develop into that of Figure 2. However, the transformers will then cease to be transformers and will not increase the voltage appreciably, if at all.

The amplification per stage afforded by this type of amplifier is equivalent only to the amplification constant of the tube; the actual figure varying between seven for the 201A tubes and forty for some of the special bulbs designed for this particular work.

## Purpose of Choke Coils

The choke coils (L1, L2 and L3, Fig. 2) serve merely to deliver the varying output of one tube to the input of the next; or, in other words, to impress the effect of the varying voltages across them onto the grids of the succeeding bulbs. The variations that take place across the chokes are the amplified reproductions of the weak currents carrying the sound impulses, and exist by virtue of a complicated tube phenomenon, which the radio fan need not investigate. The action of the tube is such that, although the voltage or electrical pressure existing across the choke coils fluctuates in direct accordance with the voice modulations, the actual amount of current flowing in the plate circuits, and therefore through the chokes, remains constant. The test of a choke coil amplifier is, in fact, the ability of a plate milliammeter to remain unchanged in needle reading, while the amplifier is functioning with a normal receiving set.

Resistance-coupled amplifiers operate in practically the same theoretical fashion. For purposes of obtaining the amplified signal in the plate circuit of one amplifier tube and of transferring it to the grid circuit of the next tube, the device in the plate circuit may be any high "impedance," and both choke coils and simple resistances give exactly the same effect. As far as actual results at the loud speaker are concerned, there is little choice between the two classes of devices, providing the individual chokes and resistances selected for comparison are of equivalent quality.

## Advantage of Choke Coils

The choke coil arrangement possesses one indisputable advantage over the resistance in that it is capable of operating perfectly with an ordinary 90-volt B battery, while the resistance systems all require at least 135 volts. This situation exists because the choke coils themselves have a comparatively low ohmic resistance and no great amount of B battery pressure is necessary to push a weak current through them, whereas a considerable drop in voltage occurs across the straight resistances. The actual battery consumptions are about the same, though, the resistance amplifier merely requiring more initial voltage to obtain the current through its coupling units.

The new socket power B unit employs full-wave rectification with small aluminum electrolytic rectifier cells. These cells have very long life and never need the addition of water.

The writer deems it irrelevant to express an opinion on the respective merits of the aforementioned four-amplifier systems, and wishes only to have a few simple facts about the circuits themselves understood by radio fans. Each system has its defenders and enemies, who are always ready to point out some inconsistency in each other's statements. If you are in doubt as to which is the elusive "best" amplifier, try them all and let your own ear judge for itself.

## News and Notes of the Radio Trade

### Power From Lighting Current

After nearly two years of intensive research and experimenting with apparatus designed to eliminate the A and B batteries of a radio receiving set, Walter E. Holland, chief receiving engineer of the Philadelphia Storage Battery Company, announces the perfection of units that successfully operate a receiver on current from an electric light socket.

The A and B units, according to Mr. Holland, may be plugged into a lamp or wall socket as one would plug in a vacuum cleaner or other household appliance. The units are built into one case for dry-cell tube sets and in separate cases for storage battery tube sets. One switch controls both A and B.

The B unit eliminates both storage and dry B batteries. Unlike the first eliminators developed, the new unit is safe to use and free of any objectionable hum or distortion. According to Mr. Holland, the unit will deliver enough power to operate a number of large tubes and yet will not give too much voltage to shorten the life of small tubes.

The A socket power unit supplies power equal to storage battery current for sets having storage battery tubes. For sets employing three-volt tubes, Mr. Holland has designed a combination A-B unit with a single switch control.

Since radio became popular fans have been wondering why some means could not be perfected whereby their sets could be powered by house current. Many fans do not understand the difficulties encountered by the engineers who have worked on this problem. But Mr. Holland explained the problem which confronted him and the manner in which he solved it.

"Storage batteries," he said, "deliver smooth direct current—that is, current that flows in one direction and without fluctuations. On the other hand, the current delivered to house wires from an electric generator is in almost all cases alternating current—current that flows through the wires in surges or waves, first in one direction and then in the other.

"Radio operation demands a smooth, even electric current. Therefore, to make ordinary house current suitable for radio, engineers had to devise a way of changing alternating current to direct current that would be practical for use in the home.

"This change in the current—technically called 'rectification'—may be brought about by a vacuum tube rectifier or an electrolytic rectifier. Either may operate on the half wave or the full wave principle.

"A half-wave rectifier acts like a check valve, simply suppressing all the half-waves of current tending to flow in one direction and letting flow all the half-waves or surges in the other direction. The surges which are permitted to flow are separated by gaps representing the opposite half-waves which have been prevented from flowing.

"A full-wave rectifier in its best form does not suppress any current, but rather directs both the halves of the waves into a common output circuit, so that there is a continuous flow of direct current without any open-circuit gaps.

"Now, after rectifying the alternating current so that it flows in one direction as direct current, it is still unfit for radio use and will produce only a hum or noise, due to the fact that it is a fluctuating or rippling type of direct current. This is done by a combination of choke coils and fixed condensers, known as a 'filter circuit.'

"It will be readily understood that the continuous flow of rippling current from a full-wave rectifier may be smoothed out much more perfectly than the succession of separate surges of current coming from a half-wave rectifier.

"The new socket power B unit employs full-wave rectification with small aluminum electrolytic rectifier cells. These cells have very long life and never need the addition of water.

This variable resistor will fit between the same clips as the present fixed resistor, and is readily adjusted.

able by turning a small knurled screw. It can also be used across the secondary of the first audio transformer to clear up noise in the set. The Cunningham variable resistor is manufactured by the R. P. Cunningham Electric Company, 319 North Whipple Street, Chicago.

### Promotion in Boston Office

Clifford G. Hillier, for the last three years manager of the merchandising sales department in the Boston office of the Westinghouse Electric and Manufacturing Company, has just been appointed manager of the receiver section in the Westinghouse radio department with headquarters in New York.

Mr. Hillier is a Boston man, educated in Boston schools and thoroughly trained in the electrical field through his previous connection with Thomas A. Edison, Inc., the Edison Illuminating Company of Boston and the American Ironing Machine Company of Chicago.

The appointment became effective at once, and Mr. Hillier assumed the duties of his new office December 1. He will be responsible for all business of the receiver section of the radio department, and will be located at 150 Broadway, New York.

### De Forest Cuts Tube Prices

Retail price reductions on all De Forest radio receiving tubes as a result of specialized manufacturing processes, increased production and greater sales were announced last week by the De Forest Radio Company in telegraphed instructions to dealers throughout the country. The new prices become effective at once.

### Entertainment All Day Long

Station WJZ has outlined a complete day of listening for its radio audience on Thanksgiving. Inasmuch as the day is one of rest, recreation and thanks for the blessings we have received, WJZ will give the listening fans a few more things to be thankful for. The schedule for the day includes a period of religious devotion in the morning, which can be attended by all members of the family without disturbing mother's preparations for Thanksgiving dinner. The early part of the afternoon is devoted to the broadcasting of one of the outstanding football games of the season, which can be enjoyed by the male members of the family while the "weaker sex" is struggling with the turkey, and then in the evening a gala program commensurate with the occasion will be broadcast.

### French Instrumental, Vocal Music in "Your Hour"

The program to be broadcast by WEAF and WOO in "Your Hour" tomorrow, beginning at 7:45 p. m., will consist mainly of French instrumental music and French vocal solos. As is usual in this popular radio offering, the program will be participated in by an instrumental trio and a tenor and soprano soloist.

In addition, there will be presented to the radio audience for the first time Mr. Dickson-Kenwin, the famous English character actor, who is now making his first visit to America. Mr. Dickson-Kenwin will impersonate for the radio audience an English parson, known as the Rev. Peter Kiljoy, and also one of his leading roles as Cardinal Wolsey.

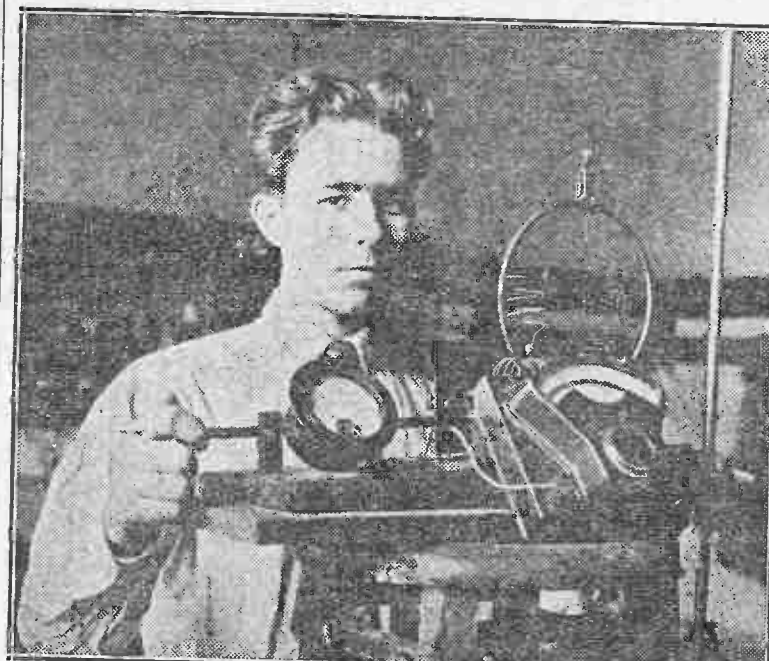
### Difference Between Class A and B Broadcasting Stations

The differentiation between Class A and Class B broadcasting stations has dwindle till there is practically no barrier between them. The idea of classifying stations when first conceived was to limit all stations using a power of less than 500 watts in the antenna to Class A. Class B stations were required to use 500 watts or more and be supplied with sufficient extra apparatus so that at no time would it be necessary for the station to shut down due to failure of some mechanical part of the circuit. Also they were not allowed to reproduce mechanical music.

### Wave Length and Frequency

To convert wave length in meters to frequency in kilocycles is not as difficult as generally supposed. If the value in wave length is known the frequency value may be determined by dividing 300,000 by the wave length in meters. The result will be the frequency in kilocycles. If the frequency is known the process may be reversed for computing the wave length in meters. The value obtained is only approximate but is accurate enough for rough computations. If accurate results are desired use

## An Ultra Short-Wave Transmitter



Winfield Salisbury, a senior in the Physics Department of the University of Iowa, has designed a CW radio transmitter which is considered the shortest wave-length apparatus ever used by an amateur. The transmitter is shown in the above picture. In laboratory tests it was operated on a wave length of but seventy-four centimeters in length.

## Small Primary Coils Are Not Semi-Aperiodic

By Theodore R. Bunting  
Research Engineer, Sleeper Radio Corporation

The use of the term "semi-aperiodic" to describe the nature of the small antenna primaries employed on many types of tuning coils is incorrect, there being no technical justification for it.

The primary circuit can be "periodic" or "aperiodic," but there is no half way condition. A "periodic" circuit is one capable of oscillating when properly excited, but an "aperiodic" circuit is one possessing such high resistance in its component parts that any current induced in it dissipates itself in heat losses just as quickly as it is supplied. The resistance of the small primaries of these tuning coils, which are found in many types of receivers, is not usually at all high enough to warrant the use of the designation "aperiodic" or "semi-aperiodic" for them.

Small fixed primaries on such coils are properly classified as "untuned" windings. They are said to be untuned because they are not adjusted to any particular wave in the broadcast band, but pick up all waves and feed them to the closely coupled secondary, where one wave is selected by a tuning process usually involving the adjustment of a variable condenser.

If these primary coils were truly aperiodic the resistance losses of the aerial circuit as a whole would be so great that only a very small percentage of the signal strength would be available for actuating the set, and as a net result the set operator would hear little if any broadcasting.

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## New Chain of Stations To Be Installed on Pacific

Continued from page four

I have a mechanical model, made up for studying wave polarization in the General Electric laboratory. The model consists of weights suspended in such a way that they are free to move in all directions. Twenty-two of these weights are arranged in a row and connected together by rubber bands. Each weight is suspended from a yoke and an equal weight hung on the other side of the yoke to serve as a counterweight. A screen is set up so as to hide the counterweight and avoid confusion in observing the wave motion. This model was set up especially to study the twisting of the plane of polarization and the experiment has strikingly confirmed the theory which it was intended to illustrate. This theory is briefly the following:

**Mechanical Model**

We will assume that the medium through which the radio waves pass has such characteristics that the velocity of propagation for a vertically polarized wave differs slightly from the velocity of the propagation for a horizontally polarized wave. It is not necessary for the present purpose to try to explain the reason for this difference in velocity. We may assume that the reason for it is due to the electrostatic and magnetic effects, to the retarding effect of the velocity of the vertically polarized wave passing close to the earth, or, on the other hand, due to properties of free electrons in the upper atmosphere. Whatever the cause may be, we may assume that such a difference of velocity exists and the mechanical model has been constructed so as to reproduce such conditions. The weights on both sides are tied together with rubber bands. Wave motion in the horizontal or vertical planes can thus be studied independently, and these two wave motions may be adjusted for different velocities. A wave started in the vertical plane maintains itself vertically and a wave started horizontally maintains itself horizontally. If, however, a wave is started in a plane 45 degrees between the vertical and the horizontal, it is found that the wave motion proceeding therefrom assumes the shape of a corkscrew.

The straight line oscillation of the first weight is passed along as an elliptical motion which gradually widens into a circle. Then this circle narrows down again to an ellipse and finally a straight line at right angles to the original line of oscillation. This is exactly in accordance with the theory. The point where the wave has shifted its plane of polarization 90 degrees is the point where the faster of the two waves is half a wave length ahead of the slower wave. From this point on the wave proceeds to repeat this peculiar corkscrew motion.

The fact that the twisting of the wave is due to different velocities in the two planes of polarization can also be demonstrated by this model. For this purpose the rubber bands are added to the counterweights. The effect of this is to change the velocity of propagation in the vertical plane, whereas, the velocity in the horizontal plane has not been affected because only the vertical motion is transmitted to the counterweights by the suspension yokes. The system can thus be adjusted so that the velocities in the horizontal and the vertical planes are exactly equal. After this has been done it is found that the tendency to corkscrew motion disappears and the wave remains strictly in the plane in which it has been started.

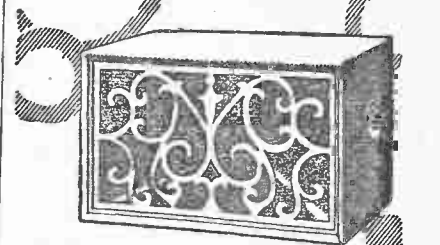
While this mechanical experiment does not bring out any new facts that were not known from the classical theory of wave motion, it helps us to visualize the main phenomena in the radio wave propagation which we are trying to explain. The phenomenon of a constantly shifting plane of polarization which we discovered experimentally in tests between Schenectady and Long Island can thus easily be explained.

**Aids to Explaining Fading**

This conception of the wave motion is also a help in explaining the phenomena of fading. There is already much experimental evidence that fading is a phenomenon of interference. In other words, the fading is due to the fact that the radio waves arrive at a certain point through two paths. The waves will sometimes add to each other and sometimes neutralize each other. If we keep in mind the observations on

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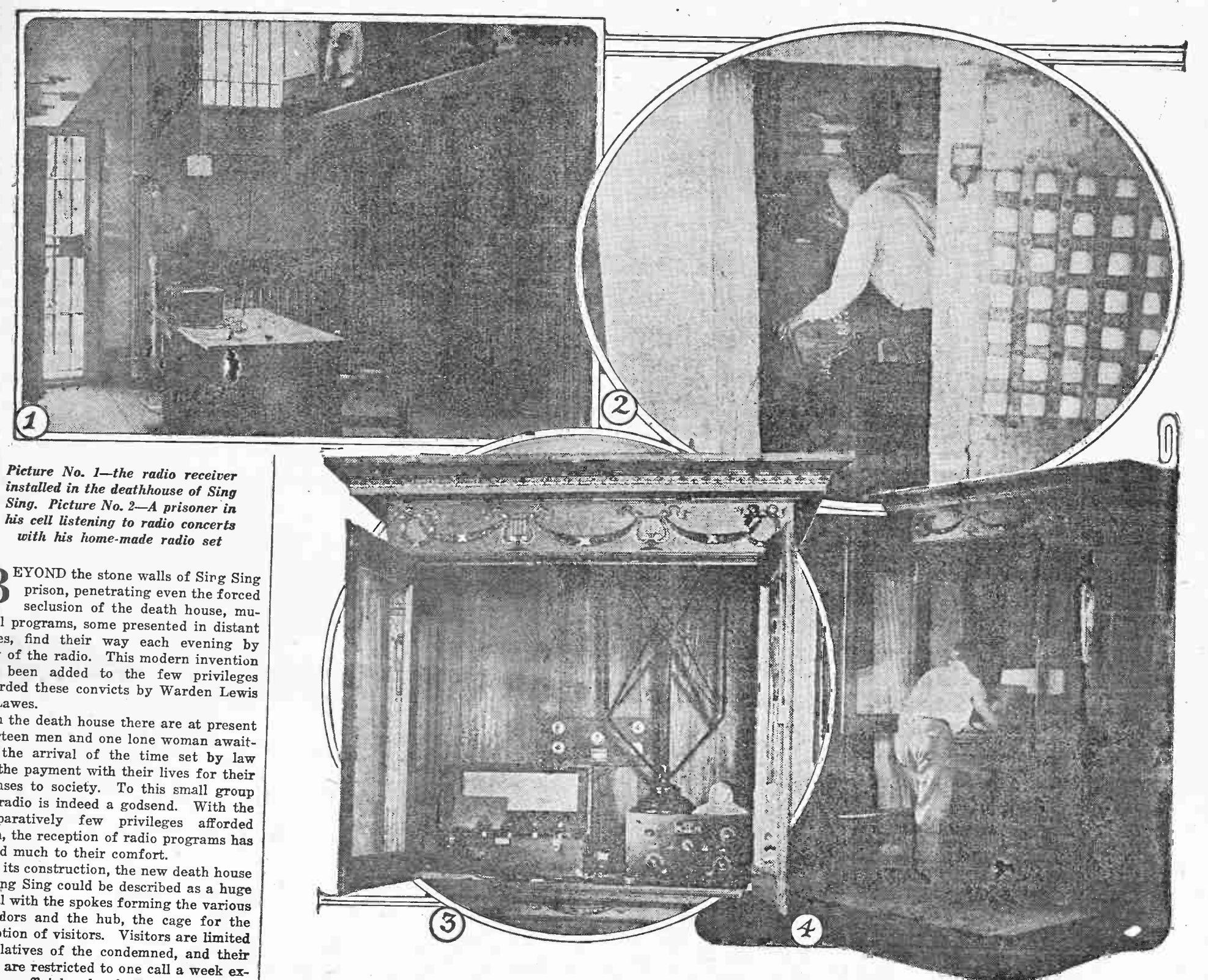
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# Radio Plays an Important Part in the Life of Prisoners at Sing Sing

Officials Provide Loud Speaker for Deathhouse Inmates; Other Convicts Have Their Own Sets

By WALTER J. FENTON



Picture No. 1—the radio receiver installed in the deathhouse of Sing Sing. Picture No. 2—A prisoner in his cell listening to radio concerts with his home-made radio set

Picture No. 3—A close-up of radio receiving equipment used at Sing Sing for the entertainment of the prisoners. Picture No. 4—A trustee tuning the radio receiver shown in Picture No. 3.

**B**YOND the stone walls of Sing Sing prison, penetrating even the forced seclusion of the death house, musical programs, some presented in distant cities, find their way each evening by way of the radio. This modern invention has been added to the few privileges afforded these convicts by Warden Lewis E. Lawes.

In the death house there are at present fourteen men and one lone woman awaiting the arrival of the time set by law for the payment with their lives for their offenses to society. To this small group the radio is indeed a godsend. With the comparatively few privileges afforded them, the reception of radio programs has added much to their comfort.

In its construction, the new death house at Sing Sing could be described as a huge wheel with the spokes forming the various corridors and the hub, the cage for the reception of visitors. Visitors are limited to relatives of the condemned, and their visits are restricted to one call a week except on official order from the court. In a few cases are court orders granted for such a purpose. The men are confined throughout the day to their cells.

Conversation between those in the death house is permitted. Reading matter is provided and when the prisoner has sufficient funds he may secure for himself smoking material. Except for a half hour each morning, when they are taken into the exercise court, these prisoners must remain in the small cells.

Other prisoners have more things to occupy themselves. They have their daily tasks they have entertainment provided at stated periods by the Mutual Welfare League, and in some instances are granted even greater exercise periods. However, throughout the entire prison it is a set rule that all must be behind the barred doors before 10 o'clock each evening.

There is no rule which compels a prisoner to attend the various entertainments provided, and some choose to remain in the solitude of their cells, some to study, some to smoke and some to tune in on their own radio receiving sets for the purpose of selecting their own amusement from the air.

**Fifty Sets in the Prison**

Throughout the prison there are about fifty individual receiving sets. To those prisoners with the necessary finance permission is given to purchase receiving sets. These sets range from the small one bulb set to the more modern sets of greater capacity. In each case the reception is absolutely restricted to headphones. There are also those prisoners whose financial standing does not permit the purchase of a set but whose interest in the programs of the air is just as intense

as their more fortunate comrades. For these it is generally found that the man with the set is willing to provide an extra pair of headphones to be extended to the adjoining cell for the edification of his neighbor.

In addition to the individual sets there is a set maintained by the authorities for use on special occasions, when all prisoners in good standing, according to the institution's manner of calculating, may listen in. Then there is another set for those inmates of the death house. This set is located in a central position and is regulated by an official who selects the programs for his charges. But in the death house the use of earphones is not permitted the individual prisoner. It is a tedious task for the guards to watch everything that enters the cell of the condemned in an effort to prevent the prisoner's cheating the law's sentence.

Musical programs play a big part in the radio reception for these unfortunate. Sometimes a program from Manhattan is chosen for their amusement, and again it may be a program from a more distant city, but in every case the program is first passed on by the official in charge of the radio apparatus.

### Equipment Used

The principal radio equipment at Sing Sing is a Western Electric superheterodyne with a power amplifier. The set itself remains in the huge cabinet, but the loud speaker on special occasions is carried about to all parts of the prison. The programs are thus placed in any part of the prison selected by the authorities

The set is equipped with a loop aerial, thus overcoming the dangling of a wire from the outside.

Politics are sometimes of considerable interest to prisoners. Sometimes the results bring hopes for reprisals and sometimes they bring additional sorrows for these men. In days gone by it was the custom at Sing Sing to provide bulletins on the progress of the elections after they were received at the office of the warden. During the recent mayoralty contest in New York City it was the privilege of the deserving to listen with their own ears to the returns as sent from the broadcasting stations in the heart of the city. This was the first time in the history of the penal institution when such an innovation was permitted.

With the completion of a day's toil some of the prisoners turn to other thoughts, some to the study of various subjects, some to the entertainments provided by the Mutual Welfare League and others to the radio sets. To the man sentenced to spend the balance of his natural life behind barred doors the radio, perhaps in some cases, offers the only means of keeping abreast with the outside world. The "long termers" and "lifers" are the real beneficiaries of the radio reception at Sing Sing. To them it means just a little more than an evening's entertainment. It means a knowledge of what the world is doing and thinking, for in the present day the broadcast stations offer not only musical programs, lectures and vocal selections, but some go even further and provide courses in numerous subjects prepared by some of the leading colleges and

universities. All these things mean much to those confined behind the bars.

That is but one side of the radio reception at Sing Sing. Picture the man who has sinned against society and has been sentenced to spend a number of years behind these barred doors. Perhaps he had a family, perhaps a mother, or at least a sweetheart. Sometimes in his life he undoubtedly had a favorite song enjoyed most when in the company of that loved one. Now here he is barred from the world with only his guards and others who have violated the law for companions. Through the air comes a program of old songs which bring back fond memories and thoughts of the days when he will again be with those he loved.

The radio undoubtedly comes in for its greatest usage during the holiday season. With the passing of Thanksgiving and the approach of the yuletide season, some of the prisoners are again looking forward to the reception of programs on Christmas Eve, which, in the days before their straying from the straight and narrow path, meant something of joy and happiness, but now means nothing more than a day nearer to freedom and liberty. They are looking forward to those radio programs which will instill in their minds the joys of leading a straight life and the happiness to be attained therefrom.

As only relatives are permitted to visit the inmates of the death house, and then on stated days, it is difficult to learn what programs are enjoyed most by these un-

(Continued on page seven)



# A New Chain of Short-Wave Commercial Stations to Be Installed on Pacific Coast

Engineers Find That 40-Meter Transmitters Using Polarized Waves Are Successful

By E. F. W. ALEXANDERSON

Chief Radio Consulting Engineer, General Electric Company

RADIO development has during the last year entered into a new phase. Until recently most efforts were devoted to apparatus in the sending and the receiving ends. In this respect the radio technique has already reached a high degree of perfection. The milestones in this development have been the introduction of continuous wave transmission and reception and of radio telephony for broadcasting.

Thus a large industry has grown up, making practical use of wave propagation through space, a phenomenon of nature which was very little understood. About two years ago the Radio Corporation and associated companies decided to make a determined effort to shed new knowledge on this subject, upon which the further growth of radio depends.

One of the first results of this effort to explore the phenomena of wave propagation led to the discovery of horizontally polarized radiation. Since these discoveries were first announced the subject of wave polarization has been brought into the limelight and is receiving much attention from radio investigators, amateurs as well as professionals. A wave of optimism has swept over the radio fraternity and brings forth new reports of success in the struggle against the old enemies of radio—static and fading.

## Two Methods of Testing

The study of wave propagation over large distances requires a comprehensive organized effort. To this end the General Electric Company undertook to do the technical pioneer work in devising new forms of radiators and receivers, whereas the Radio Corporation undertook to judge the practical value of this new development by making use of it in its communication system. It has become a tradition among radio communication engineers to accept the judgment of traffic operators

mitters gave remarkably good communication at certain times during the hours of darkness, whereas in daytime the service was totally unreliable, if any signals could be heard at all. Some of these transmitters were kept in regular service, whereas others were modified in order to explore possibilities of improved results. Thus it was found that when the wave length was below fifty meters the night signals became weaker; but, on the other hand, service could be given during daylight hours. Tests with still greater reduction of wave lengths of a range between fifteen and thirty meters proved that it was often impossible to give good service across the Atlantic Ocean at midday in the summer. The stations which are giving the best all-around service at the present time operate at a wave length of about forty meters.

## New Chain of Stations

So favorable have these results been that the Radio Corporation is now installing a chain of short-wave stations to cover the Pacific Ocean, supplementing the two long-wave transmitters at the Hawaiian Islands. This new chain of stations will include the Philippine Islands. The conditions for wave propagation over the Pacific Ocean are notably different from those on the Atlantic Ocean, and as a whole easier. It is, therefore, confidently expected that a good short-wave service will be established over the Pacific. The findings on the Atlantic circuit in regard to wave length will not necessarily apply to the Pacific, and the stations will be built in such a way that the best operating conditions can be determined experimentally. It is, however, possible to make a reasonable forecast of expectations based which is already on hand and which is rapidly accumulating.

The experimental station built by the General Electric Company in Schenectady for the purpose of exploring these pos-

2. The horizontal antenna with an over-all dimension of one-half wave fed in the middle through a transmission line.

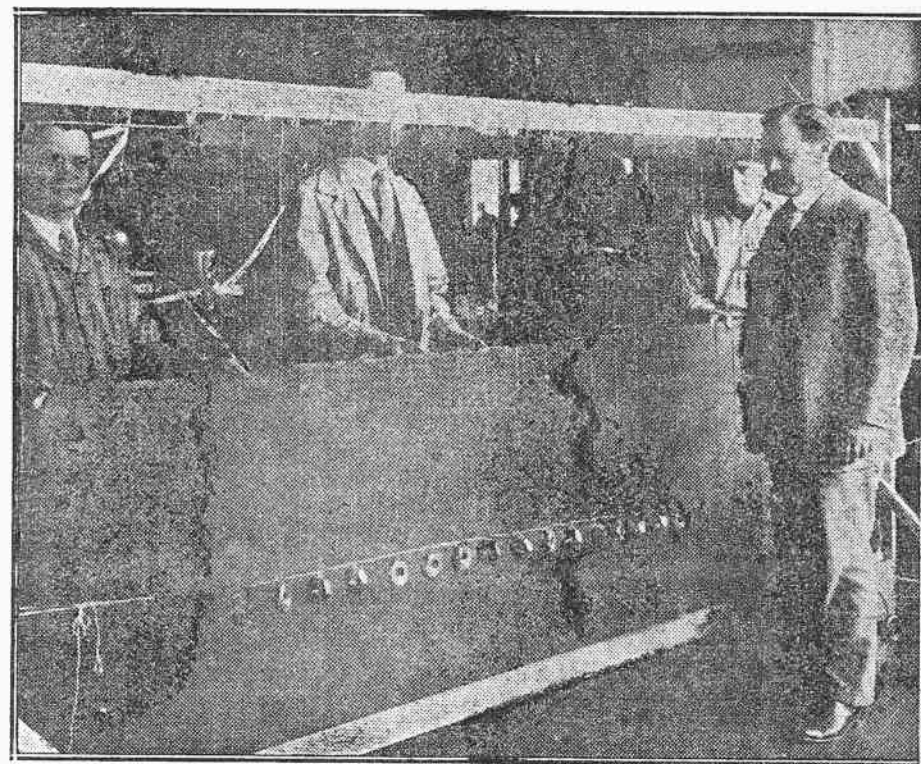
3. The series tuned horizontal loop. All these three radiators have one feature in common, that the radiation is projected at a high angle upward. They may, therefore, all be classified as high angle radiators. It has been found that only the high angle radiation is useful in reaching great distances. The high angle radiator has, therefore, the double advantage of economy of energy and the absence of objectionable signal strength in the neighborhood of the station.

The first type of antenna radiates a vertically polarized wave of the same general character as the waves that have been

conditions of wave polarization. His findings have been presented to the Institute of Radio Engineers and it may be sufficient to mention that he has shown that in the short wave range the horizontal component of polarization is usually twice as strong and sometimes ten times as strong as the vertical wave. He has also shown that fading conditions are different in the horizontal and the vertical plane.

Mr. Pickard has also shown that the wave does not maintain its original plane of polarization because the reception appears to be of the same nature regardless of whether the wave is radiated with a horizontal or a vertical polarization.

Explorations of wave polarization in the neighborhood of the station here



A model consisting of twenty-two weights connected with rubber bands which the writer uses to demonstrate the action of waves in horizontal and vertical planes

used heretofore in long and intermediate wave stations. It differs from the old type of radiation only by being a pure high angle radiator, whereas the old type of stations radiated a ground wave as well as a high angle wave.

The second type of antenna, the half-wave doublet, is an intermediate form. At right angles to its length direction it radiates a horizontally polarized wave, and in its length direction it radiates a high angle vertically polarized wave. Thus in its length direction it has a radiation of the same character as that emitted from the vertical high angle radiator, whereas in the broadside directions it emits a wave of different type.

The third antenna system, the horizontal series tuned loop, emits a horizontally polarized radiation in all directions.

For the analysis of the characteristics of high angle radiation, we are particularly indebted to Commander A. Hoyt Taylor, of the Navy Department, who has made extensive tests and furnished valuable data on the so-called "skip" distance of the wave. He has found that the distance skipped by the wave, which means the length of the trajectory required for the high angle radiation to come down again to earth, depends upon the wave length, day and night conditions and summer and winter conditions, the general rule being that the shorter the wave the greater is the skip distance.

## Measurements of Propagation

The characteristic of the horizontally polarized waves has been explored in the neighborhood of the station in Schenectady up to about ten miles and also by measurements in the various stations of the Radio Corporation. For measurements at wave polarization at long distance we are indebted to Mr. Greenleaf Whittier Pickard, who during last summer and fall has made systematic tests of the radiation sent out from Schenectady, as well as generally explored the

brought out many peculiarities which yet have not been fully explained. So far, for example, it is found at a distance of about ten miles from the horizontal loop radiator that the wave comes down with an almost vertical direction of propagation. For those who believe in a reflecting Kenelly-Heavyside layer this would appear to be good evidence, because it might be assumed that the wave has been radiated straight up from the station and is reflected directly downwards. A loop receiver under those conditions gave no orientation of the station whatever, because the signals came in apparently equally strong from all directions when the loop was rotated around its vertical axis. This would indicate that the wave, besides being vertically propagated, was circularly polarized.

Similar observations at a point only a few wave lengths distant from a horizontally radiating loop show that the wave comes down nearly vertically, but yet with a definite slant toward the station. Tests with a loop receiver gave in this case a distinct orientation, but the station appeared to be located at right angles from the direction where it really was.

## Practical Conclusions

From the point of view of the practical radio engineer it is a satisfaction to be able to state that enough has been learned to create a new and promising field of radio communication, as evidenced by the decision of the Radio Corporation to proceed with its chain of short wave stations in the Pacific Ocean. The stations which will thus be built will have antenna systems of the type classified as short wave high angle radiators. Which one of the three types discussed above will be adopted will depend upon further results from the comparative tests that are now in progress and also upon final tests in the stations when installed. So far these tests have shown that the horizontally polarized radiation is superior to vertical radiation.

Since the station is connected by wire to the control room at Aeolian Hall, in the center of New York City, it is possible to broadcast from it not only programs originating within this city but also those reaching the control room over private wires to Washington, Philadelphia, Pittsburgh, Schenectady and Boston. These lines recently have been extended through Utica, Syracuse, Rochester and Buffalo. In this way it is said that a

(Continued on page fourteen)

## WJZ's New Super-Power Station To Be Put in Active Service

Recent Tests Show That New Equipment Will Have a Daylight Range From 200 to 400 Miles; Programs To Be Transferred by Land Wire

ON NOVEMBER 11 last, the new super-power broadcasting station of the Radio Corporation of America at Bound Brook, N. J., was first heard on the air under the call letters of WJZ. The programs were conducted for experimental purposes and were sent from the New York City studio over Western Union lines to Bound Brook and radiated from that point.

This station is the first super-power installation to be supplied with regular high-grade program material from a metropolis of the size of New York City and located so near such a large city.

The station is near the Raritan River, about one and one-half miles from Bound Brook, N. J., and three miles from New Brunswick. It is connected by means of land wires to the studios and control rooms of Station WJZ, Aeolian Hall, New York City, thirty-five miles away.

The station has an antenna power of approximately 50 kilowatts. Two complete transmitting sets are provided, one of which is used for regular broadcasting, and the other for short waves. Spare equipment is also provided for the main transmitting set, so that should any portion of it fail, a spare unit may be placed in service instantly. The two transmitters require an input power of 250 kilowatts each.

The main transmitter used for broadcasting comprises a number of 10 kilowatt water-cooled oscillator tubes, with a large group of similar tubes functioning as modulators. The incoming signals from New York over wire lines, are amplified by means of five and fifty-watt balanced audio amplifiers.

The short wave transmitter is similar in design to the regular broadcasting transmitter, and will be used for special long range re-broadcasting experiments.

The regular transmitter is connected to a type "T" cage aerial having a flat top 220 feet long, and a cage lead-in 250 feet in length. This antenna is supported by two 800-foot steel towers placed 700 feet apart. The grounding system is located directly beneath the aerial, and consists of six radial overhead feeder wires which terminate in underground "starfish" ground connection.

The antenna is designed and operated in a fashion which results in exceedingly high radiation efficiency and accounts for the excellent transmission characteristics of this station.

The wires from the studio in New York to the station are entirely in underground and overhead cables, thus insuring maximum reliability. They have been arranged to provide undistorted transmission and low noise level (that is, silent in operation). The entire circuit consists of thirty-six miles of number 13 gauge paper cable, a number of pairs being provided so that in case of breakdown of one of the circuits, others will be available.

The main power supply for the station is provided by service from two different power plants of the Public Service Company of New Jersey so that if one of the sources of power supply fails the other may be put into service.

Preliminary tests of the station have indicated that it will give satisfactory daylight service to cities within a 200 to 400 mile radius. It is said that reports have been received from Washington, Baltimore, Philadelphia, Boston, Cleveland and similar points of equal distances that reliable daylight reception of the station has been obtained. According to reports, at night the station gives practically local service to those located within a radius of 500 to 1,000 miles. In the New York metropolitan district the station gives excellent service in all parts of the city and suburban districts, with few reports that the signals of the station are inconveniently powerful. The location at Bound Brook is said to have been selected with the idea of giving a maximum amount of service with a minimum amount of interference to listeners in the immediate locality.

Since the station is connected by wire to the control room at Aeolian Hall, in the center of New York City, it is possible to broadcast from it not only programs originating within this city but also those reaching the control room over private wires to Washington, Philadelphia, Pittsburgh, Schenectady and Boston. These lines recently have been extended through Utica, Syracuse, Rochester and Buffalo. In this way it is said that a

great number of splendid programs may be collected for broadcasting to the American public.

It is expected that the station will have a reliable night range, enabling it to reach all parts of the United States east of the Mississippi River. It is also anticipated that the station frequently will be heard west of the Mississippi and on the west coast, although it must be remembered that there are four hours of time difference between these two points, and when WJZ "signs off" at 11 p. m. it will only be 8 p. m. on the Pacific Coast.

It is probable that only when darkness has fallen over the entire country that transcontinental reception will be possible. The station already has been reported in San Diego, Calif. It also is said that mail from numerous parts of Mexico has been received reporting the reception of the new super-power station.

The station, which will use the well known call letters WJZ, will operate on a wave length of 455 meters, or a frequency of 660 kilocycles.

It is expected that the new station will begin to broadcast more or less regularly within the next few weeks.

## Range and Quality Test for Amateurs

"Kindly listen in" for a range and quality test from 12 midnight until 3 a. m. on Wednesday night, December 9, is the call being sent out this week by Amateur Station 2BMA, located at 3149 Boulevard, Jersey City, the building of which has just been completed by W. C. von Brandt after a year of experimentation at a cost of approximately \$3,000,000.

Mr. von Brandt announced that 2BMA is equipped for 2,000-watt power, although the output is held to 500 watts, since he is within five miles of a government station. Station 2BMA, with a telephone, has three systems of modulating voice: heising, magnetic and contact paper.

Prompted by the reports of amateurs in different parts of the country and abroad, Mr. von Brandt announces that on Wednesday night next he is desirous of establishing a new record for both signal strength and tone quality. His phone wave length on Wednesday night will be 170 meters and his C. W. telegraphy 40 or 80 meters.

## Christiansen in "Shanghai'd Out of Frisco in the '90s"

The ever popular Eveready Hour, to be broadcast by WEAF, WEEI, WFI, WCAE, WGR, WWJ, WOC, WJAR, WCOO, WSAI, WEAR and WTAG on Tuesday, beginning at 9 p. m., will be replete with thrills.

The story, "Shanghai'd Out of Frisco in the '90s," by H. P. Bailey, will be presented in the usual Eveready manner, and the narrative itself will be given by Red Christiansen, who already has played a prominent part in previous Eveready programs.

The incidents in the story to be broadcast will be highly colored by Mr. Christiansen's personality, and will be the more realistic because in his experience he has been "shanghai'd" and can therefore put considerable of the personal element into the broadcasting of this story.

## Reeve to Relate "The Radio Ghost" and Ask for Solution

The WOR schedule for Friday afternoon announces "The Radio Ghost" to be broadcast by that master of detective fiction, Arthur B. Reeve, father of Craig Kennedy. In deference to the popular belief that every one enjoys taking a hand at unraveling a mystery, Mr. Reeve will relate "The Radio Ghost" with suitable accompaniment of whispers and groans, no doubt, and then when listeners are piqued to the utmost, the noted author will perpetrate the old "continued next week" stunt; that is, he will ask listeners to send in solutions to the mystery.

# FIRST TIME IN THE HISTORY OF RADIO AT THESE PRICES

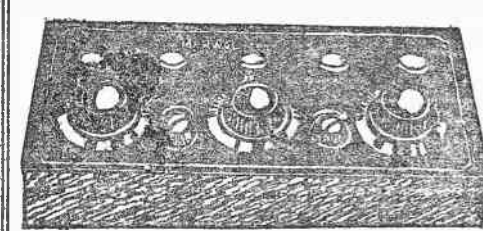
## MARWOL

### A MARVEL for PERFORMANCE

The Marwol Receivers are advertised in every large publication in the country, including the Saturday Evening Post. The success of these two sets has been phenomenal. YOU SIMPLY CANNOT GO WRONG. Don't let this golden opportunity slip by right now with Xmas so near at hand.

Both of these sets are 5 tube radio frequency. Genuine mahogany cabinet. Coast to coast reception. Highest grade parts.

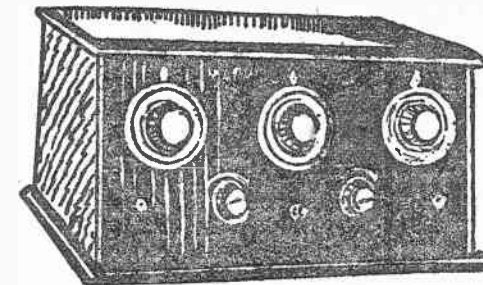
A REAL SET IN EVERY SENSE OF THE WORD



**BABY GRAND**  
LIST PRICE 36.50

OUR SALE PRICE **\$19.95**

The Jewell is a 5 tube set—From the standpoint of quality, performance and appearance it cannot be duplicated for three times the money.



**JEWELL**  
LIST PRICE 39.50

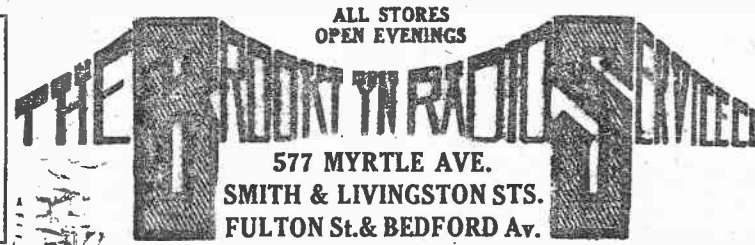
OUR SALE PRICE **\$22.95**

TWO GUARANTEES—BROOKLYN RADIO SERVICE AND MARWOL FACTORY

PACKED IN ORIGINAL FACTORY CARTONS

## DEALERS

Get in touch with us for special prices on these sets and many other sets or parts.



## MAIL ORDERS

Promptly attended to. Write 577 Myrtle Ave., Brooklyn, N. Y.

## Radio Sale!

Only One Set to a Customer  
We Purchased from a Leading Manufacturer the Entire Factory Output of These Wonderfully Built 5 TUBE SETS

After many months of preparation, we were fortunate to secure these NATIONALLY KNOWN Radio Sets, to sell at this amazingly low price! Arrangements were made by a HUGE CASH PURCHASE and with the understanding that the manufacturer name be omitted in advertising. You'll recognize these sets when you see them. You'll agree they're worth DOUBLE! Come in! Don't miss this Event!



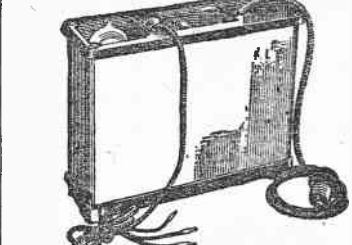
AT LAST! Here's the opportunity you've long waited for! Now your home will not be without a Radio for the Holidays! No matter how little your savings are, you don't have to use your holiday money to buy this set. Place a small down payment on it and it's yours for

Terms as Low as \$1 a Week

The savings are phenomenal! How long these sets will last we cannot guarantee—So Act Here Early, Don't Delay!

EXTRA SALESPEOPLE—EXTRA CASHIERS  
EXTRA WRAPPERS—EXTRA SPACE  
All Extra Shopping Conveniences for you!

**NATIONAL RADIO COMPANY**  
1853 BROADWAY at 61st ST.—TEL. COLUMBUS 2209  
BROOKLYN—CAPITOL RADIO CO. 1011 BEDFORD AVE., COR. LAFAYETTE AVE.  
NEWARK—UNIVERSAL RADIO CO.—236 HALSEY ST.



The new Acme B-eliminator. Two models, E-1 (110 volts 60 cycle) \$50. E-2 (110 volts D. C.) \$20. Raytheon Tube included. Eveready.

No hum and what's more... No distortion

THAT'S the story of the new Acme B-eliminator. Furthermore, it gives you greater volume, greater distance and an everlasting "B" supply at a current cost amounting to the enormous sum of one cent for 6 "first row orchestra" hours. Acme Apparatus Co., Cambridge, Mass.

**ACME**  
for amplification



**Make Your Own Comparison!**

**TRINITY**  
SIX

**\$50**

(LESS ACCESSORIES)

The fact that TRINITY SIX at \$50 gives the most yet offered in radio is easily proven. Just make your own comparison with other high grade sets, costing \$80—\$90—\$100—or more.

TRINITY SIX costs you less because it costs Beacon less to build it.

Most set manufacturers buy cabinets—Beacon builds its own.

Most manufacturers buy panels—Beacon makes its own.

Most manufacturers buy dials and other Bakelite parts—Beacon moulds its own.

Most manufacturers buy condensers, rheostats, jacks, etc.—Beacon makes its own.

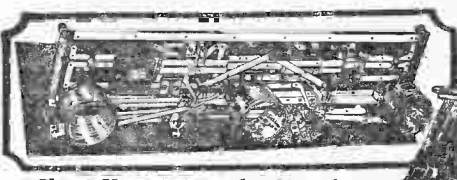
TRINITY SIX is the first one-profit receiver.

All in-between manufacturers' profits are eliminated.

We repeat—TRINITY SIX in its large, handsome mahogany-finish cabinet at \$50 is the most yet offered in radio! You can prove it at the nearest TRINITY dealer.

Free booklet, "The Value Only Beacon Can Build," sent on request, gives description of exclusive Beacon construction, with full specifications. Sold only by "Trinity" Dealers. Manufactured by

BEACON RADIO MFG. CO. 323 Berry St., Brooklyn, N. Y. (Broadcast Receiver Division)



Licensed under U. S. Navy patents. Other patents pending.

Chassis View Underneath Sub-Panel  
Showing how the main cause of set trouble—older connections—is eliminated in TRINITY SIX by use of riveted nickel phosphor bronze "power house" bus strips. Watch wide, which form connections and tube-prong contacts. This exclusive Beacon patented construction also cuts assembling costs—and gives the user the benefit of the saving.

**DOWNTOWN HEADQUARTERS FOR**

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Sold on convenient terms

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**BRONX HEADQUARTERS**

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**TRINITY SIX**

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If it is made by Acme we have it and will gladly demonstrate it.

Acme Sets, Service, Parts by Acme Specialists.

**GABE RADIO CO.**

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Licensed by Acme Apparatus Co.



Fred W. Stein.

**Steinite**  
Interference Eliminator  
No Radio Set Complete Without It

Select stations at will. With music and voices crowding the air the average set fails to bring in the desired stations properly. The Steinite Interference Eliminator shuts out local and other interference. You get one station at a time, the one you want, and time in loud and clear. Operates on any set—attach to aerial wire and to set—no changes—no extra tubes or batteries. Greatest Dollar Value in Radio Today. One \$15.00 Set.

Improved Results with Tube or Crystal

Try entirely at my risk the wonderful improvement this inexpensive little device will make in the reception of your set. Improves results on both crystal and tube sets that use any kind of aerial except loop antenna. Clears up reception wonderfully, increases volume, and partially absorbs static. Money—Back Guarantee.

Mrs. Famous 1,500 Mt. Steinite 1-Tube Set, \$6; Long Distance Crystal Set, \$8; Steinite Crystal Set—Value for \$1.

Steinite 5-Tube Set \$29.75

FREE Descriptive Literature on request.

1 Postpaid If you are not results you get your dollar back

Put this interference eliminator on your set and note amazing improvement. No tools needed—install in a moments time. Connect with set and follow simple instructions. Money back promptly if not delighted. \$1.00 postpaid anywhere in U. S. when cash with order.

References: Exchange National Bank, Atchison Savings Bank. Order today—a dollar bill will do.

**STEINITE LABORATORIES, 127 Radio Bldg., ATCHISON, KANSAS**

## Beware of the Man Who Knows All About Radio Sets

By E. J. Craine  
Eagle Radio Company

Radio is full of romance and in the few years of its miraculous growth it has revealed some astonishing phases of human nature, and not the least of these is the pest who knows all about radio.

Whoever heard of a man going into a home where a new piano had been installed and announcing that he knew all about pianos and would remove a string or two, switch some of the bass wires up into the treble and perhaps file an inch off a peg here and there? Or, whoever heard of a man volunteering to take the new phonograph apart and drop a bit of solder on one of the connections? Neither a piano nor a phonograph arouses this small-boy desire to take it apart, but bring a new radio receiver into your home and immediately they see it a big percentage of your male guests will be seized with an apparently uncontrollable frenzy to build it over, and nothing short of absolute violence on your part will save it from some sort of reconstruction.

### Work of Radio Fiend

Invariably this radio fiend has "built a number of all kinds of sets," several of which are used by the most prominent people in the world. A close check-up on these "specially-built sets" brings forth the information that they are "not working now" or they "need an overhauling."

This man who knows all about radio is so really a menace that at least one radio store in the city has a printed warning which it has slipped into every receiver sold. One of the biggest department stores on the Atlantic Coast has trained its salesmen to impress upon customers the importance of guarding against the fixer.

"We will do everything in our power to see that you get satisfaction out of your radio, but we must warn you to keep it locked, and do not, under any inducement, be inveigled into letting any one experiment with it," the salesman reiterates.

A big percentage of the servicing of radio receivers is made necessary by this tribe of rebuilders. Crazy as it may seem, a set was returned for repair, and when taken out of the box it was found that the panel was cracked and a dial broken. "No one had touched the set," the man insisted, but the marks of some sort of wedge were so evident a child could tell what had happened. Finally the owner admitted that a friend whose business it was to do "all kinds of repair work" had wanted to see the inside, and instead of removing a few screws, which were in plain sight, this "general repairer" deftly slipped a crowbar under the dial, and with one energetic heave ruined the instrument.

### Happens in Best of Families

Not long ago a set was installed by a real radio man in one of the nice homes in Riverside Drive. Everything was connected as it should be, and the family were overjoyed at the perfect reception.

"Now, remember, keep your set locked," the radio man warned.

"Oh, no one will touch it," the man of the house was sure.

"I'll bet you a box of cigars, any brand you like, that in less than a week you'll have somebody who will want to change that radio set for you."

The man laughed, "All right, it's a bet, but you'll lose."

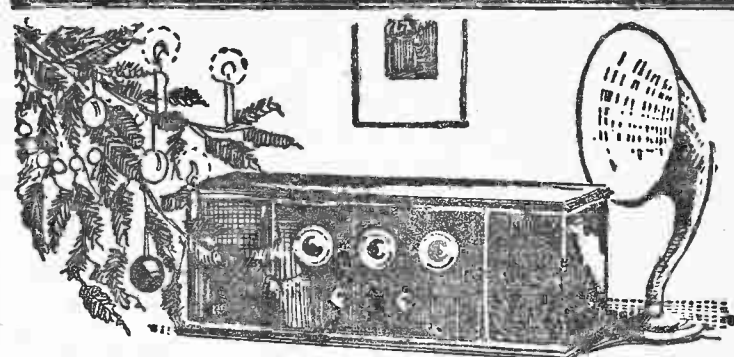
That was Saturday afternoon at 4 o'clock, and the set was duly locked against invasion. The family enjoyed the dinner music, the evening's programs, had a little dance after 11 and sat up until 3 o'clock receiving distance. They made up a very splendid log of stations received and were perfectly happy with the performance of their receiver.

A little after 2 the next day the man of the house called up the radio man and this is the gist of their conversation:

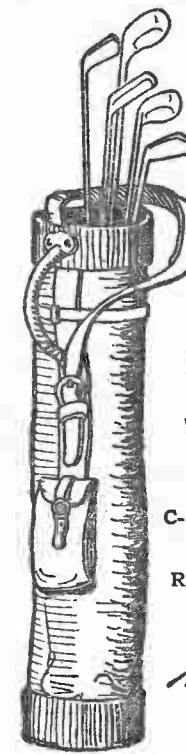
"Hello, you win! Can you come over and fix it?" said the man.

"What happened?"

"Old friend of the family came in. Said he knew all about radio, had built sets for most of the Metropolitan stars. The set was working beautifully. I had to go out for a half hour and a friend of the wife's called her on the telephone. When I came in the chap said he'd cut the antenna, it was too long. The set's acting queer, like a lot of firecrackers; can you fix it? The cigars are waiting for you—best Havanas."



## When you remember your friend's hobbies



you come very close to their hearts, you prove that your gift goes beyond the ordinary limits and shows real understanding. For the radio enthusiast no gift is more welcome, more appropriate, or more needed than a set of

**Cunningham**  
RADIO TUBES

Since 1915—  
Standard for all sets  
A type for every radio use

C-11, C-12, C-13, C-14, C-15, C-16, C-17, C-18, C-19, C-20, C-21, C-22, C-23, C-24, C-25, C-26, C-27, C-28, C-29, C-30, C-31, C-32, C-33, C-34, C-35, C-36, C-37, C-38, C-39, C-40, C-41, C-42, C-43, C-44, C-45, C-46, C-47, C-48, C-49, C-50, C-51, C-52, C-53, C-54, C-55, C-56, C-57, C-58, C-59, C-60, C-61, C-62, C-63, C-64, C-65, C-66, C-67, C-68, C-69, C-70, C-71, C-72, C-73, C-74, C-75, C-76, C-77, C-78, C-79, C-80, C-81, C-82, C-83, C-84, C-85, C-86, C-87, C-88, C-89, C-90, C-91, C-92, C-93, C-94, C-95, C-96, C-97, C-98, C-99, C-100, C-101, C-102, C-103, C-104, C-105, C-106, C-107, C-108, C-109, C-110, C-111, C-112, C-113, C-114, C-115, C-116, C-117, C-118, C-119, C-120, C-121, C-122, C-123, C-124, C-125, C-126, C-127, C-128, C-129, C-130, C-131, C-132, C-133, C-134, C-135, C-136, C-137, C-138, C-139, C-140, C-141, C-142, C-143, C-144, C-145, C-146, C-147, C-148, C-149, C-150, C-151, C-152, C-153, C-154, C-155, C-156, C-157, C-158, C-159, C-160, C-161, C-162, C-163, C-164, C-165, 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# Elementary Information for Radio Novices

## Radio Waves and the Receiving Circuit

By JAMES W. H. WEIR

Technical Editor, The National Stockman and Farmer

This is the sixth of a series of lectures for the radio layman which is being broadcast through KDKA, the Westinghouse Electric and Manufacturing Company's station at East Pittsburgh, Pa.

IN THE preceding lesson you made the acquaintance of an elementary radio transmitter. It produced a certain type of radio wave known in the parlance of radio as the "damped wave." The action of the condenser in the transmitting circuit is really to blame for this type of wave because the currents of electricity have a peculiar habit of darting from one side of the condenser to the other until they gradually die out. This dying out is termed "damping out." Naturally we can perceive that this action will be in evidence in the waves that these currents produce. The wave sets out very briskly and gradually fades out as another wave starts out upon the heels of the first. Each of these waves of course is but a fraction of a second in duration and many thousands of them occur in a full second.

Now there is another type of radio wave known as the "undamped wave." This wave is designated by the letters "CW," meaning continuous wave. It has no dying out or fading characteristic. These waves are produced by a special type of transmitting apparatus in which vacuum tubes play a prominent part.

We are now ready to investigate the methods by which these waves "damped" or "undamped" are captured and changed into intelligible sounds which we recognize as music and speech. Some of you doubtless believe that it is an extremely difficult task to capture something unseen and traveling at a speed of 186,000 miles per second. With the aid of a simple

trap, however, known to us as the receiving circuit, it becomes comparatively easy. Often times this trap is too efficient and captures a lot of undesirable waves, causing interference.

How is this trap or receiving circuit constructed? In the first place there's the aerial and ground, always essential to the simple type of receiving circuit, but gradually becoming excess baggage in the more modern and complicated circuits. In this latter type of circuit the well known "loop" becomes the substitute. Next, connected to the aerial we find a coil of wire or a tuning device so arranged as to permit the changing of the number of turns of wire in the coil. In radio this is termed the tuning inductance and it must be variable if the best results are to be obtained. Let me explain the reason for this necessity.

Suppose you leave your window open on a windy day. Mr. Wind, coming along with great gusto, will not pass by without a call. The open window is his invitation, and in he comes. Had the window been closed he'd have passed right on by without a call. It is somewhat similar in the case of the radio wave. If the aerial is correctly tuned to the wave length, similar to that of the passing wave, the wave is bound to pay you a visit. Of course a stretch of wire hanging out on the roof can't change itself to suit every friendly wave that comes along, so you must help it adapt itself to the proper size to accommodate the different waves. Your assistance now comes in the form of an operation known as "tuning in." This is not difficult to do, and with your radio set merely consists of turning one or two dials so that the radio signal comes in louder and without interference.

Wave length, as you have learned from previous articles, is measured in meters.

You are also acquainted with the fact that the meter equals 39.37 inches. Now along comes a wave of 300 meters. Isn't it only natural that the antenna and the receiving circuit combined should have 300 meters of wire or its equivalent in order to permit the 300-meter wave to pay a visit? Of course, but do not take this fact too literally, because we cannot always have the exact length of wire and must depend on other units in the circuit such as condensers to make up for the wire we are unable to supply. In other words, a combination of "capacity" and "inductance" permits you to make up the desired wave length. The condensers, by the way, are variable, as is the "inductance" or wire turns in the tuning device.

In tuning you may discover that you can perform the operation in two ways. One of these will permit only the desired wave to travel through the circuit to you, while the other will permit several waves to drop in at the same time. In the first case the tuning is said to be "sharp" and in the latter "broad." If you are tuned "sharp" to receive a 300-meter wave and a 350-meter wave comes along it won't bother you, for the 350-meter wave will pass right on by without stopping. If the tuning is "broad" the 350-meter wave and some of his brethren may deem it necessary to pay you a visit, and they all come piling in at once, giving you no end of trouble. Keep in mind here that a sharp tuning receiver is known as a "selective" receiver and it means that you will be able by manipulation of the tuning devices to limit the number of stations you hear at the same time.

Well, to get back to our story. We now have the wave caged up in the aerial circuit. It is now in the form of a feeble current of electricity and it is running around trying to get out. The complete

path that it is permitted to travel over is termed the "primary circuit" of the receiver. Now the problem is to make it speak to us.

Let us look at the "secondary circuit" of our receiver. As the feeble current in the "primary circuit" is an alternating one of very high frequency the secondary circuit, if it is tuned to respond to the "primary circuit," will receive from it a similar current of electricity by means of "induction." In other words the transfer of energy needs no metallic pathway to convey it from one circuit to the other. Now if we only had the headphones hooked into this secondary circuit the diaphragm of the receivers would vibrate at such a high frequency that we would hear nothing. Being human, you know, the vibration speed to which our ears responds is limited, and anything above the speed limit of vibration would not be recognized by us. Science has come to our assistance, however, and provided a little device that lowers the vibration or frequency of the current and conveys it to the headphones at a speed or frequency that we can interpret. It acts somewhat like a check valve, permitting the high frequency currents to travel without interruption in one direction, but positively forbidding a return passage. What is the result? An intermittent direct current flows into the phones with a frequency much reduced and therefore rendered audible.

Next week before taking up the receiving circuit in detail we shall devote some space to the "continuous wave" and investigate the methods by which the voice is carried through the air. Thus far our study has merely been of radio signals such as the dot and dash. From now on the popular broadcast will be the primary thought in back of these articles.

## Department of Commerce Has Traveling Radio Inspector's Office

MOST of the delegates to the recent fourth national radio conference were greatly interested in a radio test car which was, on several occasions, parked in front of the Chamber of Commerce of the United States, where the sessions of the conference were held.

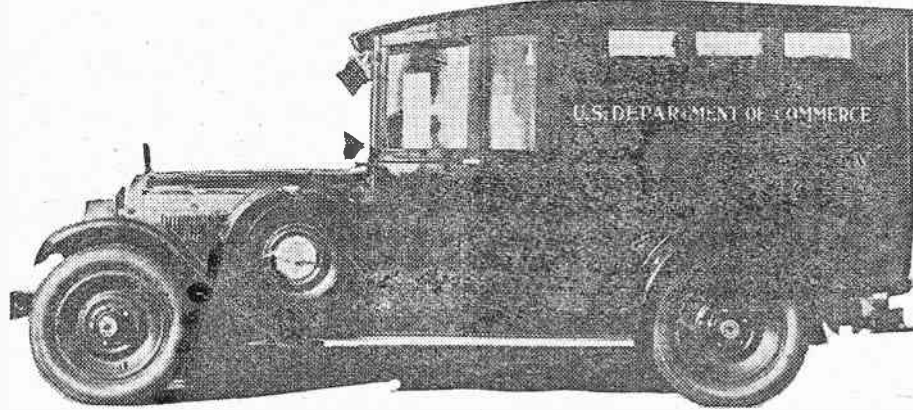
This car is the latest contribution to service made by the radio division of the Department of Commerce. Chief Radio Supervisor Terrell and his associates are very proud of it and sanguine for its usefulness. The car is, in effect, a completely equipped traveling radio inspector's office. It carries a typewriter, stationery, a supply of bank forms and other necessary impediments. A Packard standard chassis has been surmounted by a specially designed covered body which houses the radio equipment. The front seat comfortably holds three persons and in an emergency could be used as a bed.

The primary uses to which this new radio car will be put are testing broadcasting station wave lengths, elimination of beat notes, detecting power interference and conducting examinations for both commercial and amateur licenses. In many cases, especially in isolated communities, the car will drive right up to the applicant's door and examine him on the spot. Full equipment, including an omnigraph, is provided for this purpose.

### Department to Have Nine Cars

Eventually the department hopes to have at least nine of these cars, one for each of the present radio inspection districts. The local radio inspector will always be in charge of and responsible for the car assigned to him.

Apparatus is provided for testing field strength and a standard Kolster marine compass enables the operatives to locate illegal stations. The equipment also includes a fifty-watt oscillating transmitter



Interior and exterior views of the Department of Commerce radio truck

for measuring wave lengths and for emergency communication in time of disaster. It also may be used as a receiver and operates on any wave length from

50 to 3,500. In case of a cyclone, flood, fire or any like catastrophe where telephone and telegraph communication is destroyed one of these radio test cars would

be rushed to the scene to re-establish contact with the outside world and direct relief measures and assistance.

A special superheterodyne, operating also on 50 to 3,500 meters for checking purposes, is a part of the mobile installation. An amateur receiver working the amateur wave lengths also is included in the equipment. Other apparatus comprises a special induction receiver adjustable to zero sensitivity and the latest type of Piezo electric oscillator for checking wave lengths.

Power for ten hours' continuous operation of the radio equipment is supplied from a forty-eight-volt storage battery. This may be recharged, one cell at a time, while the car is in motion.

### Santa Claus Broadcasts

Though a comparatively new name to radio programs, that cheery old gentleman, "Santa Claus, Esq.," has proved one of the genuine feature speakers at WOR, through which station he speaks nightly until Christmas, broadcasting his greetings to boys and girls of all ages from an illuminated airplane each evening from 6:15 to 6:25. The whirr of his plane motor adds zest to the novelty feature as he wings through the clouds covering northern New Jersey each evening. The method employed is to broadcast his talk on a short wave length, which is picked up and relayed through WOR.

Listeners located in the outlying districts of Newark, N. J., have the added pleasure of seeing him in his brilliantly lighted plane, from which he sends forth three mystic light shows each evening. The reported purpose of his nightly flights is to locate the homes of all good lads and girls in order that he may make a speedy visit to their homes on December 24.

## Radio Entertainers With Broken Bones Do Not Fail Fans

Many and detailed have been the sneering epithets bestowed upon radio artists by their contemporaries of the legitimate and vaudeville stage since the early days of broadcasting, but within the last year one fact has given the microphonic performers cause for chuckles and the dramatic and vaudeville actors cause for deep thought. The one great hazard of all those who earn their bread and board in front of footlights—disability from accident and illness—has been reduced by 50 per cent among radio artists. Such trifles as broken legs and fractured arms cause no interruption in the income of the microphone stars, for so long as their throats and necks are left intact their "performance" remains uncurtailed. As a broken neck generally ends the need for an income, the radio artists are in a much less hazardous financial situation than are the treaders of the boards.

### Disabled but Keeps Date

Probably the most striking instance of this advantage enjoyed by the broadcasters occurred recently, when Mr. Malcolm La Prade, conductor of a weekly travelogue feature at WJZ, broke his right arm less than twenty-four hours before his scheduled broadcast. Upon being told by the attending doctor that he could not possibly do any work for a few days, Mr. La Prade used his voice with considerable force and more length. The success with which he rallied against the ironical dealings of Fate convinced him that though his arm might be, and was, swathed in a large size plaster cast his vocal organ was as unencumbered as ever. Whereupon he decided to keep his microphone date the next evening.

For half an hour he described the beauties of Berlin to his invisible audience, with more than occasional interludes wherein he directed his supporting orchestra with a free and slightly ungraceful—but thoroughly effective—left hand. No mention was made of his disabled arm, and the radio listeners found nothing amiss with the broadcast.

Other less spectacular instances are not rare in the still brief annals of metropolitan stations, where singers on crutches, speakers unable to stand up by themselves and, in one case, a cellist with a crushed foot, have fulfilled their radio bookings and given excellent performances. It is rather significant—and this is what has silenced many of the sneers from the vaudevillians and interpreters of the drama—that none of these "crippled" broadcasts was made in the days when radio artists received nothing more monetary than thanks for their work. Since the insurance companies have as yet made no change in their "disability" policies, the radio artists are beginning to appreciate the "invisible" factor in their work more than ever.—S. H. H.

### Meeting of Government Club By WEA F To-morrow

A regular meeting of the Government Club will be broadcast by WEA F direct from the Hotel Astor, New York City, to-morrow beginning at 2:30. Mrs. George E. Owens will preside over the meeting.

### How Radio Is Received in Far Distant Parts of Canada

Suggestive of striking distances are three communications this week to KOA at Denver, from three widely separated staff members of the historical Hudson's Bay Company in northern Canada.

One of these, written by D. McAlpine, who is detailed to duty north of the Arctic Circle, was mailed from Kittigaruit, which faces the Beaufort Sea.

"We are on the Mackenzie River delta, at a latitude of approximately 69 degrees 20 minutes, and heard your station to-night quite distinctly," the letter reads. "At the time this is written, August 26, there is hardly any darkness at night."

The second response, which was transported overland a distance of 300 miles to the nearest railroad, was sent by R. B. Urquhart, manager at Isle a la Crosse.

"On behalf of the Hudson's Bay staff at this post, kindly allow me to convey an appreciation for KOA's most enjoyable programs," the writer declares. "Volume and tone are most pronounced."

From the Sturgeon Lake post P. G. B. Bodeker writes: "To one who has spent twenty

years away from civilization it was like hearing Heaven almost, when for the first time I tuned in KOA the other night on my newly acquired receiving set. This was my first radio

success—my first thrill. Even if I should live 100 years longer I'll never forget the experience." Innumerable communications also have been received at the General

Electric broadcasting station from listeners residing beyond the territorial boundaries of the United States. Included are residents of New Zealand, Hawaii, Alaska, New England, West Indies, Mexico and various sections of Central and South America. Reception also has been reported as far east as Birmingham.

## The TIMMONS B-Liminator

The Timmons B-Liminator gives you smooth noiseless B current from a source that is inexhaustible—your electric light circuit 110 volt 60 Cycle A C.

After severe tests, the B-Liminator has been officially endorsed by sixteen radio publications and newspapers.

For sale by your dealer or we'll tell you where you can buy one.

Price \$28.50 with special tube

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## AMSCO ALLOCATING CONDENSER

Hear Those Fellows Below 300 Meters

DO you get the low wave stations on your set? If not, install AmSCO Allocating Condensers in place of your old ones. The low AmSCO minimum capacity enables you to "get down" to the low numbers. After which, the AmSCO "spread" or allocation of the stations, enables you to tune them in, one at a time, with ease. Made in six space-saving sizes—three Single, three Siamese—at reasonable prices. Ask your dealer. AMSCO PRODUCTS, INC. Broome and Lafayette Streets, N. Y. C.

## AN ASTOUNDING BARGAIN!

The Nationally Advertised Standard RADIO Products PLEASE NOTE — THIS IS A 6 TUBE SET

Model 61 LIST PRICE \$223.00

THIS PRICE FOR CASH — ONLY — \$59.00

Genuine mahogany cabinet, 16 3/4" high, 24 1/4" wide, 12 3/8" deep; panels and dials genuine bakelite.

PACKED IN ORIGINAL SEALED FACTORY CARTONS

NOTE: The Federal is a ten million dollar (\$10,000,000) corporation, and the Federal is one of the best sets on the market.

Free! to you! Included in the purchase of this set we will give ABSOLUTELY FREE a \$7 Federal Head Set and an 80c Phone Plug.

The FEDERAL Type 61 may be used with equal effectiveness with a loop antenna, a small indoor wire or the more common large outdoor antenna systems, and when used with any of these types of signal system will give a range of reception of such magnitude as to make available almost all American and Canadian broadcasting. It secures its great range and flexibility through the use of three stages of radio frequency amplification in combination with two stages of audio frequency amplification and a unique switching system, which gives an exceptionally great variation of amplification and selectivity.

Mail Orders Promptly Attended To—Phone, Write or Telegraph

ECONOMY MUSIC SHOP

112 West 23rd St. NEW YORK CITY

Dealers Write for Special Proposition on this set



## Additional Radio Programs for the week

(Continued from preceding page)

WFI—PHILADELPHIA—395

10 p. m.—Tea room ensemble.

10 p. m.—Sherwood Century Club program.

10:15 p. m.—Mack &amp; Lence, songs.

10:30 p. m.—Concert Orchestra.

10:45 p. m.—Program same as WEAF.

WJL—PHILADELPHIA—395

10:15 p. m.—Organ; Religious Services.

10:30 p. m.—Concert Orchestra.

10:45 p. m.—Studio hour.

11 p. m.—Dream Holiday.

WCAU—PHILADELPHIA—278

10:15 p. m.—Billy Hayes's Orchestra.

10:30 p. m.—Recital.

10:45 p. m.—Barry O'Keefe, tenor.

11 p. m.—Musical Chorus.

11:15 p. m.—Sesqui-Centennial Hour.

11:30 p. m.—Daddy Dingle.

WJL—ATLANTIC CITY—300

10:15 p. m.—"Billy" Rock, "Sports."

10:30 p. m.—Organ Recital.

10:45 p. m.—Dinner music.

11 p. m.—World Wonder Excursions.

11:15 p. m.—Concert.

WJL—ATLANTIC CITY—275

10:15 p. m.—Seaside Trio.

10:30 p. m.—Market and weather report.

10:45 p. m.—Eddie Brennan, Dick Adams, singers.

WGY—SCHENECTADY—380

10:15 p. m.—Music talk.

10:30 p. m.—"WGNY Club Chat."

10:45 p. m.—WGNY Orchestra.

11 p. m.—United States Army Band.

11:15 p. m.—Royal Saint Orchestra.

11:30 p. m.—Adrian, soprano, and orchestra.

WJL—ATLANTIC CITY—310

10:15 p. m.—Program same as WEAF.

WJL—HARTFORD, CONN.—476

10:15 p. m.—Dinner music.

10:30 p. m.—Talk.

WJL—PROVIDENCE—306

10:15 p. m.—Joe McNamara's Orchestra.

10:30 p. m.—Health talk.

10:45 p. m.—Zippers.

WJL—BOSTON—280

10:15 a. m.—Christmas carols.

10:30 a. m.—Double record; club talks.

12:15 p. m.—Noon service.

12:30 p. m.—Dinner to Malcolm Nichols.

4 p. m.—Mosey Pearl's Rambler.

6 p. m.—The Smilers.

6:30 p. m.—Dinner dance.

8 p. m.—Talks, Mr. Raymond.

8:15 p. m.—Musical Quartet.

8:30 p. m.—Dance.

WJL—BOSTON—349

6:50 p. m.—Lost and Found; weather.

7:15 p. m.—Classifying the Stars.

8:15 p. m.—Program same as WEAF.

WJL—SPRINGFIELD, MASS.—333

6:15 p. m.—Dinner concert.

6:30 p. m.—Market reports.

6:45 p. m.—English Literature, Prof.essor E. Black.

7 p. m.—Dance orchestra.

8 p. m.—Second New England Forestry Congress.

9:15 p. m.—Musical program.

10:30 p. m.—McNelly's Orchestra.

WJL—WORCESTER, MASS.—268

12 noon.—Market and weather report.

12:30 p. m.—Lunch music.

4:30 p. m.—Radio entertainment.

8:15 p. m.—Story teller.

8:30 p. m.—Program same as WEAF.

WJL—WASHINGTON—469

10 a. m.—Women's Hour from WJL.

12 noon.—Organ recital.

12:30 p. m.—Mayflower Orchestra.

1 p. m.—Hamilton Orchestra.

1:30 p. m.—Smithsonian talk.

2 p. m.—Shoreham Orchestra.

2:30 p. m.—Royal Saint Orchestra.

10:30 p. m.—Meyer Davis's Orchestra.

WJL—BALTIMORE, MD.—375

6:45 p. m.—Dinner music.

8:30 p. m.—Organ recital.

KDKA—PITTSBURGH—309

6:15 p. m.—Dinner concert.

8 p. m.—Palm program.

8:15 p. m.—Richard Kohn; KDKA Symphony Orchestra, concert.

9 p. m.—KDKA Symphony Orchestra, concert.

9:15 p. m.—Pittsburgh Post-Review.

WJL—PITTSBURGH—461

10:15 p. m.—Dinner concert.

10:30 p. m.—Children's period.

10:45 p. m.—Larkin concert.

11 p. m.—Goodrich Zippers.

WJL—AKRON, OHIO—258

6:30 p. m.—Dinner concert.

8:30 p. m.—Studio concert.

WJL—CLEVELAND—39 0

6:15 p. m.—Dinner concert.

7 p. m.—Dinner concert.

7:15 p. m.—Dinner concert.

7:30 p. m.—Dinner concert.

## FRIDAY

WJL—NEW YORK CITY—455

10 a. m.—Wanda.

1 p. m.—Ambassador Trio.

4:30-7:30-10:30 p. m.—News.

5:30 p. m.—Market quotations.

6:10 p. m.—"The Star Line."

6:30 p. m.—"N.Y. U. C. course: 'Tariff Problems.' Professor Reid McCune.

7 p. m.—Bernard Levitt's orchestra.

7:15 p. m.—"Law Enforcement," John Kennedy.

8:10 p. m.—Estey hour.

9 p. m.—U. S. Army night; Army Music Band.

9:30 p. m.—Musical Chorus.

10 p. m.—Sesqui-Centennial Hour.

11 p. m.—The Parodians.

11:30 p. m.—Daddy Dingle.

WJL—ATLANTIC CITY—300

10:15 p. m.—"Billy" Rock, "Sports."

10:30 p. m.—Organ Recital.

10:45 p. m.—Dinner music.

11 p. m.—World Wonder Excursions.

11:15 p. m.—Concert.

WJL—ATLANTIC CITY—275

10:15 p. m.—Seaside Trio.

10:30 p. m.—Market and weather report.

10:45 p. m.—Eddie Brennan, Dick Adams, singers.

WGY—SCHENECTADY—380

10:15 p. m.—Music talk.

10:30 p. m.—"WGNY Club Chat."

10:45 p. m.—WGNY Orchestra.

11 p. m.—United States Army Band.

11:15 p. m.—Royal Saint Orchestra.

11:30 p. m.—Adrian, soprano, and orchestra.

WJL—ATLANTIC CITY—310

10:15 p. m.—Program same as WEAF.

WJL—HARTFORD, CONN.—476

10:15 p. m.—Dinner music.

10:30 p. m.—Talk.

WJL—PROVIDENCE—306

10:15 p. m.—Joe McNamara's Orchestra.

10:30 p. m.—Health talk.

10:45 p. m.—Zippers.

WJL—BOSTON—280

10:15 a. m.—Christmas carols.

10:30 a. m.—Double record; club talks.

12:15 p. m.—Noon service.

12:30 p. m.—Dinner to Malcolm Nichols.

4 p. m.—Mosey Pearl's Rambler.

6 p. m.—The Smilers.

6:30 p. m.—Dinner dance.

8 p. m.—Talks, Mr. Raymond.

8:15 p. m.—Musical Quartet.

8:30 p. m.—Dance.

WJL—BOSTON—349

6:50 p. m.—Lost and Found; weather.

7:15 p. m.—Classifying the Stars.

8:15 p. m.—Program same as WEAF.

WJL—SPRINGFIELD, MASS.—333

6:15 p. m.—Dinner concert.

6:30 p. m.—Market reports.

6:45 p. m.—English Literature, Prof.essor E. Black.

7 p. m.—Dance orchestra.

8 p. m.—Second New England Forestry Congress.

9:15 p. m.—Musical program.

10:30 p. m.—McNelly's Orchestra.

WJL—WORCESTER, MASS.—268

12 noon.—Market and weather report.

12:30 p. m.—Lunch music.

4:30 p. m.—Radio entertainment.

8:15 p. m.—Story teller.

8:30 p. m.—Program same as WEAF.

WJL—WASHINGTON—469

10 a. m.—Women's Hour from WJL.

12 noon.—Organ recital.

12:30 p. m.—Mayflower Orchestra.

1 p. m.—Hamilton Orchestra.

1:30 p. m.—Smithsonian talk.

2 p. m.—Shoreham Orchestra.

2:30 p. m.—Royal Saint Orchestra.

10:30 p. m.—Meyer Davis's Orchestra.

WJL—BALTIMORE, MD.—375

6:45 p. m.—Dinner music.

8:30 p. m.—Organ recital.

KDKA—PITTSBURGH—309

6:15 p. m.—Dinner concert.

8 p. m.—Palm program.

8:15 p. m.—Richard Kohn; KDKA Symphony Orchestra, concert.

9 p. m.—KDKA Symphony Orchestra, concert.

9:15 p. m.—Pittsburgh Post-Review.

WJL—PITTSBURGH—461

10:15 p. m.—Dinner concert.

10:30 p. m.—Children's period.

10:45 p. m.—Larkin concert.

11 p. m.—Goodrich Zippers.

WJL—AKRON, OHIO—258

6:30 p. m.—Dinner concert.

8:30 p. m.—Studio concert.

WJL—CLEVELAND—39 0

6:15 p. m.—Dinner concert.

7 p. m.—Dinner concert.

7:15 p. m.—Dinner concert.

7:30 p. m.—Dinner concert.

WJL—NEWARK—252

8 p. m.—Piano; race results (half hourly).

8:15 p. m.—Songs.

8:30 p. m.—Studio program.

8:45 p. m.—Sylvia Rose, songs.

9 p. m.—Dorothy Hays, soprano.

9:15 p. m.—Richman Entertainers.

9:30 p. m.—Richard Hays, soprano.

9:45 p. m.—Win Unger, songs.

WJL—NEWARK—263

11 a. m.—Clarinet trio; talk.

11:15 a. m.—Rainbow Skyline.

11:30 a. m.—Rainbow Skyline.

11:45 a. m.—Rainbow Skyline.

12 p. m.—Rainbow Skyline.

12:15 p. m.—Rainbow Skyline.

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5:30 p. m.—Rainbow Skyline.

5:45 p. m.—Rainbow Skyline.

6 p. m.—Rainbow Skyline.

6:15 p. m.—Rainbow Skyline.

6:30 p. m.—Rainbow Skyline.

6:45 p. m.—Rainbow







## Radio Engineers 500 Strong Attend I.R.E. Convention

On Monday and Tuesday of last week approximately 500 members of the Institute of Radio Engineers attended their regular annual meeting and first annual convention, which was held at the Engineering Societies Building, 29 West Thirty-ninth Street, New York City.

After the customary registration of delegates and distribution of badges, which took place Monday at 9 a. m. in the lobby, those present gathered in the auditorium on the third floor for the first session of the convention. The meeting was opened by the retiring president, Dr. John Howard Dellinger, who presented a report of the institute activities during 1925. This was followed by a report of the election of the institute officers for 1926, who are as follows: Donald McNeil, president; Dr. Ralph Brown, vice-president; Dr. J. H. Dellinger, junior past president; Dr. A. N. Goldsmith, secretary; and W. F. Hubley, treasurer. The president-elect and vice-president-elect were introduced to the convention.

The board of direction prepared a testimonial which was presented to Dr. Goldsmith. In his speech of acceptance he told an interesting story about how the institute was organized sixteen years ago and of the great struggle to keep it going during the first few years of its existence.

The Liebmann Prize and \$500 were presented to Frank Conrad, chief radio engineer of the Westinghouse Electric and Manufacturing Company, for the most noteworthy contribution to radio engineering during the last year. This was in recognition of his work in the development of short wave signaling.

The technical paper presented at this meeting was by Greenleaf W. Pickard on "The Polarization of Radio Waves." Mr. Pickard, who is consulting engineer for the Wireless Specialty Apparatus Company, told, with the aid of slides, of his experiments and the facts about radio waves which he was able to gather from them.

At 2 p. m. on Monday the delegates started on an organized trip of inspection of the new high-power radio broadcasting station of the Radio Corporation of America at Bound Brook, N. J. This trip required the remainder of the afternoon.

At the evening session a symposium on the results of the November, 1925, Washington Radio Conference was presented and the views of Dr. J. H. Dellinger, Dr. A. N. Goldsmith, S. V. L. Hogan and R. H. Marriott were given.

On Tuesday morning the delegates had a choice of two tours, the first of which left the Engineering Societies Building at 9 a. m. in busses and included an inspection of the manufacturing plant of the A. H. Grebe Company, Richmond Hill, L. I.; station WHAG, Richmond Hill, L. I.; the transoceanic radio telegraph office of the Radio Corporation of America, New York City, and the studio of WJZ, New York City.

Another tour left the Engineering Societies Building at 9:30 a. m. in busses and included a visit to the transoceanic radio telegraph office of the Radio Corporation of America, the studio of station WEA and the Bell Telephone laboratories.

Both tours returned to the headquarters of the convention at 4 p. m. in time to hear the lecture by Dr. L. W. Austin, which was entitled "The Present Status of Radio Atmospheric Disturbances." This paper is printed in full elsewhere in this magazine.

The convention was brought to a formal close on Tuesday evening at a banquet which was held at the Waldorf-Astoria Hotel. Addresses on radio topics were made by many prominent radio engineers and executives, including Dr. M. I. Pupin, Dr. Irving Langmuir, Dr. P. B. Jewett, Dr. E. F. W. Alexanderson, Dr. A. E. Kennelly, Edward J. Nally, Professor J. H. Morecroft and A. H. Grebe.

## "Miss Simplicity" Revived in Tabloid Form in Pop Concert

The audiences of two broadcasting stations, WEA, New York, and WOO, Philadelphia, will hear the half-hour program known by the familiar title, "Pop" concert, to be broadcast at 8 o'clock to-morrow evening. On this evening the old comic opera, "Miss Simplicity," composed by Harry L. Hertz, and a favorite in the field of musical comedy less than a quarter of a century ago, will be revived in tabloid form by the quartet which is heard each week in this outstandingly popular feature of WEA's program.

## Radio Statistics for Year of 1925

The following statistics of the radio industry, as of January 1, 1926, have been compiled by the monthly magazine, "Radio Retailing," from sources which it believes to be accurate and authoritative:

Total radio audience.....	20,000,000
Total radio sets in use.....	5,000,000
Total sales in 1925.....	
Radio sets.....	2,000,000
Loud speakers.....	2,000,000
Headsets.....	900,000
Vacuum tubes.....	20,000,000
Accessories and replacements.....	200,000,000
(Including dry batteries A, B and C, \$75-100,000; storage batteries, \$18,000,000)	
Parts.....	70,000,000
Total retail value of all radio equipment sold during 1925.....	\$450,000,000
Radio industry census—	
Radio manufacturers.....	2,000
Radio jobbers.....	1,000
Radio retailers.....	31,000
Figures bearing on radio saturation—	
Homes in the United States.....	26,000,000
Telephones.....	15,000,000
Passenger automobiles.....	15,000,000
Homes wired for electricity.....	14,500,000
Phonographs.....	10,000,000
Farms in the United States.....	6,500,000
Radio sets now in use on farms.....	650,000

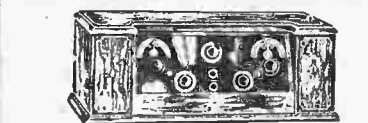
## N. Y. Symphony Orchestra Under W. Damrosch To-day

This evening fifteen broadcasting stations will send out as the evening's "Atwater Kent Radio Hour" a program by the New York Symphony Orchestra, under the direction of the famous Walter Damrosch. Radio listeners will be particularly interested in knowing that Mr. Damrosch will make brief explanatory remarks preceding each selection rendered by

the orchestra, which will be heard direct from the well known Waldorf-Astoria in New York City. This will be the second time since the "Atwater Kent Radio Hour" began on Sunday, October 4, that an orchestra has been heard, for it will be recalled that on the evening of Sunday, November 22, the New York State Symphony Orchestra broadcast direct from the Astor Galleries of the Waldorf-Astoria.

## GREATEST SALE EVER HELD

**CROSLEY**  
\$60.00 SUPER  
TRIRDYN SPECIAL



**Performance**  
That Has No Peer

The improved Super-Trirdyn model is assembled in a new solid mahogany cabinet finished in ducochrome. This is a striking lines and simple detail decoration of equal size to house all dry battery or circuit for dry cell tube operation. On display at Myrtle Ave. Store only.

**\$29.75**

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Morrison Unit..... 3.40  
Zitack No. 10..... 2.39  
Atwater Kent..... 6.95  
Diaphragm Unit..... 8.95  
Stromberg Carlson..... 7.00  
Baldwin Phone..... 6.98  
Baldwin Type H..... 4.98  
Thimmons..... 2.98

**SPEAKERS**  
Snyder No. 18..... 13.50  
Farrand Sr..... 32.50  
Farrand Jr..... 16.50  
Professional 50 List 9.49  
New Radiola in stock  
Crosley Musicone..... 11.98  
Bosch Ambitone..... 24.50  
Charm Cone..... 12.50  
Pathe New Cone..... 19.75

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DAVEN, ALL Sizes; at Special Prices.  
Rohrer..... 1.19  
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Freshman V. Grid..... .19  
Leak..... .39  
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Bretwood..... .29  
Lavie..... .29  
Leak with Mtg..... .29  
Filkoek..... .98

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L. F. 0003..... 3.29  
Anisco 0003 S.L.F..... 3.49  
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U. S. L. Low Loss..... .98  
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No Noise..... .69  
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20 FOURTH AVE. At Atlantic Ave. Subway Station  
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**AERO-LOOP**

Silencer of Static and Interference. Sturdily built, compact and very portable.

**\$10.50**

**BARGAINS**  
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General Radio 285 5.25  
Federal 65 & 65A..... 2.98  
Rathbone Tubes..... 0.25  
Stromberg Carlson..... 4.50  
Thurston Auto..... 3.69  
Formers..... 2.95  
" 21..... 2.95  
" 31..... 2.39  
Jefferson Station..... 2.59  
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Patent 199..... .39  
Naid U. X 400..... 1.05  
U. X..... .35

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" 77A..... 10.95  
Rectron 5 Amp..... 16.95  
Balkite Triode..... 6.95  
Freshman A..... 22.95  
Clifton Midget..... 22.50

**'B' ELIMINATORS**  
Balkite..... 22.95  
Freshman A..... 22.50  
Clifton Midget..... 22.50

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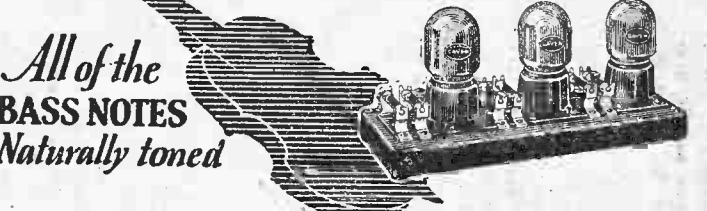
## DAVEN RADIO

### At WOR Last Night

Broadcast an enjoyable program—different—interesting and educational with not one second of "drag." Mr. Marriott, past president of I. R. E., spoke to you in your own language and told you a story that most of you are not acquainted with—the story of Radio's "lost notes."

**The Daven Amplifier is the Unit That Enables You to Hear ALL the Music—Base and High Notes with Equal Distinctness**

This was clearly demonstrated last night from WOR and will be continued every Saturday evening at 8:45—tune in on 405 meters.



**Have the Daven Service Dealer Install Daven Amplification for you**

**NEW YORK CITY**  
Anc Electric Co., Inc., 204 W. 34th St.  
Ferris Radio Supply Co., Inc., 3180 B'way  
Radio Engineering & Repair Co., 380 E. 149th St.  
Willis Radio Store, 302 Willis Ave.  
The Radio Store, 2835 Broadway  
Resistor, Tyler & McDowell, Inc., 136 Liberty St.  
Wireless Expert, 179 Greenwich St.  
Horns & Bolt, 44 Park Place  
Charles W. Downs, 711 Eighth Ave.  
Interstate Radio Manufacturing Co., 1001 Amsterdam Ave.  
William T. Baxter Corp., 4234 Broadway  
Dreher Radio, 315 Amsterdam Ave.

**Imperial Economy Radio Co., 81 Cortland St.**  
**Brown Radio Laboratories, 82 W. 8'way**  
**Haynes-Griffin, Inc., 41 W. 43d St.**  
**Radio Hospital, 39 Eighth Ave.**  
**Radio Construction Laboratory, 71 W. Broadway**  
**Or Sport Shop, 112 Chambers St.**  
**BROOKLYN, N. Y.**  
**Stores of Brooklyn Radio Service Co., 577 Myrtle Ave.**  
**20 Fourth Ave.**  
**1188 Fulton St.**  
**573 Myrtle Ave.**  
**NEWARK, N. J.**  
**Empire Light Co., Inc., 52 Springfield Ave.**  
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# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

SECTION ELEVEN SUNDAY, JANUARY 24, 1926 16 PAGES

## Radio Causes Downfall of 'Yellow Fangs'

Roger Wharton, the Dreamer of Hopedale, Circumvents a Wily Wolf and Thereby Earns Enough to Buy Receivers for Himself and His Chum

By CHARLES A. HARTLEY

FARMER HIRAM PECK, from out on Stony Point Creek, came into the store of John Hoskins at Hopedale with anger oozing from every pore and his chin whiskers bristling.

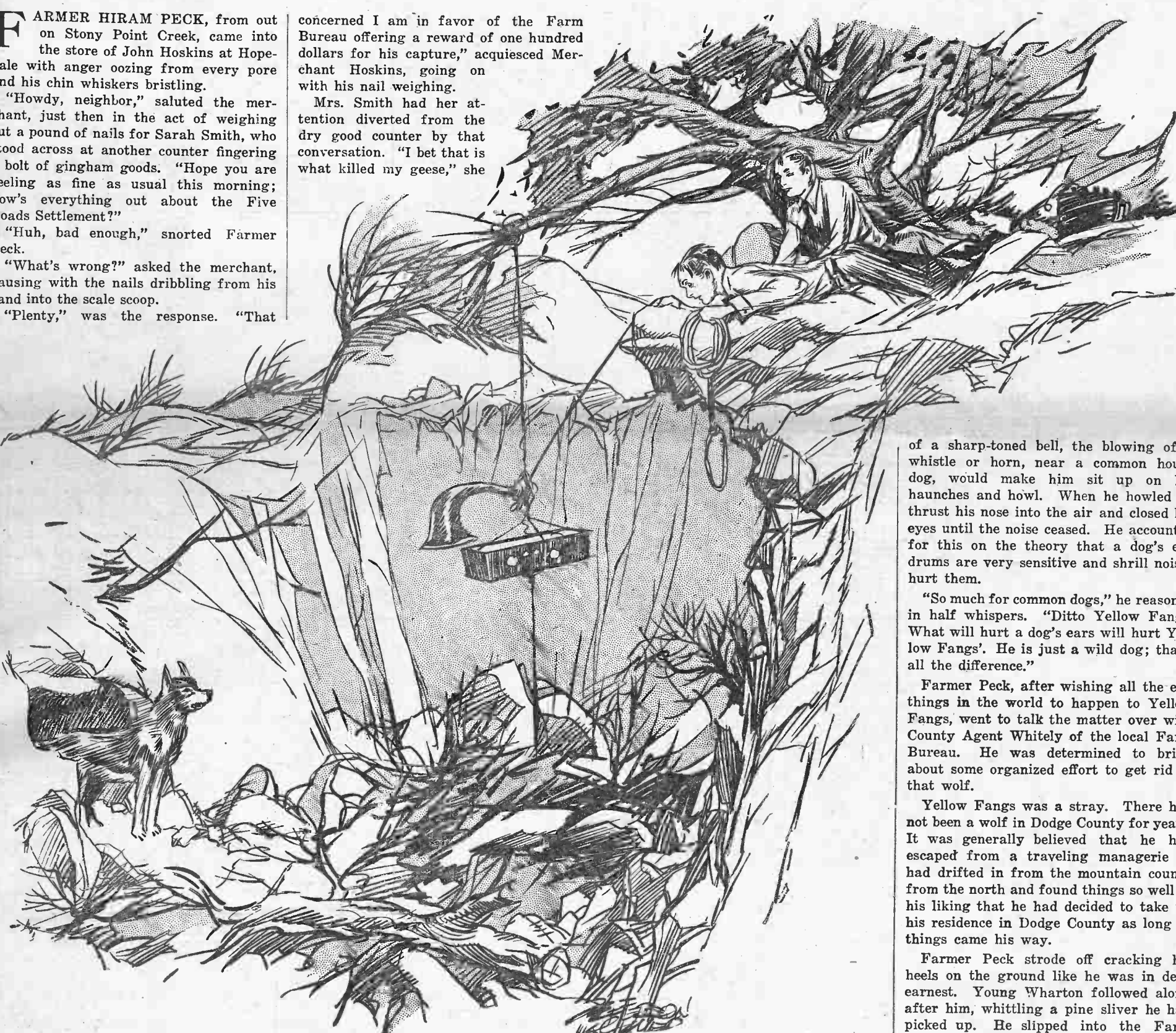
"Howdy, neighbor," saluted the merchant, just then in the act of weighing out a pound of nails for Sarah Smith, who stood across at another counter fingering a bolt of gingham goods. "Hope you are feeling as fine as usual this morning; how's everything out about the Five Roads Settlement?"

"Huh, bad enough," snorted Farmer Peck. "What's wrong?" asked the merchant, pausing with the nails dribbling from his hand into the scale scoop.

"Plenty," was the response. "That

concerned I am in favor of the Farm Bureau offering a reward of one hundred dollars for his capture," acquiesced Merchant Hoskins, going on with his nail weighing.

Mrs. Smith had her attention diverted from the dry good counter by that conversation. "I bet that is what killed my geese," she



of a sharp-toned bell, the blowing of a whistle or horn, near a common house dog, would make him sit up on his haunches and howl. When he howled he thrust his nose into the air and closed his eyes until the noise ceased. He accounted for this on the theory that a dog's ear drums are very sensitive and shrill noises hurt them.

"So much for common dogs," he reasoned in half whispers. "Ditto Yellow Fangs. What will hurt a dog's ears will hurt Yellow Fangs." He is just a wild dog; that's all the difference."

Farmer Peck, after wishing all the evil things in the world to happen to Yellow Fangs, went to talk the matter over with County Agent Whitely of the local Farm Bureau. He was determined to bring about some organized effort to get rid of that wolf.

Yellow Fangs was a stray. There had not been a wolf in Dodge County for years. It was generally believed that he had escaped from a traveling managerie or had drifted in from the mountain county from the north and found things so well to his liking that he had decided to take up his residence in Dodge County as long as things came his way.

Farmer Peck strode off cracking his heels on the ground like he was in deep earnest. Young Wharton followed along after him, whittling a pine sliver he had picked up. He slipped into the Farm Bureau office without attracting special attention. Agent Whitely nodded to the boy when he entered and took a seat in the rear of the room.

Farmer Peck stated his grievance in few and emphatic words. He wanted that wolf killed and no more foolishness about it. As a member of the organization he was willing to stand his share of \$100 reward for the capture of the night prowler.

Agent Whitely fell in with the idea and it was agreed that the reward should be published in the county paper that week. When the two were about to separate, after further discussion of the matter, to which Wharton listened carefully, Farmer Peck got to his feet and was in the act of shaking hands, when the dreamer boy

He knew, for instance, that the ringing

Then a cautious forefoot came out, soon followed by another. Then the shoulders.

Yellow Fangs wanted to know what was going on outside.

devilish wolf, Yellow Fangs, has been at it again. He killed one of my finest heifers last night. That's enough to make a man angry from center to circumference. There's got to be something done about this destructive beast. I honestly believe he has killed five hundred dollars worth of stock in the county. I say there's got to be something done about it and that right away."

Farmer Peck stormed up and down for a few seconds he was so agitated.

"I agree that there ought to be an end put to the depredations of this beast. We might get to some experienced hunters and exterminate the brute. So far as I am

broken in. "Drat his hide, I'd go five dollars on a reward pot for his capture."

Roger Wharton, eighteen, the dreamer of the village of Hopedale, sat on a keg of nails back in a corner and listened to this tale of woe. He had heard about the wolf before. For three years it had been roaming up and down over two or three townships and living off the fat of the herds. Attempts had been made to run it down with dogs. It rendered the dogs. Some one saw it one day in the act of slaying a sheep and its fangs were reported to be two inches long and yellow. That is the way it got the name of Yellow Fangs.

Dogs were afraid of it; that is, the ones which were not killed or so badly mangled that all the fight had been taken out of them. Hunting parties were organized and armed and searched the woods for miles around. Yellow Fangs had a nose too acute to be caught in that way. He did not come out from his hiding place when there was snow on the ground. He was wise and wily.

This boy dreamer, Roger Wharton, was also wise in woodcraft and in the ways of woodfolk generally. He had a pretty good knowledge of the animal family, wild and domestic.

He knew, for instance, that the ringing

(Continued on page seven)

## Cunningham RADIO TUBES

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### Radio Engineers 500 Strong Attend I.R.E. Convention

On Monday and Tuesday of last week approximately 500 members of the Institute of Radio Engineers attended their regular annual meeting and first annual convention, which was held at the Engineering Societies Building, 29 West Thirty-ninth Street, New York City.

After the customary registration of delegates and distribution of badges, which took place Monday at 9 a. m. in the lobby, those present gathered in the auditorium on the third floor for the first session of the convention. The meeting was opened by the retiring president, Dr. John Howard Dellinger, who presented a report of the institute activities during 1925. This was followed by a report of the election of the institute officers for 1926, who are as follows: Donald McNicol, president; Dr. Ralph Brown, vice-president; Dr. J. H. Dellinger, junior past president; Dr. A. N. Goldsmith, secretary, and W. F. Hubley, treasurer. The president-elect and vice-president-elect were introduced to the convention.

The board of direction prepared a testimonial which was presented to Dr. Goldsmith. In his speech of acceptance he told an interesting story about how the institute was organized sixteen years ago and of the great struggle to keep it going during the first few years of its existence.

The Liebmann Prize and \$500 were presented to Frank Conrad, chief radio engineer of the Westinghouse Electric and Manufacturing Company, for the most noteworthy contribution to radio engineering during the last year. This was in recognition of his work in the development of short wave signaling.

The technical paper presented at this meeting was by Greenleaf W. Pickard on "The Polarization of Radio Waves." Mr. Pickard, who is consulting engineer for the Wireless Specialty Apparatus Company, told, with the aid of slides, of his experiments and the facts about radio waves which he was able to gather from them.

At 2 p. m. on Monday the delegates started on an organized trip of inspection of the new high-power radio broadcasting station of the Radio Corporation of America at Bound Brook, N. J. This trip required the remainder of the afternoon.

At the evening session a symposium on the results of the November, 1925, Washington Radio Conference was presented and the views of Dr. J. H. Dellinger, Dr. A. N. Goldsmith, J. V. L. Hogan and R. H. Marriott were given.

On Tuesday morning the delegates had a choice of two tours, the first of which left the Engineering Societies Building at 9 a. m. in busses and included an inspection of the manufacturing plant of the A. H. Grebe Company, Richmond Hill, L. I.; station WHAG, Richmond Hill, L. I.; the transoceanic radio telegraph office of the Radio Corporation of America, New York City, and the studio of WJZ, New York City.

Another tour left the Engineering Societies Building at 9:30 a. m. in busses and included a visit to the transoceanic radio telegraph office of the Radio Corporation of America, the studio of station WJZ and the Bell Telephone Laboratories.

Both tours returned to the headquarters of the convention at 4 p. m. in time to hear the lecture by Dr. L. W. Austin, which was entitled "The Present Status of Radio Atmospheric Disturbances." This paper is printed in full elsewhere in this magazine.

The convention was brought to a formal close on Tuesday evening at a banquet which was held at the Waldorf-Astoria Hotel. Addresses on radio topics were made by many prominent radio engineers and executives, including Dr. M. I. Pupin, Dr. Irving Langmuir, Dr. F. B. Jewett, Dr. E. F. W. Alexanderson, Dr. A. E. Kennelly, Edward J. Nally, Professor J. H. Morecroft and A. H. Grebe.

### "Miss Simplicity" Revived in Tabloid Form in Pop Concert

The audiences of two broadcasting stations, WJZ, New York, and WOO, Philadelphia, will hear the half-hour program known by the familiar title, "Pop" concert, to be broadcast at 8 o'clock to-morrow evening. On this evening the old comic opera, "Miss Simplicity," composed by Harry L. Hertz, and a favorite in the field of musical comedy less than a quarter of a century ago, will be revived in tabloid form by the quartet which is heard each week in this outstandingly popular feature of WJZ's program.

Radio Statistics for Year of 1925	
The following statistics of the radio industry, as of January 1, 1926, have been compiled by the monthly magazine, "Radio Retailing," from sources which it believes to be accurate and authoritative:	
Total radio audience.....	20,000,000
Total radio sets in use.....	5,000,000
Total sales in 1925—	
Radio sets.....	2,000,000
Loud speakers.....	2,000,000
Headsets.....	900,000
Vacuum tubes.....	20,000,000
Sets.....	\$180,000,000
Accessories and replacements.....	200,000,000
(Including dry batteries A, B and C, \$75-000,000; storage batteries, \$18,000,000)	
Parts.....	70,000,000
Total retail value of all radio equipment sold during 1925.....	\$450,000,000
Radio industry census—	
Radio manufacturers.....	2,000
Radio jobbers.....	1,000
Radio retailers.....	31,000
Figures bearing on radio saturation—	
Homes in the United States.....	26,000,000
Telephones.....	15,000,000
Passenger automobiles.....	15,000,000
Homes wired for electricity.....	14,500,000
Photographs.....	10,000,000
Farms in the United States.....	6,500,000
Radio sets now in use on farms.....	650,000

### N. Y. Symphony Orchestra Under W. Damrosch To-day

This evening fifteen broadcasting stations will send out as the evening's "Atwater Kent Radio Hour" a program by the New York Symphony Orchestra, under the direction of the famous Walter Damrosch. Radio listeners will be particularly interested in knowing that Mr. Damrosch will make brief explanatory remarks preceding each selection rendered by

the orchestra, which will be heard direct from the well known Waldorf-Astoria in New York City. This will be the second time since the "Atwater Kent Radio Hour" began on Sunday, October 4, that an orchestra has been heard, for it will be recalled that on the evening of Sunday, November 22, the New York State Symphony Orchestra broadcast direct from the Astor Galleries of the Waldorf-Astoria.

### GREATEST SALE EVER HELD

**CROSLEY**  
\$60.00 SUPER  
TRIRDYN SPECIAL



**Performance**  
That Has No Peer

**AERO-LOOP**



**\$10.50**

**\$29.75**



**BARGAINS**

In original carton, Factory Guarantee

Add 10% on Mail Orders

PHONES, LOUD SPEAKER UNITS	
Brando Superior.....	2.98
Tower Spiders.....	1.95
Morrison Unit.....	3.40
Zitach No. 10.....	2.89
Atwater Kent.....	6.95
Fada.....	6.49
Dictograph Unit.....	8.95
Stromberg Carlson.....	7.00
Baldwin Phone.....	6.98
Baldwin Phone.....	4.98
Timmons.....	2.98
SPEAKERS	
Snyder No. 18.....	12.50
Farrand Jr.....	32.50
Professional 50 List 9.40	
New Radiola in stock	
Crosley General 11.10	
Boech Ambotone 24.50	
Charm Cone.....	12.50
Futhe New Cone.....	19.75
RESISTANCES	
DAVEN, ALL Sizes; at	
Special Prices.....	
Royalty.....	1.19
Charles.....	.98
Bradley Ohms all	
sizes.....	.79
Bradley Unit.....	.69
Freshman V. Grid	
Leak.....	.19
Cutter Hammer Grid	
Leak.....	.39
Brewster.....	1.19
Lavite.....	.29
Freshman Trans.....	.29
Leak with Mfg.....	.98
Fikoleak.....	.98
CONDENSERS	
U. S. L. Triple.....	7.95
Gen'l Instrument S.....	1.29
L. F. 00055.....	3.79
Gen'l Instrument S.....	.89
L. F. 00055.....	3.29
Amco 0005 S.L.E.....	2.49
Amco 0005 S.L.E.....	2.98
Remier.....	3.69
U. S. L. Low Loss.....	.98
00025 33-000.....	.98
Preferred 0005 S.....	1.29
L. F.....	.79
Low Loss.....	.98
Duplex.....	.98
GRID LEAKS	
No Noise.....	.69
Tora-Hi.....	.75
MIDGET CONDENSERS	
General Radio.....	1.19
Amboresor S. F.....	1.29
Hammerlund.....	1.59
Chilton Midgets.....	.98

**THE BROOKLYN RADIO**



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**577 Myrtle Avenue**  
(Corner Classon Avenue)

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**SMITH  
AND  
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**DAVEN RADIO**

**At WOR Last Night**



**The Daven Amplifier is the Unit That  
Enables You to Hear ALL the  
Music—Base and High Notes  
with Equal Distinctness**

**All of the  
BASS NOTES  
Naturally Toned**

**Have the Daven Service Dealer Install Daven Amplification for you**

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Ferris Radio Supply Co., Inc., 3180 B'way  
Radio Engineering & Repair Co.,  
300 E. 149th St.  
Willis Radio Stores, 302 Willis Ave.  
The Radio Store, 2835 Broadway  
Resistor, Tyler & McDonald, Inc.,  
136 Liberty St.  
Wireless Expert, 179 Greenwich St.  
Vides & Bolot, 44 Park Place  
Charles W. Downs, 711 Eighth Ave.  
Interstate Radio Manufacturing Co.,  
188 Fulton St.  
William T. Baxter Corp., 4234 Broadway  
Dreher Radio, 315 Amsterdam Ave.

**IMPERIAL Economy Radio Co.,  
81 Cortlandt St.  
Brown Radio Laboratories, 82 W. B'way  
Haynes-Griffin, Inc., 41 W. 43d St.  
Radio Hospital, 39 Eighth Ave.  
Radio Construction Laboratory,  
71 W. Broadway  
Orr Sport Shop, 112 Chambers St.  
**BROOKLYN, N. Y.**  
Stores of Brooklyn Radio Service Co.:  
577 Myrtle Ave.  
20 Fourth Ave.  
188 Fulton St.  
573 Myrtle Ave.  
**NEWARK, N. J.**  
Empire Light Co., Inc., 35 Springfield Ave.  
Ace Radio Shop, 217 Washington St.**

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**DAVEN RADIO CORPORATION**  
Resistor Specialists  
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Standard for all sets**

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**Types  
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**IN THE  
ORANGE AND BLUE  
CARTON**

**DIALS—VERNIER**  
Select, 3 in., plain..... 29  
Kurtz Karwell, 4 in., 49  
Bell, 3 in., plain..... 25  
Univertor..... 79  
Stinson..... 49  
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D. A. S..... 1.19  
Marco..... 1.49

**LOOPS**  
Lincoln..... 3.98  
Lincoln Tapped..... 4.98  
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Comsee Double..... 49c

**TRANSFORMERS**  
Ravland Lyries..... 3.95  
General Radio 245..... 2.25  
Federal 65 & 65A..... 2.98  
Rathena Tubes..... 6.25  
Stromberg Carlson..... 4.50  
Thorndarson Auto-  
formers..... 3.69  
"B-1"..... 2.89  
"B-2"..... 2.39  
Jefferson Stars..... 2.89  
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**VOLTMETERS  
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Sterling 0-50 volts..... 1.79  
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0-50 volts..... 2.49  
Sterling 0-35 amp..... .79  
Sterling 0-35 amp..... .69  
Yankee Voltmeter..... .69

**ADAPTERS**  
Bell U. X..... 25  
De Jur U. X..... 29  
General Radio U. X..... 29  
Facet 195..... 39  
Naid U. X. 450..... 1.05  
U. X..... .30

**KITS**  
Torold Coil, set of..... 4.95  
Fada..... 17.95  
Ultrafine..... 25.50  
Freshman..... 9.50  
Bremer Tully 6..... 31.50  
Daven 3K Kit..... .89  
Daven 3S Amplifier..... 9.98  
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**CHARGERS**  
Tanner A. & B..... 12.49  
Apo..... 2.99  
Jr..... 7.95  
77A..... 16.95  
Rectigon 5 Amp..... 16.95  
Baikite Trickle..... 6.95  
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**Steinite**

**Interference Eliminator**



**Low  
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**No Radio Set Complete Without It**

Select stations at will. With music and voices crowding the air the average set fails to bring in the desired stations properly. The Steinite Interference Eliminator shuts out local and other interference. You get one station at a time, the one you want, and tune in loud and clear. Operates on any set—attach to aerial wire and to set—no changes—no extra tubes or batteries. Greatest Dollar Value in Radio Today.

**Improved Results  
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**Try entirely at my risk the wonderful improvement this inexpensive little device will make in the reception of your set. Improved results on both crystal and tube sets that use any kind of aerial except loop antenna. Clears up reception wonderfully, increases volume, and partially absorbs static. Money-Back Guarantee.**

**FREE Descriptive Literature on request.**

**Put this interference eliminator on your set and note amazing improvement. No tools needed—install in a moment's time. Connect with set and follow simple instructions. Money back promptly if not delighted. \$1.50 postpaid anywhere in U. S. when cash with order.**

**References: Exchange National Bank, Atchison Savings Bank. Order today—a dollar bill will do.**

**STEINITE LABORATORIES, 127 Radio Bldg., ATCHISON, KANSAS**

# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

SECTION ELEVEN SUNDAY, JANUARY 24, 1926 16 PAGES

## Radio Causes Downfall of 'Yellow Fangs'

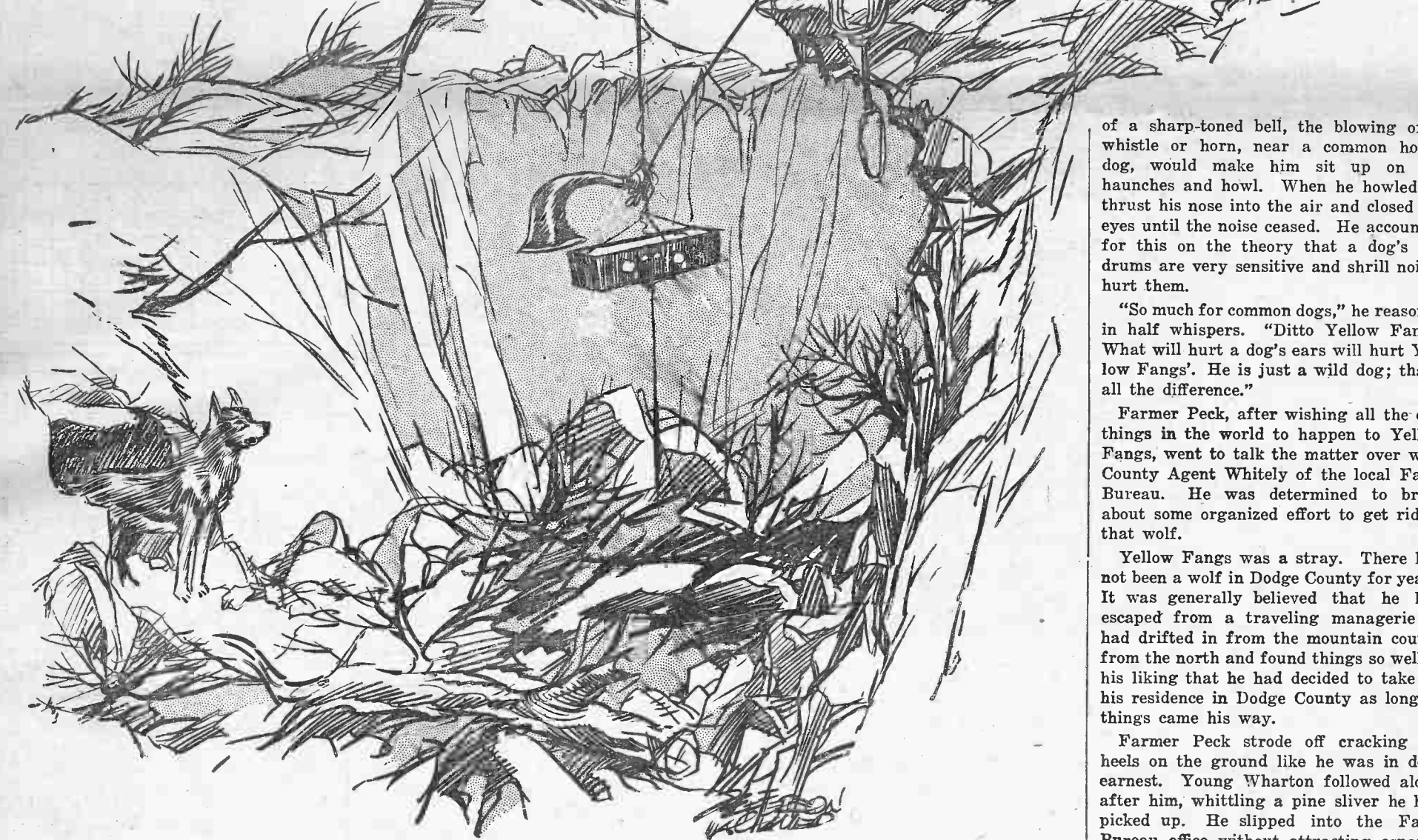
Roger Wharton, the Dreamer of Hopedale, Circumvents a Wily Wolf and Thereby Earns Enough to Buy Receivers for Himself and His Chum

By CHARLES A. HARTLEY

FARMER HIRAM PECK, from out on Stony Point Creek, came into the store of John Hoskins at Hopedale with anger oozing from every pore and his chin whiskers bristling. "Howdy, neighbor," saluted the merchant, just then in the act of weighing out a pound of nails for Sarah Smith, who stood across at another counter fingering a bolt of gingham goods. "Hope you are feeling as fine as usual this morning; how's everything out about the Five Roads Settlement?"

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broken in. "Drat his hide, I'd go five dollars on a reward pot for his capture." Roger Wharton, eighteen, the dreamer of the village of Hopedale, sat on a keg of nails back in a corner and listened to this tale of woe. He had heard about the wolf before. For three years it had been roaming up and down over two or three townships and living off the fat of the herds. Attempts had been made to run it down with dogs. It tended the dogs. Some one saw it one day in the act of slaying a sheep and its fangs were reported to be two inches long and yellow. That is the way it got the name of Yellow Fangs.

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(Continued on page seven)

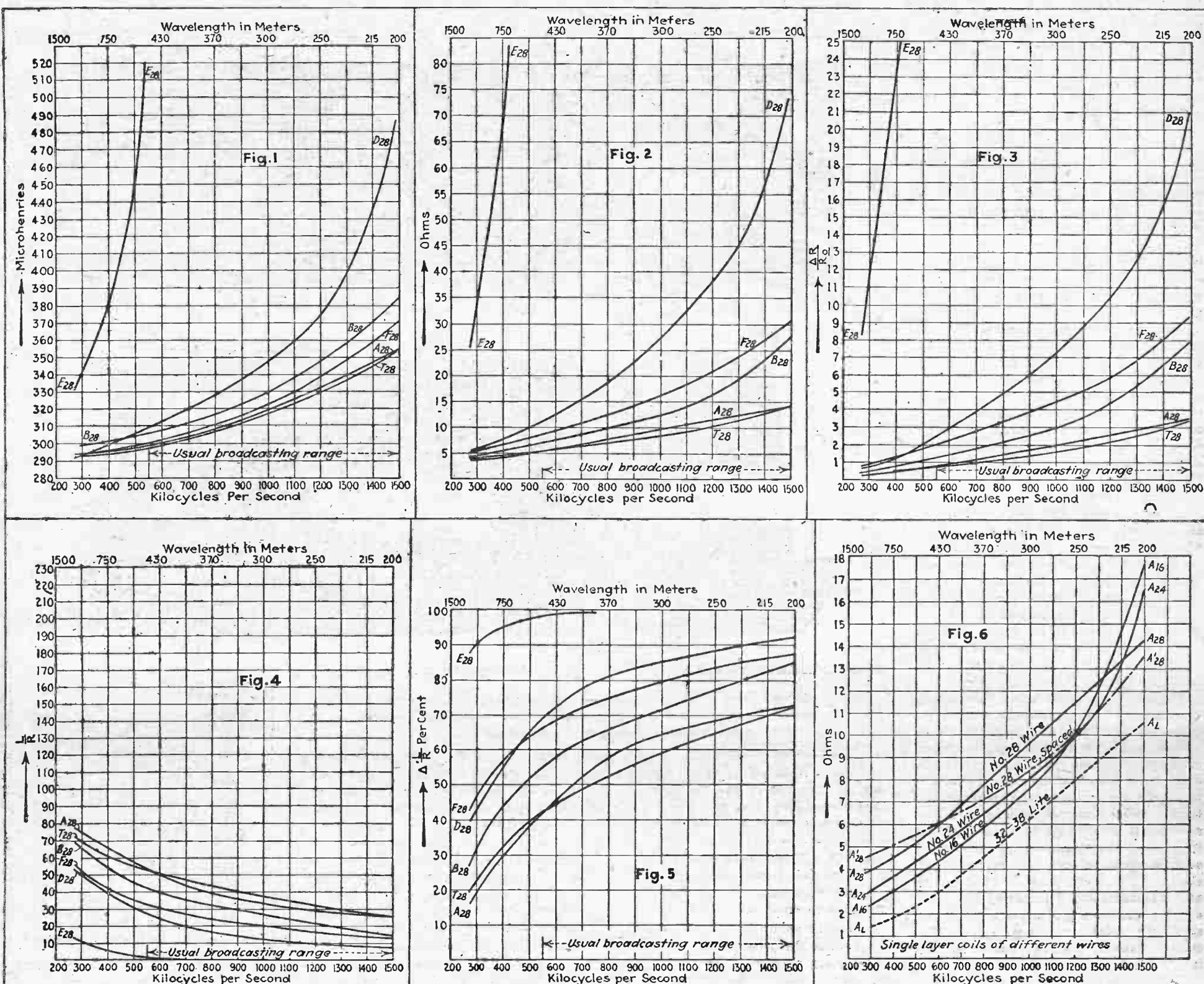
Additional Radio News Will Be Found in Section Two of To-day's Herald Tribune



# Radio-Frequency Resistance and Inductance Of Coils for Broadcast Receivers

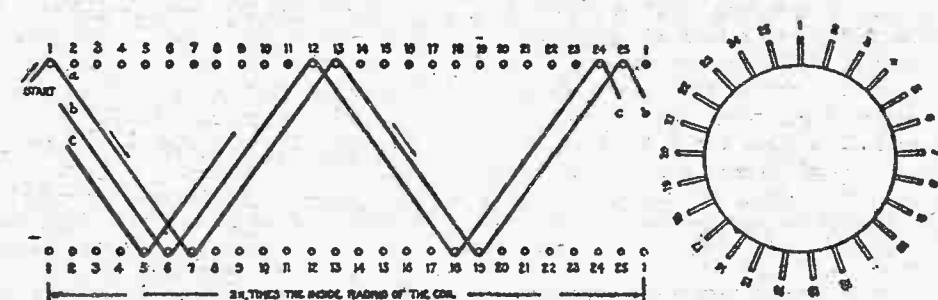
Tests Conducted by the U. S. Bureau of Standards Give Interesting Data on Inductances

By FULTON H. CRAWFORD



Five graphs prepared by the United States Bureau of Standards to show the electrical characteristics of different types of inductances used for broadcast reception, and one graph showing how the radio frequency resistance of single layer coils varies with the size of wire. Figure 1—The apparent inductance at different frequencies. Figure 2—Ratio of increase of resistance over its direct current value to its direct current value. Figure 3—Ratio of inductance to resistance. Figure 4—Ratio of inductance to resistance. Figure 5—Percentage decrease in the ratio of inductance to resistance below the value of 1 k. Figure 6—Radio frequency resistance of single layer coils with different sizes of wire. In figures 1 to 5, inclusive, A-28 is a single layer coil, B-28 is a radial basket-weave coil, D-28 is a honey-comb coil, E-28 is a two-layer coil, F-28 is a narrow basket-weave coil, T-28 is a loose basket-weave coil. All coils are wound with No. 28 wire and have a minimum inductance value of 291 microhenries.

DURING the last two years much has been written about the relative merits of various designs of so-called low loss coils and about the disadvantages of the standard single layer solenoid. Every writer and manufacturer has designed at least one type of radio inductance for which he claims the lowest radio frequency resistance, distributed capacity, etc. However, due to the fact that the same claims have been made for each coil the radio public has been at a loss for information on which type is really the most satisfactory.



Winding forms for spiderweb and honeycomb coils

Some of the much desired information on coils is now available to the public for the first time. In Technologic Paper No. 298 of the United States Bureau of Standards (part of Volume No. 19), entitled "Radio-Frequency Resistance and Inductance of Coils Used in Broadcast Reception," by August Hund, electrical engineer, and H. B. De Groot, junior aid, the United States Department of Commerce releases many interesting data on various types of coils used for the reception of radio broadcasting. Tests conducted in the radio laboratory of the Bureau of Standards formed the basis of the paper, and as the data which it contains are of great value to the radio experimenter, a summary of the results of the tests is given here.

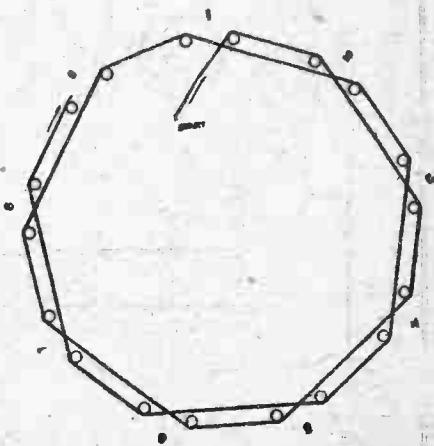
Ten types of coils, six of which will be found illustrated on page six, were compared in the tests. They were single-layer

radial basket weave on cardboard, radial basket weave on rubber, honeycomb, two-layer narrow basket weave, loose basket weave, two-layer bank wound, three-layer bank wound and four-layer bank wound. As it is known that bank-wound coils are entirely unsatisfactory they will not be fully discussed in this article. The two-layer coil, however, will be considered, as it is a typical example of poor coil construction, and it will be used to demonstrate the importance of using good coils. For the purpose of the tests several coils of each type were constructed, some with different sizes of wire and others with different insulating varnishes or binders. In each case, however, the coils were adjusted to the same self-inductance at a frequency of kc per second, namely, 291 microhenries, which is of the order of magnitude common in receiving equipment for tuning to broadcast wave lengths.

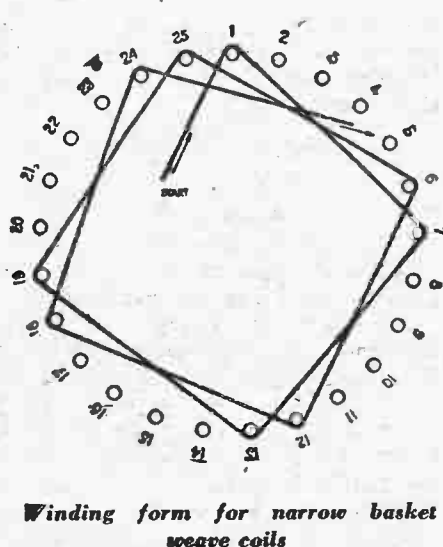
It was pointed out in the paper that the quality of a coil can be considered in terms of a number of different properties, each of which is of importance in the use of the coil. For use in the tuned circuit of a radio receiver the important characteristics of a coil are:

- (1) The apparent inductance.
- (2) The radio-frequency resistance.
- (3) The ratio of the increase of resistance over its direct current value to the direct current value.
- (4) The inductance resistance ratio.

(Continued on page six)



Winding form for loose basket weave coils



Winding form for narrow basket weave coils

## Service and Parts

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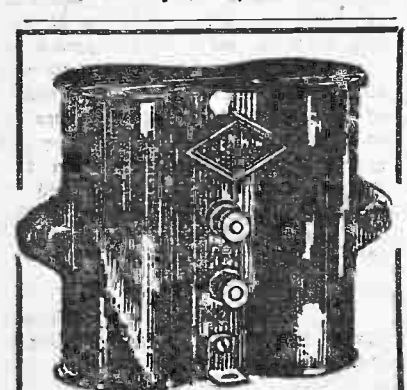
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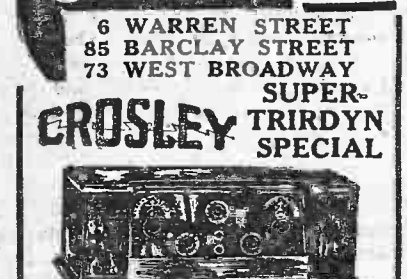
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## News and Notes of the Radio Trade

**New Address**  
The Davidson Radio Corporation, manufacturers of the Rasla Products, has moved to 134 Livingston Street, Brooklyn, N. Y.

**To Build New Factory**  
F. A. D. Andrea, Inc., manufacturers of the Fada receivers, have purchased more than an acre of ground in one of the best business sections of the Bronx, New York City, for a new plant which is to be devoted exclusively to the manufacture of radio apparatus. The new plant will be located at 138th Street and will extend from Mott Avenue to Walton Avenue. Here will be concentrated the manufacturing activities that are now being conducted in four factories located at and near the main division of the company at 1581 Jerome Avenue, New York City.

The company reports the cost of the property to be about \$250,000 and expects an outlay of \$750,000 by the time the buildings are erected. The \$150,000 laboratory of the firm, which contains some of the finest and most delicate instruments for testing purposes known to science, will be moved from its present site to the new quarters.

In the new Fada plant there will be ample space for the volume production of such sets as the Neutrolite, the Neutrola, the Neutroceiver and the various art furniture models manufactured by Andrea. By the time the plant is in operation the company will be in production on its new loudspeaker.

All the Fada sets are tuned radio frequency receivers using the neutrodyne principle.

**Sales Report**  
Dr. Gordon C. Sleeper, president of the Sleeper Radio Corporation, of Long Island City, has announced that the corporation ended 1925 with record breaking December shipments amounting to \$174,068. The total shipments for the last quarter amounted to \$457,247. This business compares with \$51,769 for December, 1924, and \$202,560 for the last quarter of that year—an increase of more than 100 per cent.

**Changes in Radio Company**  
At the annual meeting of the General Radio Company held January 12 the position of chairman of the board of directors was created to meet the growth of the company. Henry S. Shaw, treasurer of the company for the past eight years, was elected to this position. H. B. Richmond, formerly secretary and assistant treasurer, was elected to the position of treasurer. No other change was made in the officers. Melville Eastman, who has served as president for the past eleven years, will continue in that office, and E. H. Locke enters his sixth year as vice-president in charge of manufacturing.

During the past year the company completed its new factory at Cambridge, Mass., which provides 50,000 square feet of manufacturing space. The company will continue with the development and manufacture of scientific apparatus for the radio and telephone fields, and with the well known GR line of radio parts.

**Battery Eliminator Exhibit**  
Recognizing the widespread public interest in the development of practical battery eliminators during the past year, nearly a dozen prominent manufacturers are co-operating in a special exhibition and demonstration designed to show radio owners the most satisfactory and successful types of battery elimination for use with the many various types of receivers on the market to-day.

These manufacturers have secured the two stores of Haynes-Griffin, Inc., for the exhibition, starting Saturday, January 23, and continuing from 8:30 to 6 daily for the period of one week. No effort has been spared to make the exhibition the most complete of

its kind ever held in New York City. Every well known type of battery eliminator and battery substitute will be on demonstration and in actual operation on various standard radio sets during the entire period of the exhibition. Each manufacturer will have a separate booth where his product will be displayed to the public.

Manufacturers' representatives and engineers, as well as the Haynes-Griffin technical staff, will be available to answer questions and give individual problems careful attention. Complete information with data on the operating cost of various eliminators will be available.

The program for the exhibition includes a series of talks and demonstrations by men who have figured prominently in the development of battery eliminators and socket devices. Among those who will speak during the week are Harry W. Houck, development engineer of the Dubilier Condenser and Radio Corporation; Grant A. Layne, of the Mayolian Corporation; Major R. A. Clark, of the Gould Storage Battery Company, and A. J. Haynes, vice-president and engineer of the Haynes-Griffin Company.

One section of the exhibition will be devoted to the display of knock-down eliminators. Step by step construction and wiring of a practical B battery eliminator will be visualized in an exhibit showing the various stages of construction. The exhibition is open to the general public without charge.

### Alphabet Code Prevents Misunderstood Calls

(Continued from page six)

stations get around this situation in a way by announcing the name of the city in which the station is located: "Radio Paris," "Radio Madrid," and again, "Radio Geneva." But this would be a difficult thing to arrange in cities like Chicago and New York, where there are a dozen stations or more.

If it were possible for our American stations to adopt the code alphabet idea we would then hear "Watch Joy Zed" or "Watch Easy Able Fox," and then again, "King Yacht Watch" on the air, being, respectively, stations WJZ, WEA and KYW. There would be no possibilities of taking "Watch George Yacht" for anything else than WGY, while the municipal station of New York would then become known as "Watch Nan Yacht Cast." It might be a real test of the announcer's ability to twist his mouth, but then many more radio fans would rest easier for their more readily confirmed radio reception of known call letters.

**A Positive Check**  
Radio fans, especially those who want to get the very long distance stations, would thank any station manager who would be so kind as to help them check up accurately on the call letters. Evidently many announcers have never been at the receiving end, because they make no special efforts to make distinct their call letters.

Of course, it is possible to identify stations through their special broadcast features, the personality of their artists and personnel, or, again, by their slogans, woven into call letter initials. But how about making it positively impossible to mistake the letter "B," for instance, for any of the following: E, C, D, V, or even T?

### WANTED

**Radio Program Director**  
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PRECISION PRODUCTS

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100-VOLT RECHARGEABLE ALKALINE ELEMENT "B" BATTERY AND CHARGER \$12.00. Look into this ad and see for yourself if we are not giving each and every customer a square deal without a lot of "TAPES" and misrepresentation. We do not advertise that you get a 110-volt battery, when the correct rating is only 101.4 volts. The 100-volt See-Jay battery consists of 78 cells and each cell has a reading of 1.3 volts, giving a total of 101.4 volts. With the overcharge Y.T. generally reads from 110 to 115 volts. 140-volt battery (correct reading 140.4) over-charge from 150 to 165 volts. Greater volume and see for yourself if we are not giving each and every customer a square deal without a lot of "TAPES" and misrepresentation. Old types can be adapted by separators and two pounds of imported chemicals. The See-Jay units and batteries are constructed from genuine alkaline elements and connected with a non-corrosive connector (no holes in elements). Each battery guaranteed or money refunded. Completely assembled 100-volt battery and charger, with chemical, shipped dry, \$19.00; 140-volt battery and charger, \$27.00. All complete batteries put up in beautifully finished oak cabinets. Factory made Universal "See-Jay" battery charger (contains all parts), \$1.75. You can either order C. O. D. or send check or money order. If C. O. D. pay expressman upon delivery. All orders shipped by Express. Address: **SEE-JAY BATTERY COMPANY**, 915 Brook Ave., Bronx, N. Y. 10451. Station, 26 Ave. L. Phone Jerome 1739. Open until 9 o'clock evenings.

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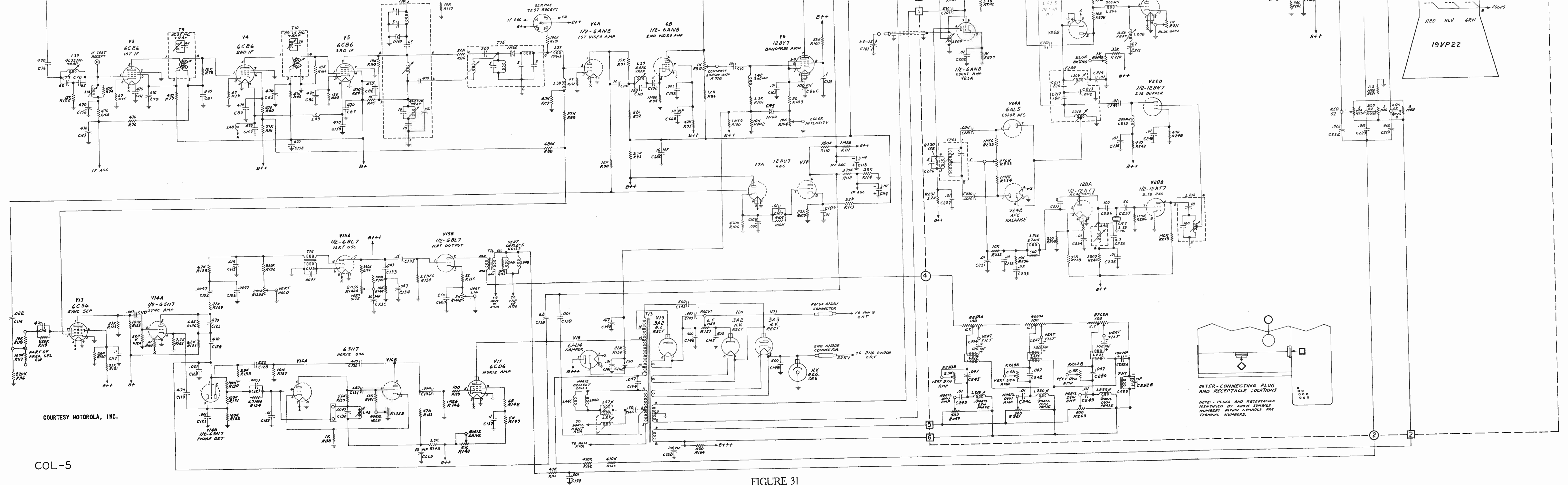
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**A AND B SOCKET POWERS**

Philco also makes rechargeable radio "A" and "B" batteries especially designed to keep all the acid inside. Charge indicators tell you when and how much to recharge. Philco also makes the famous super-powered Diamond-Grid Battery for your automobile.

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**GRID GATES**

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### Extra Size for Silent Service

THESE are not the common or garden variety of grid leak. They are not "leaks" at all, but "gates" providing measured control of the current flow.

Amsco Grid Gates are extra size, making possible accurate, unchanging, noiseless performance. Made in all standard values and many not heretofore available. Fit all mountings.

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## The Present Status of Radio Atmospheric Disturbances

Thunder Storms Have Been Known to Cause Interference in Receivers Located 1,500 Miles Away; Most Static Is Directive

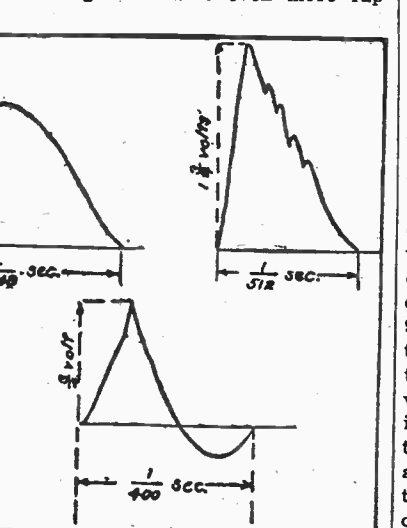
The following is a paper presented by L. W. Austin, of the United States Bureau of Standards, before the annual convention of the Institute of Radio Engineers in New York City January 19, 1926.

Our knowledge concerning the atmospheric disturbances is still very meager. The observed facts may be cataloged as follows: (1) In general, atmospheres are stronger at the longer wave lengths. (2) Except for the effects of local storms, they are nearly always stronger in the afternoon and night, while for the higher frequencies this increase in strength is confined usually to the night. (3) They are stronger in summer than in winter. (4) In the South than in the North, and (5) on the land than on the ocean. (6) A large proportion of them appear to be directive; that is, to come from definite regions, or centers, as mountain ranges, rain areas, or thunder storms. It is also reasonably certain that (7) at least most of the long-wave disturbances travel along the earth with a practically vertical wave front, like the signals; (8) that a considerable portion are oscillatory in character, though a certain portion are non-oscillatory and give rise to shock oscillations in the antenna at all wave lengths; and (9) that disturbances sometimes occur simultaneously at stations thousands of miles apart.

The origin of the ordinary rumbling disturbances (grinders) has been the subject of many conjectures. Eccles believed at one time that he had found the source of this

turbances which occurred when no flashes were apparent. This comparatively feeble effect of the flashes is difficult to understand if the current rise at the beginning of the flash is as steep as is often assumed, but would be understandable if the lightning discharge curves were of the form and duration of the atmospheric disturbance curves observed by Appleton and Watt (Figures 1 to 5). On the other hand, it is quite possible that the small deflections from the lightning flashes were due to a paralysis of the detector tube, a phenomenon which often occurs when the tube is exposed to very high electro-motive forces. It must, therefore, be concluded that the connection between lightning and atmospherics is still not clear, and valuable work can be done by any one who will watch the lightning and listen to the atmospheric crashes from thunder storms in the neighborhood.

At the London Physical Society symposium already mentioned, Professor C. T. R. Wilson discussed the probability of there being discharges of thunder clouds to the upper conducting region of the atmosphere. His calculations indicated that thunder clouds of common electric moment might very readily discharge to a conducting layer at a height of sixty to eighty kilometers, since the electric force required to produce discharge decreases even more rapidly with the height than the electric force of the thunder cloud. Discharges of this kind, probably non-luminous, may possibly furnish the explanation of the strong atmospherics heard from thunder clouds when no flashes are visible.



Mr. Watson Watt, in analyzing the records of European direction-finding stations, concluded that in only about 35 per cent of the cases could thunder storms be identified as the sources of atmospheric disturbances, though in about 75 per cent of the cases the identified sources were rain areas of some kind.

Captain Bureau, of the French Meteorological Office, has recently published papers in which he shows that many of the atmospheric disturbances in France are closely connected with the advance of meteorological cold fronts and that the atmospherics are accentuated when these air movements come in contact with mounted ranges.

For the determination of the direction from which atmospheric disturbances come, Mr. Watt has invented an automatic recording apparatus in which a radio compass coil, tuned to about 30,000 meters, is rotated slowly and continuously by clockwork, the atmospheric crashes being recorded on a drum attached to the coil.

It should be said in this connection that it has been very common in Europe to estimate the strength of atmospherics by the number of disturbances occurring in a given time. This method, of course, would hardly seem to be applicable to our Washington summer conditions, or to the conditions during the disturbance season in the tropics, where often in the afternoons and evenings the noise in the telephones form an almost continuous rumbling through which no signal can be heard unless it is strong enough to rise above the background of disturbing sounds. If, indeed, there is a physical dif-

ference between the atmospherics, crashes, grinders, etc., it is not at all certain that what is being measured in Europe by the counting method is the same thing that is being measured in America, either by direct estimates of the average disturbance strength, or by measuring the strength of signal which can be read through the disturbances.

On the Atlantic and Pacific coasts of the United States, except for occasional local thunderstorms, very little certain connection has been noticed between the direction of the atmospheric disturbances and rain areas. On the Atlantic coast the main disturbances seem to come roughly from the southwest, but it seems uncertain whether the sources are in the Allegheny Mountains or much farther removed, perhaps in Yucatan. Experiments reported by the Navy Department in New Orleans have indicated the more southerly origin.

Unfortunately, very few triangulation experiments have been made in America for fixing the exact positions of sources of atmospherics. In most cases, therefore, the direction is all that is known. Observations made at Madison, Wis., by Professor Terry, of the University of Wisconsin, covering the last two years, show conditions in the Middle West which are similar to those described by the Continental European observers; that is, there is no single prevailing direction of the atmospherics, but a more or less definite connection with thunder storms and other rain areas. This absence of any prevailing southerly source of atmospherics in the central portion of the country casts doubt on the Mexican origin of those observed in the Atlantic Coast region, since the distance from Yucatan to Madison, Wis., is about the same as from Yucatan to Washington.

On the Pacific Coast of the United States it is pretty well established that at least at San Francisco and San Diego the sources of disturbances are largely local, lying in the mountain ranges not far from the coast. These centers seem to be permanently fixed, resulting in very constant directional conditions.

It seems to be pretty well settled, in all parts of the world where observations have been made, that there is a very definite connection between the intensity of the disturbances and the position of the sun. In the Northern Hemisphere during the winter, when the sun is far in the south, the disturbances are generally moderate even as far south as Panama, within 9 degrees of the equator. But as the sun comes north in the spring there is often a rapid and, sometimes, very sudden increase in strength, and it is reported that stations close to the equator experience two disturbance maxima, corresponding to the two periods when the sun is nearly overhead.

In addition to the study of the sources of the disturbances, the question of their wave form is of much importance. Messrs. Watt and Appleton, in England, working under the Radio Research Board, have made some investigations of this problem, making use of the cathode ray oscillograph (Braun tube). In their work the atmospheric disturbance, after being received on an aperiodic antenna and amplified by an aperiodic resistance-coupled amplifier, was impressed on one pair of plates of the oscillograph, while a source of 60-cycle current was connected to the other pair of plates for the purpose of drawing out the spot of light into a line on the fluorescent screen. The resulting movement of the spot of light could not be photographed, but could be observed and sketched with some accuracy. Five typical curves are shown in the figures. Most of these appear to be aperiodic, though some are feebly oscillatory.

In Figure 3 it is seen that there are minute oscillations superposed on the main curve. It will be noted that the period of the main oscillation is, in all cases, of audio frequency; and, in some cases, of audio frequency; and, in some cases, of audio frequency; and, in some cases, of audio frequency. Mr. Watt in the symposium cited accepts this view and adds that more recent experiments in Egypt and elsewhere in the tropics show that there the fine ripple structure is much more common and of much greater amplitude than in England. Professor Appleton, on the other hand, holds that the low-frequency wave forms shown in the figures are capable of producing the observed disturbances at all wave lengths by shock excitation.

## Constructional Data on a Simple, Efficient Two-Control Six-Tube Receiver

Although a Siamese Variable Condenser Is Used the Set Is Not Difficult to Build

By ROBERT HERTZBERG

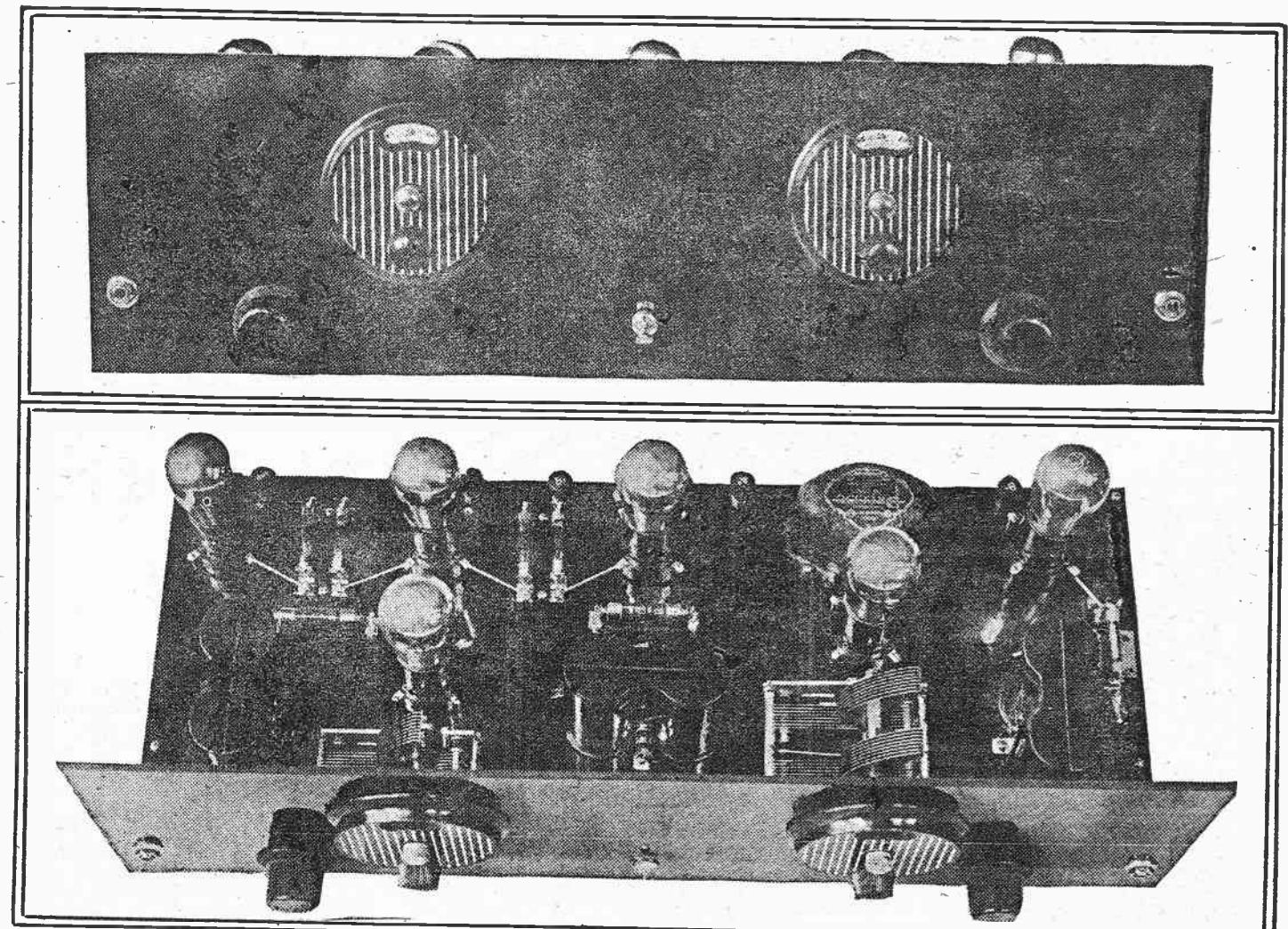
THERE is something about a two-dial radio receiver, any two-dial receiver, that endears it immediately and everlastingly to every man, woman or child who acquires one. The appeal is a definitely physical one, and has no superficial psychological aspects. The simple fact is that all human beings, circus sideshow characters excepted, are equipped with two hands; therefore, it follows quite naturally that any machine which requires manual manipulation will afford the greatest satisfaction to its operator, with the expenditure of the least physical and mental effort on the latter's part, if it has a maximum of two continuously variable controls. The logic is irrefutable.

Well, then, why not make two-dial sets instead of three-dial outfits, which keep their owners' hands in a constant state of movement between the knobs? We have some very nice double and triple variable condensers all ready for us, so all we have to do is to select a circuit and some tuning coils, choose an audio amplifier system and decide on the mechanical arrangement of the composite unit. It sounds easy and it is easy; just to prove it the writer will describe a highly effective two-dial receiver which he designed on a tablecloth at a luncheon table at noon, which was built during the afternoon, and which was supplying sweet music that same evening. The set is proving to be so gratifyingly satisfactory in every respect to the untechnical members of his family that he thinks even the most sophisticated constructor will find its description interesting.

The set is a six-tube affair, comprising two stages of tuned radio frequency amplification, detector, one stage of transformer coupled and two stages of resistance coupled audio amplification, with one of the new power tubes in the last socket to handle the strong output without distortion. This combination is by no means new, but it is indisputably a good one, for it displays the blessed characteristics of sensitiveness, selectivity, volume and clarity. The front panel is of standard and reasonable size, 7 inches by 24 inches, and the whole outfit presents a simple but strikingly attractive appearance. The striped bakelite dials in particular aid in the effect.

### Parts Required

The exact parts used were as follows: 7 by 24 inch bakelite front panel, 9 by 23 inch back panel; three Gen-Win "Lemnis-coils" (radio frequency transformers); two Bruno micrometer dials; Cutler-Hammer toggle-type battery switch; Precise 2 1/2 to 1 audio transformer; Dubilier grid condenser and leak; two No. 112 (1/2 ampere) amperites; two Daven resisto-couplers, and the following Amsco instruments: one single .00035 mfd. straight line frequency and one Siamese condenser consisting of two .00035 mfd. straight line frequency sections; one 10 and one 15 ohm rheostats; one single closed circuit (three spring) and one single open circuit (one spring) telephone



Above—Interior and exterior views of the two-control, six-tube receiver described on this page. Right—Picture showing how the radio-frequency transformers are constructed.

Editor's Note.—The various pieces of apparatus referred to in this article were actually selected by the author and employed in the construction of the receiver described. This does not imply their superiority over equally efficient standard apparatus of other manufacture, which may be substituted with discretion.

jacks; six UX-type tube receptacles; ten binding posts. Other makes of corresponding electrical and mechanical features may be employed.

As clearly shown in the accompanying photographs the panel holds the variable condensers, rheostats, battery switch and phone jacks. The condensers are mounted seven inches in from the sides of the panel and three inches down from the top. The rheostats are spaced in four inches from the sides and one and one-eighth inches up from the bottom, with the 10 ohm on the left. The switch fits evenly between the condensers and just above the bottom edge of the panel.

The three-spring jack is fastened in the right-hand corner of the panel, the other in the left corner, about an inch in. They are raised 1 1/4 inches above the bottom edge, with their frames facing upward, so that the 9 by 23 inch sub-panel rests comfortably on them and clears the edges of the two rheostats. The jack frames are heavy and act as excellent brackets. An additional little

L-shaped bracket is screwed to the front panel and subpanel, just above the battery switch, to support the center section of the subpanel. Short machine screws passed through the latter into the jacks hold the bakelite in place.

The lay-out of the parts on the sub-panel is practically self-explanatory, the photograph being very clear. One Lemnis coil is fastened next to the single condenser by means of the brackets supplied with it; a second fits between the single and the double condensers, being turned as shown; while the third fits on the right-hand side of the double condenser. One socket for the firsts R. F. tube is placed directly behind the single condenser; another behind the double instrument for the second R. F. bulb; a third in the upper right-hand section of the subpanel for the detector; the fourth, fifth and sixth along the back edge in the left-hand section.

The audio transformer occupies the space behind the second R. F. socket and next to the detector one. The resisto-

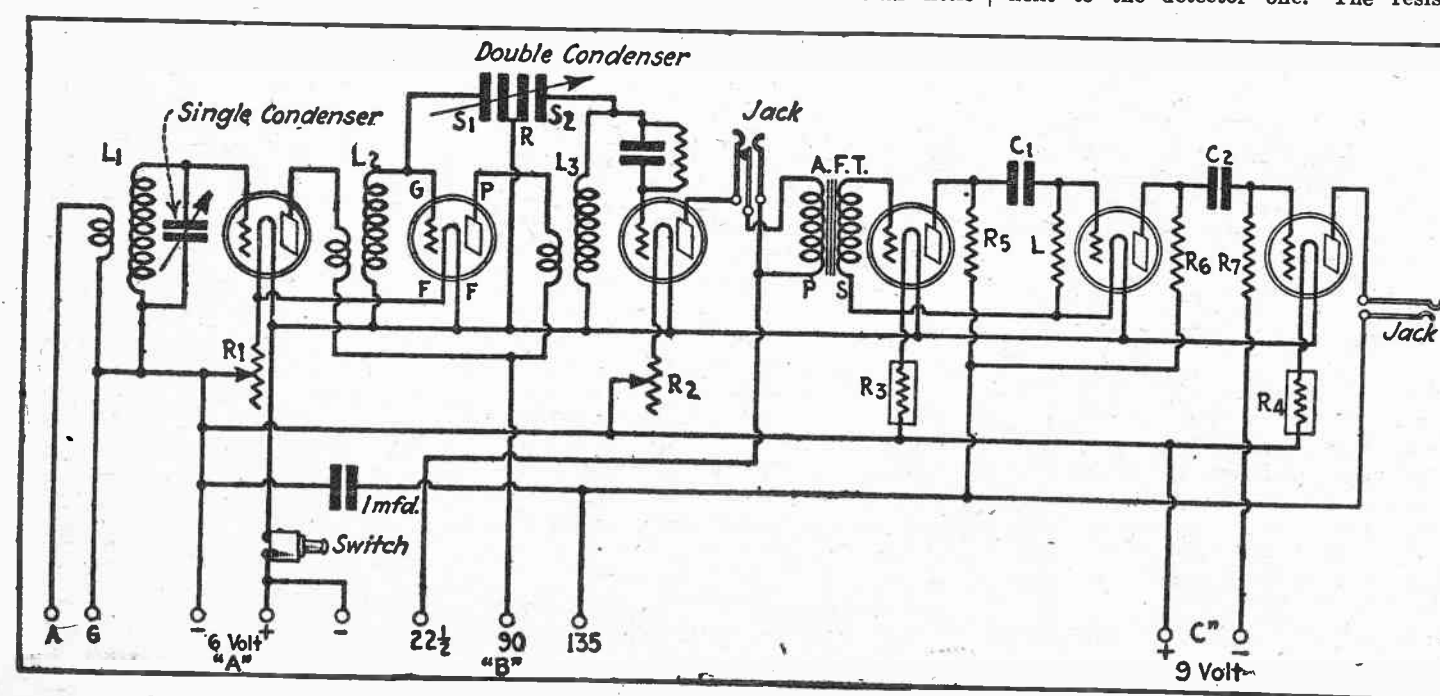
couplers fall naturally between the last three sockets. The grid condenser goes in its natural position between the third Lemnis coil and the detector receptacle. One amperite is screwed down between the center Lemnis coil and the socket to the left of the audio transformer, while the other fits in front of the left-hand resisto-coupler. The ten binding posts are distributed along the extreme back edge of the subpanel in this order from left to right: aerial and ground; C battery; 135, 90, 22 1/2, minus B battery; A battery.

The Bruno micrometer dials, just brought out, require no mounting screws, but fit simply over the protruding ends of the variable condensers. On the under side of each disk there is a little bakelite projection, which fits into a hole drilled in the panel about two inches directly above the condenser shaft openings. This holds the device firmly in place and prevents it from twisting around when the control knob is turned. The dials use a friction system of reduction drive and provide what the writer considers exceedingly smooth regulation of the variable condensers.

### Drilling the Panel

These directions are given in detail for the benefit of the inexperienced constructor. If he follows them he will not have the slightest difficulty in completing the set correctly at the first attempt.

The front panel and the subpanel sub-panel and run to their various destinations on the under side of the latter. This removal of the wires from the top surface in no way affects the electrical operation of the set, but it most decidedly does improve its appearance. In fact, all the writer's friends who saw the set comment-

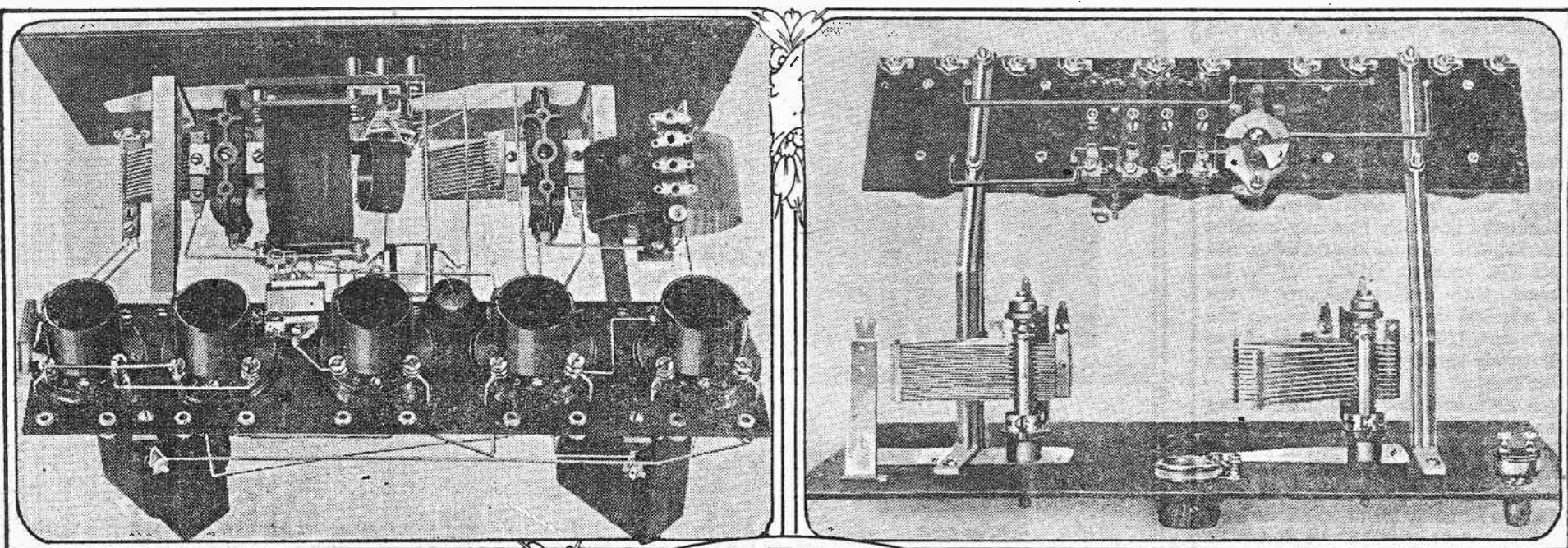




# How to Build the Improved Five-Tube Non-Radiating Roberts Receiver

This Set Employs One Stage of R. F., a Regenerative Detector and Two Radio Stages

By VEECH T. BAIRD  
The Hammarlund Manufacturing Company, Inc.



WHEN the Roberts circuit made its first appearance about a year ago it proved an instant hit with the fan who builds his own and with the professional set builder. They found that it was selective, sensitive, easy to tune, a good distance-getter and that it gave great volume without distortion. The original Roberts was a three or four tube reflex, designed primarily for economy of tubes and current. The original set, however, had its drawbacks, due to the reflex stage, which, in some cases, caused howling, was difficult to stabilize and affected the quality of reproduction.

The designer of the circuit, assisted by a number of other engineers, has spent many months in redesigning this circuit so that the reflex feature could be eliminated and the set simplified and reduced to one stage of tuned non-oscillating radio frequency, a detector and two stages of audio, which would give faithful reproduction. The obstacles were finally overcome, and the five-tube Roberts hook-up is one of the simplest, most positive and efficient circuits offered to the set builder to-day.

The writer has just completed building a number of these sets for use under very exacting conditions and believes information on the subject will be a valuable contribution to other set builders.

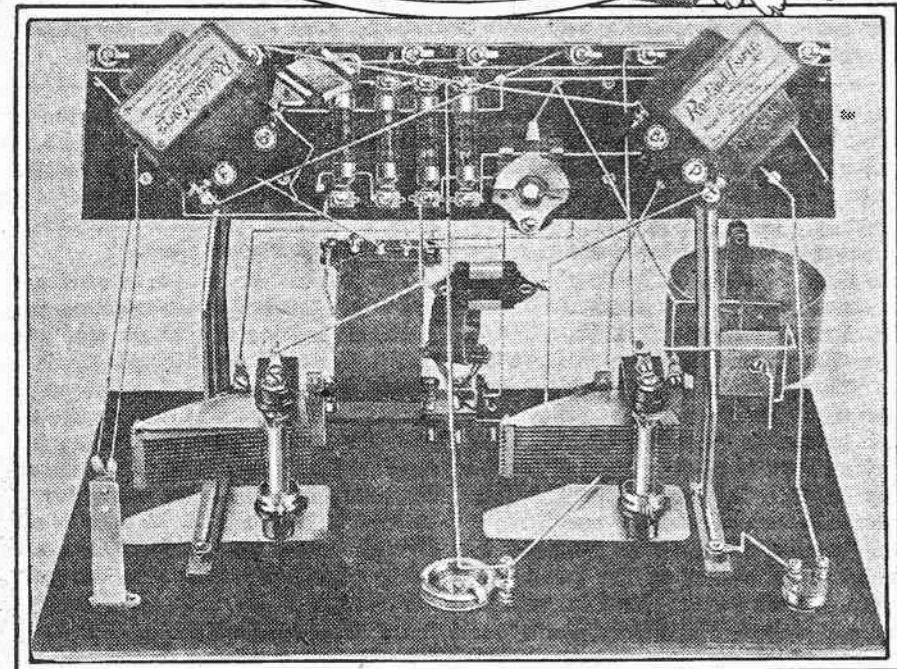
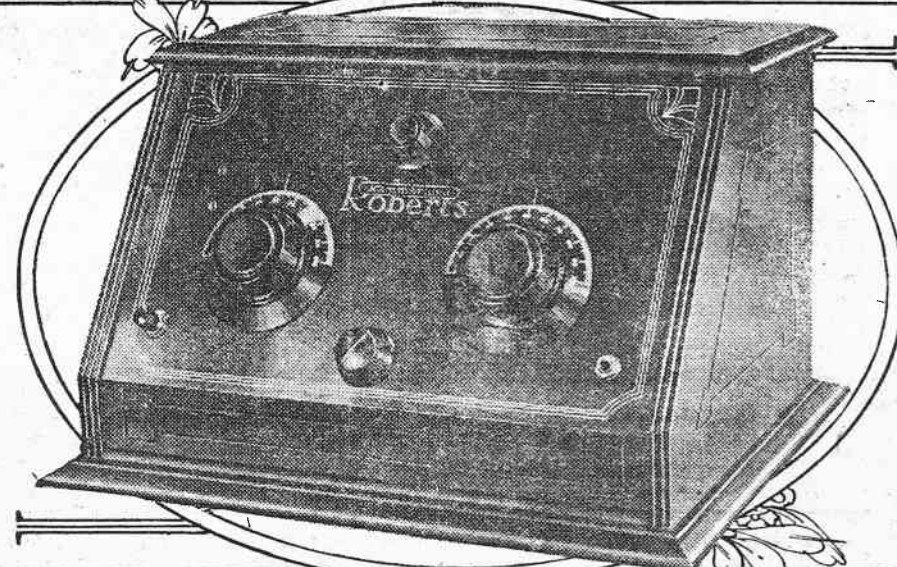
## The Circuit

The circuit employs a stage of tuned and non-oscillating or neutralized radio frequency so arranged as to give exceptionally high amplification to weak signals, a regenerative detector, a stage of straight audio amplification and a stage of audio amplification, having two tubes arranged in a parallel on a single audio transformer. This last audio stage permits the set to give exceptional volume without distortion. On local or very strong signals one of the tubes in this last stage may be removed from the socket without sacrifice of volume.

The following parts were used in the sets constructed, but others may be substituted if desired:

Two Rauland lyric transformers, two Hammarlund .0005 mfd. model C or S. L. F. condensers, one Hammarlund "midget" condenser, one set Hammarlund-Roberts coils, two Na-ald "Super De Luxe" four-inch bakelite dials, 5 Na-ald De Luxe sockets, one No-ald K3,843—1 1/4 inch dial, one Carter 25-ohm "Imp" rheostat, one Carter single control No. 101 "Holt-Tite" jack, one Carter "Imp" battery switch, one Durham resistor, four amperites No. 1-A, one Dubilier type 640-G .00025 mfd. grid condenser, one Dubilier type 640 .002 mfd. fixed condenser, one Dubilier type 640 .006 mfd. fixed condenser, five pairs Union phone tip jacks, one Hammarlund-Roberts foundation unit (contains engraved bakelite panel, drilled bakelite and subpanel, metal brackets and wire).

It was found impossible to purchase drilled and engraved panels, panel supports, etc., for this set, and by the use of these ready-made parts a great deal of

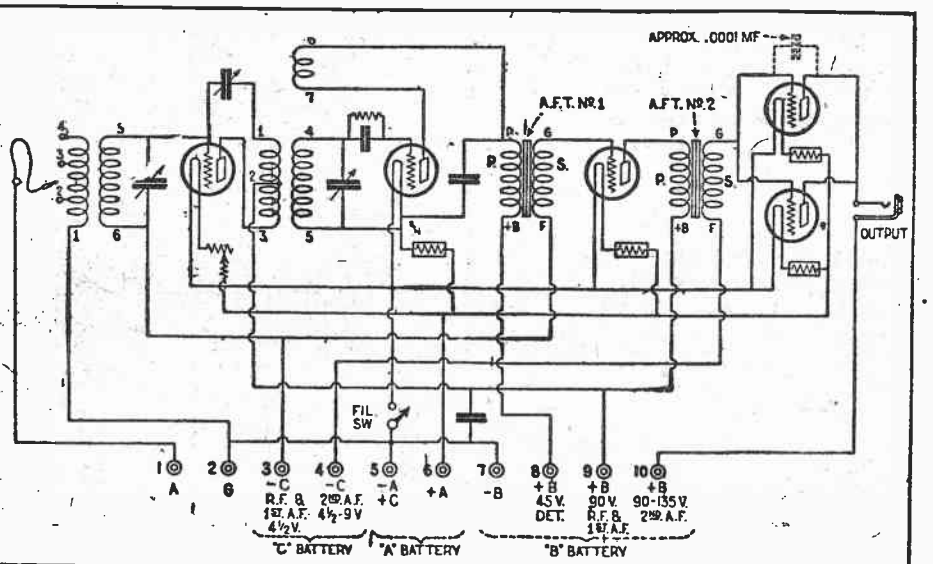


A front view of the completed receiver and three other views showing the set in several stages of construction

the handwork was eliminated and a more finished set was produced.

A glance at the diagram shows the extreme simplicity of the circuit, a large part of which may be constructed at home. For the fan who wishes to wind his own

coils the following data is given: The coil 1-6-4-5 is the antenna coupling coil and tunes the grid of the R. F. tube. The primary 1-4 is mounted inside and at one end of the secondary on a 2 1/2-inch diameter tube and contains fifteen



The wiring diagram of the circuit herein described

Editor's Note.—The various pieces of apparatus referred to in this article were actually selected by the author and employed in the construction of the receiver described. This does not imply their superiority over equally efficient standard apparatus of other manufacture which may be substituted with discretion.

turns of No. 28 D. S. C. wire, tapped at the fifth, tenth and fifteenth turn. It should be mounted with about one-eighth-inch clearance between it and the secondary. The secondary coil 5-6 contains forty-nine turns of No. 22 D. S. C. wire on a three-inch diameter tube and is tuned by a .0005 mfd. condenser. The coils here specified were spaced twenty-six turns per inch, and if any other spacing or other condensers are used allowance must be made for this. If there are more than twenty-six turns per inch the total number of turns in the coil must be reduced proportionately, or if less than twenty-six turns per inch are used the coil must be made longer. The taps on the primary coil provided for increasing or decreasing the selectivity of the R. F. stage act as a volume control, and they should be arranged with some sort of a plug arrangement, or may be carried out to a top switch on the front of the panel.

The detector tuning coil is rather difficult to construct. The primary coil No. 1-3 has twenty-eight turns of No. 28 D. S. C. wound close together in a 2 1/2-inch form, and is tapped at the fourteenth turn. This coil fits inside the secondary coil No. 4-5 with about one-eighth-inch clearance. The secondary coil has forty-nine turns of No. 24 D. S. C. wire and is three inches in diameter. The tickler coil is 1 1/2 inches in diameter and has thirty turns of No. 28 D. S. C. wire closely wound, and should be so mounted that it may rotate on an axis three-quarter-inch above the top or grid end of the secondary. The secondary of this coil as used by the writer was space wound twenty-six turns per inch and was tuned with a .0005 mfd. straight line frequency condenser, and allowances must be made in the number of turns for any change in spacing or condenser capacity.

The balancing condenser connected between the grid and plate of the R. F. tube should be a variable of the midget type, having a capacity of about twenty mfd. The grid condenser has a capacity of .00025 mfd. and was used with a grid leak of two to five megohms, depending on the tube used. The filament of the radio frequency tube is controlled by a 25-ohm rheostat, and for convenience all the other tubes were controlled with amperites. A single 10-ohm rheostat may be used to control all of them, although this makes extra and needless controls in the panel. Care should be used in selection of the audio transformers, and only those

(Continued on page seven)

## Secretary Hoover Favors Radio Bill Now Pending in Congress

Head of Department of Commerce Says It Is of Extreme Importance to the Listening Public; Radio Legislation Is Absolutely Essential

The following is the statement of Herbert Hoover, Secretary of Commerce, before the Committee on Merchant Marine and Fisheries, on Radio Bill H. R. 5589.

The Radio Bill, H. R. 5589, on which this hearing is based, is the culmination of the great amount of study and consideration which has been devoted to conditions during the past few years. The subject is of the greatest importance to our people. The radio public is now numbered in millions and embraces every class in every section. When we consider legislation, we deal with matters which profoundly and intimately affect the daily lives of these millions of American citizens. They are entitled to radio service on the highest plane that inventive genius and mechanical progress permit. The law in force in the United States to-day does not permit of the establishment of such a system. The situation and the service can be improved only by careful regulation under legislative authority. I consider it highly important to the development of this great means of public communication that legislative relief be given at the present session of Congress.

You are not entering upon the subject hastily. It has received exhaustive consideration from all angles. Your committee devoted time and study to a similar bill at the last session of Congress, and after lengthy hearings unanimously reported a draft with which in its main provisions the bill now before you is in full accord.

### Radio Conference

You have also before you the recommendations of the fourth national radio conference, which considered the subject at its meeting at Washington in November of this year. This conference was made up of some 600 representatives of all the numerous classes who are interested in radio development, including broadcast listeners. Some of the members of this committee attended its sessions and are familiar with its proceedings. The conference adopted resolutions expressing the views of its membership as to the principles upon which legislation should be based. H. R. 5589 substantially follows these recommendations.

The primary condition that makes legislation necessary is the congestion in broadcasting. This situation has existed for some time. I have hoped that natural laws, working with scientific and mechanical advance, would themselves solve the problem without legislative intervention. But such has not been the case. Inventive genius has not been able yet to furnish us with more broadcasting channels. The desire to broadcast daily becomes more widespread, the demand for licenses steadily increases, we have to-day more powerful stations in operation and more applications that cannot be granted than ever before. The law has imposed the duty of providing for every applicant so far as possible, with the result that we now have too much crowding together, unscientific geographical distribution, overlapping confusion. The interference between stations has become so great as to greatly minimize their public service.

Radio stations in the United States now fall into the following classes: Amateurs ..... 15,111 Ships ..... 1,901 Land stations ..... 558 Broadcasting ..... 536 making a total of 18,006 stations. The principal administrative problems, however, are confined to the broadcasting class.

### Broadcast Wave Band

The 536 broadcasting stations must operate on a total of 89 wave lengths. There are no more in the broadcasting band. It is simply a physical fact and many of these wave lengths are badly effective use. No two stations can operate at the same time in the same vicinity on the same wave length. There must be certain separations between them. The problem has been to try to divide 89 wave lengths among more than 500 stations, which means an average of over six stations to each wave length. Satisfactory division has been a mathematical impossibility. Only by time division, power limitation, geographical separation and other expedients has it been possible to preserve any order at all in the ether. There are some 250 applications for new stations before the department now. If they were allowed, and the number thereby increased by nearly 50 per cent, the whole broadcasting service will be affectively destroyed. From the viewpoint of public service we need fewer stations rather than

more. The present bill permits the correction of this condition.

I think, therefore, that in discussing this bill we may take three facts as settled. First, radio legislation is absolutely and immediately essential if we wish to prevent chaos in radio communications, especially broadcasting; second, the bill now proposed has already received substantial approval, and third, the principles declared in this bill have received the approval of both the radio industry and the radio public.

### Features of This Draft

The distinctive feature of this draft, which I consider of the greatest importance, are as follows: First—The bill affirmatively asserts and assumes jurisdiction in the Federal government over all phases of radio communication in so far as such communication constitutes or affects interstate or foreign commerce. I believe that Federal supremacy is absolutely essential if this system of communication is to be preserved and advanced. There can be little question of the interstate character of this service. Every word broadcast traverses state lines.

Second—It provides an administrative organization by which Federal control is to be exercised. It requires a Federal license as a prerequisite to the operation of a transmitting station. This license system has been in effect since the passage of the act of 1912, and has demonstrated its soundness in spite of other deficiencies in that law.

Third—It retains complete control in the Federal government of all channels of radio communication. It declares that there shall be no ownership or vested right in wave lengths and the period of use allowed under the license shall be limited to five years, subject to renewals. In so doing the bill carries into the law the system which now exists by department practice. While the law of 1912 contains no limitation whatever on the license period, so that long time privileges or perpetual franchises might have been granted, the department has been careful to prevent any such situation. It has limited its licenses to short periods, two years, land stations other than broadcasting one year and broadcasting ninety days. Due to this policy there is to-day complete governmental control of air channels, and the situation is clear for your action. If the bill now under consideration is passed there will not be outstanding a single broadcasting license whose expiration outlasts the effective date of the law. There is no vested right in licenses the wave lengths to-day, and under the provisions of the bill there need be no fear that vested interest will ever override governmental control.

Fourth—It recognizes that the public interest is paramount in all forms of radio activity. To that extent, the bill adopts as to this service the principles which have been found so effective in the state regulation of public utilities. It recognizes that the interest of the public as a whole supercedes the desire of any individual. This is a new and highly desirable feature in the radio law.

Fifth—It vests in the Secretary of Commerce the power to grant or refuse licenses, but this power is so limited as to obviate the possibility of its arbitrary exercise. The Secretary is required to make his determination with public benefit as the test and standard. There is a com-

## The Radio Antenna And a Few of Its Eccentricities

The part the aerial plays in the working of a radio receiver is often the subject of inquiry among set owners. As some outfits require the use of outside wires and others get along with short indoor ones and still others need no lengthy wires at all, radio fans find that their usual conception of the aerial as an exposed wire that "picks up" broadcasting of the air does not cover all receiver installations. To clear the widespread misunderstanding surrounding this subject, J. Louis Reynolds, chief engineer of the Sleeper Radio Corporation, explains the real function of the aerial and corrects a few popular myths surrounding it.

First of all, says Mr. Reynolds, a radio aerial need not be entirely exposed to the atmosphere in order to perform its duties. If, for instance, an indoor type, such as the cage-like "loop" is employed, it is not necessary that the windows of the room be kept open, contrary to the amusing belief which many people hold at one time and which many, in fact, still do hold. The radio waves transmitted by a broadcasting station radiate out into space, it seems, and are affected only by large bodies of metal. They travel practically unimpeded through inert materials like wood, brick, stone, non-reinforced cement and glass and lose little of their effectiveness in a passage through structures in which these substances predominate.

2AKH is securing exceedingly good results with a single five-watt tube operating on forty meters. He virtually has communicated with amateurs in every part of the civilized world.

Used in HAMMARLUND-ROBERTS and all other good sets

AMPERITE means "RIGHT AMPERES"

## For the TRANSATLANTIC TESTS You must use head-fones



THE only way to bring in the foreign stations during TRANSATLANTIC TEST WEEK, January 24 to 30 is with highly sensitive head fones such as FROST-FONES.

When you listen in between 11 and 12 p. m. Eastern Time, or 10 and 11 p. m. Central Time, from Sunday to Thursday you will have a better chance to hear Europe with FROST-FONES than with any others because these famous fones are designed and built so as to be especially sensitive to weak signals. Without head fones you will not have much luck in hearing the foreign programs.

## FROST-FONES

No. 174—2000 ohm, \$3.00  
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Highly sensitive to weak signals

Due to our extreme care in winding coils, lapping shells, grinding magnets and testing and measuring FROST-FONES they are about twice as sensitive as most others. We could not be more particular of FROST-FONES. Our rigid inspection guarantees the quality. See your dealer NOW for as many pairs of FROST-FONES as your family will need for TRANSATLANTIC TEST WEEK.

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The Enchantment of Distance The Joy of Clearness with FROST-FONES



## Aspiring Dramatists Attempt to Write Play for Contest

No corner of American life remains untouched by the wizardry of radio, to judge from a preliminary survey of the manuscripts received at station WJZ for the New York Edison Hour Radio Play Contest, which was announced in November and closed on January 1. More than a hundred aspiring dramatists "tuned in" on the contest, and in almost every manuscript radio figures either as hero of the play or as invaluable servant to mankind. Radio as solace to the blind, as a joy to the old folks back on the farm, as a means of keeping "flaming youth" at home and of making the maid happy on her job, not to mention it as an instrument for spreading the gospel and even for apprehending escaped convicts—these are only a few of the uses the radio dramatists have imagined for the most popular of modern miracles.

From Unadilla Falls (New York) to San Diego (California) and from Oregon to Florida, from almost every state in the country, manuscripts have been pouring into station WJZ as a result of the announcement that Arthur Williams, vice-president commercial relations, of the New York Edison Company, would give \$500 in prizes for the three best radio plays illustrating electricity's contribution to modern home life. Even from far off Turkey came a request for information concerning the play contest. One of the teachers in Robert

College, Constantinople, wanted to enter the contest.

**Practical Plots**

Many of the plots are said by the authors to be based on actual experiences in their own or neighbors' homes. In some of the plays submitted, electrical appliances—particularly the washing machine, ironer and vacuum cleaner—have been veritable good fairies who came just in the nick of time to prevent the home from going on the rocks. The radio dramatists have found the young wife and young husband alike to blame for letting home life grow irksome, the former for wearing herself out in unnecessary toil with antiquated tools, the latter for neglecting to bring into the home the same standard of efficiency and the labor-saving devices he demands in the office. As for the rural playwrights, one and all they announce that the old regime of the slaving wife is over and that from now on Hiram must wake up and electrify his home.

The changing character of radio audiences, not only in those who "listen in," but also in those who participate in radio experiments, is strikingly illustrated in the list of contestants who submitted manuscripts. It is evident that no station of American life remains unaffected by radio. College professors and simple housewives in city apartment and country farmhouse agree that modern life is unthinkable without the assistance of electricity. A doctor submits the story of how he cured a serious disease with his electric heater, and a blind woman, who is not able even to write her signature on the manuscript she dic-

tates, tells how radio brought a new lease on life to her by restoring contact with the outside world. Among other contestants are high school teachers, newspapermen, professional scenario writers and the daughter of a United States Congressman.

**Prizes to Be Announced**

The plays are now in the hands of the judges and the prize winners they select will be announced in the near future. In addition to the \$500 in gold offered, Mr. Williams will also give \$100 for any play which can be developed into a good radio drama or may be adapted for the screen. The selection and training of players to broadcast the prize winning plays from station WJZ will begin immediately after the awards have been made. The judges in the contest, which is being watched as an interesting experiment throughout the radio world, are Cosmo Hamilton, the famous English novelist and playwright; James H. McGraw, president of the McGraw-Hill Company, publishers of numerous electrical and radio magazines, and B. C. Forbes, editor of "Forbes Magazine."

## The Antenna Plan Includes Aerial and Ground Connection

The meanings of the words antenna and aerial are quite often confused when the radio fan attempts to discuss this part of the receiving circuit. When speaking of antenna it means the entire system employed for collecting the radio waves from the ether or whatever the medium of conduction the radio waves have of reaching the receiving apparatus through space. The antenna is the connecting link between the transmitting station and the receiver and includes the ground or counterpoise. Strictly speaking, the aerial is the part of the system which is suspended in the air or above the earth. A loop is not an aerial but an antenna, as it is the sole means of conducting the radio signals from space to the receiving set.

The ground of an antenna system is the connection to the earth, as the name implies.

A counterpoise is something entirely different than an aerial or ground connection, although when it is used it takes the place of the latter. Such a device is usually suspended in the air at a height of several feet and is entirely insulated from the earth. It acts as a capacity between the aerial, itself and the ground. A counterpoise is more often used for transmitting than receiving and is usually employed in the receiving circuit when it is impossible to obtain a low resistance ground connection.

**New York String Trio in Next Lewisohn Chamber Concert**

The next of the Lewisohn free chamber music concerts, to be broadcast by station WJZ at 8:30 Wednesday evening, will present the New York String Trio in a program of four selections. The trio is composed of Clarence Adler, pianist; Louis Edlin, violinist; and Cornelius Van Vliet, cellist. Dr. Henry T. Fleck is very well pleased with the manner in which the concerts are gaining the end for which they were instituted. Their prime purpose is to give to the general public the education in music necessary for real appreciation and enjoyment.

**President Coolidge to Address Washington Budget Meeting**

On Saturday evening radio listeners of WEAF and a chain of stations will have the opportunity of hearing the proceedings of the meeting of the Bureau of Budget to be held in Washington, during which President Coolidge will deliver an address. This important meeting should be of outstanding interest to all radio listeners because the subject of national budget, concerning, as it does, tax reduction and economy in the operation of government, matters to which President Coolidge has given particular concern, interest all taxpayers and citizens.

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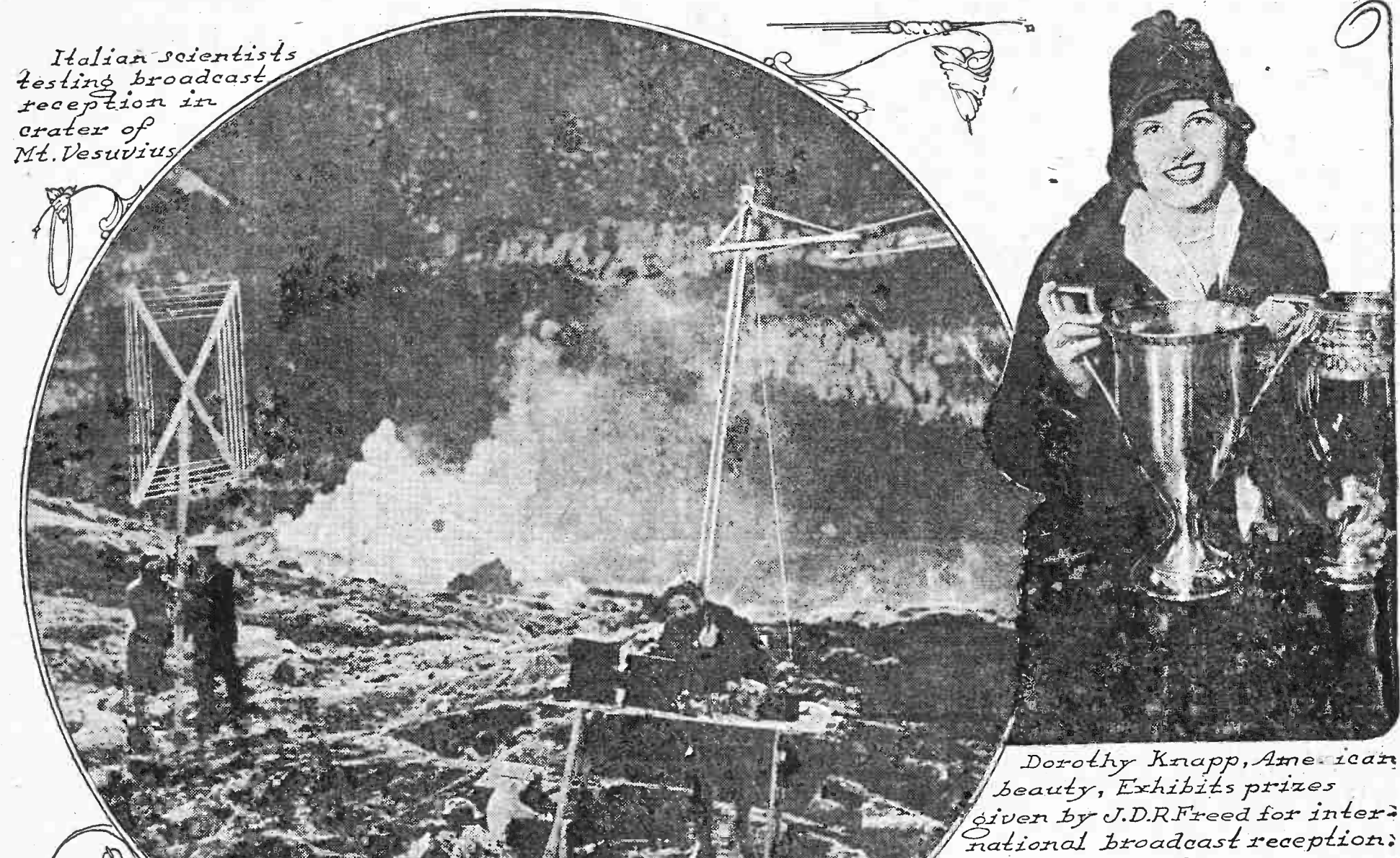
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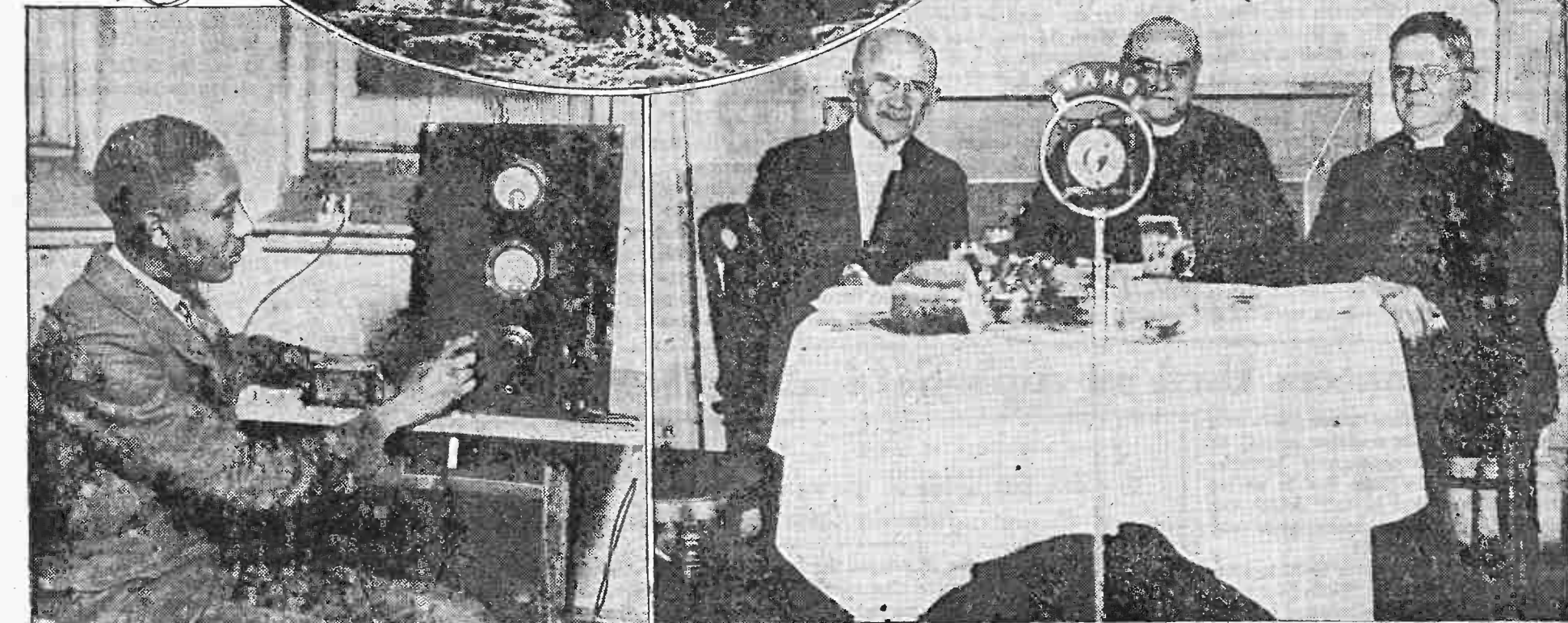
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# Up-to-the-Minute News of Radio in Pictures



Dorothy Knapp, American beauty, Exhibits prizes given by J.D.R.F. for international broadcast reception.



Rabbi Lyons, Monsignor Belford, and Dr. S. Parkes, Cadman broadcast through WAHC at banquet of Parents and Teachers Assn. of Adelphi Academy, Brooklyn.

# \$500 Cash Prize

## for a Name

### for the wonderful new Tower Diaphragm

**WE** will pay \$500 cash for a name best describing THE NEW TOWER DIAPHRAGM—THE MOST IMPORTANT DISCOVERY in OVER 50 YEARS of EXPERIMENTAL WORK in the ACOUSTICAL FIELD. Over 1000 other valuable prizes will be awarded to persons submitting names of merit.

Over fifty years ago Alexander Graham Bell invented the telephone receiver with its all-metal Diaphragm. Until now the world's greatest acoustical experts have been unable to effect any radical improvements on this type.

Now—after exhaustive experiments, Dr. Herman Fisher, the eminent Russian Scientist and acoustical expert of the Tower Co., has perfected a marvelous new Diaphragm, revolutionary in principle and unparalleled in performance.

**Dr. Fisher**

The Diaphragm consists of two different materials, one of which reproduces the upper register of the scale, and the other, the lower, making it a veritable double Diaphragm which brings out ALL the notes with an amazing mellowness of tone, increased volume and COMPLETE absence of distortion, hitherto never attained in a radio loud speaker.

The name "HIGH-LOW TONE" has been suggested but we believe some one can suggest a better one. Let us have yours—it may win the \$500 prize or one of the 1000 additional awards.

**YOUR CHANCE TO WIN AS GOOD AS ANYONE'S**

Names must be submitted on U. S. postcards with name and address of sender clearly printed—no others will be considered. Send as many names as you wish. Contest closes February 15th, so act promptly. Decision of Tower Company officials will be final. In event the winning name is suggested by more than one person, the prize will be divided equally.

PATENT PENDING

\$15.00

**Meistersinger**

In addition to the Meister-singer, the Scientific and Phonograph Attachment are equipped with the New Diaphragm.

*Scientific	\$8.50
*Little Spitfire	4.95
*Midsize Speaker	3.95
*Phonograph Attachment	3.95
*Scientific Headset	2.95
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On Sale by Reliable Dealers From Coast to Coast

**TOWER MFG. CORP., BOSTON, MASS.**

**WORLD'S GREATEST SPEAKER VALUES**



# R. F. Resistance and Inductance of Coils

(5) Percentage decrease in the ratio of inductance to resistance below the value of 1 k.

In Figures 1 to 5 inclusive the curves show the extent to which these different characteristics exist in the six coils under discussion. In these graphs curve A represents the single-layer coil, B the radial basket-weave coil, D the honeycomb coil, E the two-layer coil, F the narrow basket-weave coil and T the loose basket-weave coil. The figure 28 after the letter indicates that the coils were wound with No. 28 AWG d. c. c. wire.

In Fig. 1 the inductance in microhenries of the coils is plotted against frequency in kilocycles, and the curves indicate the apparent inductance of the coils at different frequencies. The value of the apparent inductance of a coil should not be too large at the frequency at which it is used, as a large percentage of the increase in its value is due to the distributed capacity of the coil. From the curves it is therefore easy to see that Coil T proved to be the most satisfactory and that A runs a close second. The two-layer coil is very poor, as it acts similar to a condenser in the circuit; the same also applies to the honeycomb.

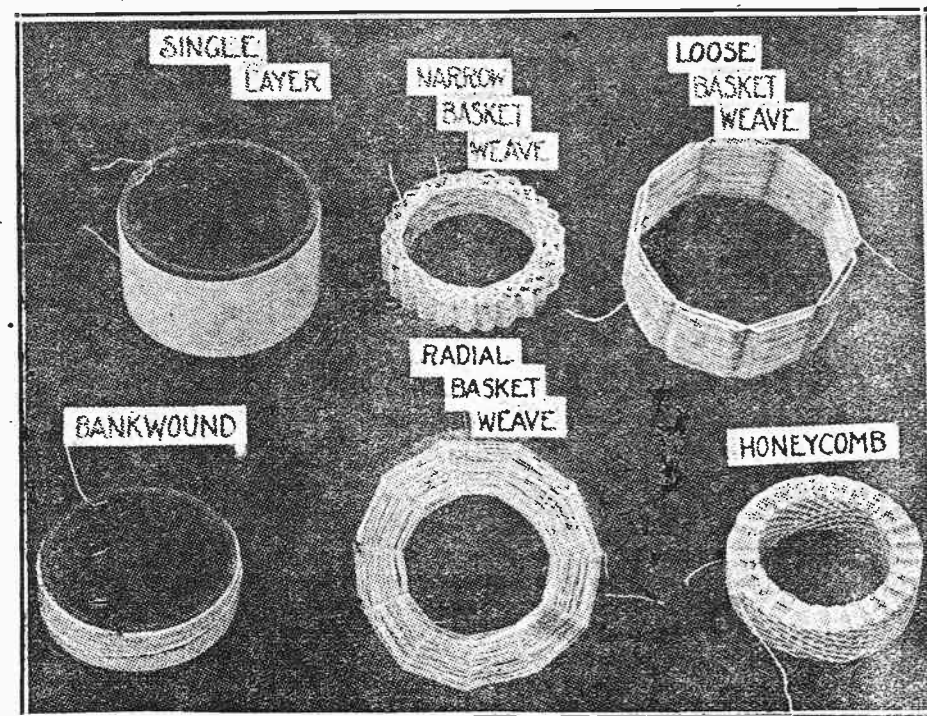
The radio-frequency resistance of the six coils at different frequencies is indicated by the curves in Fig. 2. The value of this resistance, it is hardly necessary to say, should be as low as possible over the range of frequencies on which the coil is to be used. Again it is easy to see that Coils T and A have the lowest resistance and are therefore the most satisfactory.

The ratio of the increase of resistance over its direct current to the direct current value of each of the six coils is shown by the curves in Fig. 3. As the value of this ratio should be as low as possible, again Coils T and A best answer the requirement.

The value of the ratio of inductance to resistance should not be small on the operating frequencies as compared with the value obtained at 1 kilocycle, and, therefore, the curves in Fig. 4 indicate that Coils T and A are most efficient in this respect. This ratio predetermines the sharpness of the resonance point which a circuit containing the coil will have.

Again in the last method of comparing coils, Fig. 5, where the percentage decrease in the ratio of inductance to resistance of the six coils is shown, Coils T and A remain the best, for this value should not be unreasonably large if maximum efficiency is to be had.

By examining all of the curves it can be seen that on the broadcast wave band



The six types of coils tested in the radio laboratories of the United States Bureau of Standards. From left to right (above)—Single layer solenoid, narrow basket weave coil, loose basket weave coil; (below)—Two layer bank-wound coil, radial basket weave coil, honeycomb coil.

coil T, the basket weave type, is the best in every instance, and that coil A, the single-layer coil, is the next best. Coils B, the radial basket weave, and F, the narrow basket weave, almost tie for third place, but coil B is slightly better. In every instance coil D, the honeycomb, comes in fifth, and coil E, the two-layer coil, sixth. It also will be noted that on wave lengths above and below the broadcast band coil A is either equal or slightly better than coil T.

Another interesting fact brought to light by the tests is the effect of different sizes of wire on the radio-frequency resistance of a coil. The curves in Fig. 6 show how the resistance of a single layer coil changes when different sizes of wire are used. It will be noticed that in all wave lengths between 1,500 and 200 meters No. 32-38 Litz wire has the lowest resistance. Of the solid wires No. 24 is probably the most satisfactory. These curves are very similar to those obtained with other types of coils. However, in most cases the resistance of coils wound with Litz wire increases enormously on the high frequencies in the

(Continued from page two)

Courtesy of the United States Bureau of Standards

vicinity of 1,500 kilocycles (200 meters). In the past, the chief argument against the use of Litz wire has been that its resistance increases enormously if any of the strands are broken. This statement has also been disproved by the tests. In the case of No. 32-38 Litz wire there are thirty-two strands of No. 38 AWG coil, sixth. It also will be noted that on wave lengths above and below the broadcast band coil A is either equal or slightly better than coil T.

The increase in the radio-frequency resistance of a coil caused by the use of insulating varnishes or binders was also measured by the tests. Five different types of binders were compared. They were collodion, commercial insulating varnish B, commercial insulating varnish A, shellac and paraffine. It was found that on wave lengths in the vicinity of 1,000

meters the insulating varnish did not affect the resistance of the coil, but that as the wave lengths increased the effect was much more noticeable. On 200 meters, for example, the resistance of a coil coated with paraffine increased from 14.2 ohms to 18.5 ohms. Collodion is found to be the most satisfactory binder for coils, due to the fact that it has less effect on the resistance of the coil and that it dried very much quicker. In the 14.2 ohm coil previously mentioned collodion increased the resistance to 14.4 ohms on 200 meters, commercial insulating varnish B to 15.9 ohms, commercial insulating varnish A to 16.4 ohms, shellac to 17.2 ohms and paraffine to 18.5 ohms. On wave lengths below 300 meters a material increase in resistance of coils could not be noted when insulating varnish or binders were applied. The results of the tests may be summarized as follows:

(1) The various experimentally obtained curves that appear on this page can be used as a design basis for comparing coils of the six types for any frequency in the broadcast range.

(2) The curves shown in figures 2 and 5 give the changes of resistance and of the ratio of inductance to resistance with frequency. High values of these ratios do not in all cases correspond to high values of radio-frequency resistance.

(3) The curves in figures 2 and 4 give the actual radio-frequency resistance and the ratio of inductance to resistance as various frequencies.

(4) Of all the coils measured the loose basket weave coil and the single layer coil and next to them the radial basket weave coil wound on hard rubber, have the lowest radio-frequency resistance. The two-layer coil, the four-layer bank wound coil and the honeycomb coil have the highest resistance. This, however, cannot be generalized to other frequencies. For instance, for low frequency sets (20 to 100 kilocycles) the multi-layer bank wound coil and the honeycomb coil have a relatively low resistance and are good mechanically, while other types have no special advantage.

(5) There appears to be little reduction of resistance at low frequencies in spacing turns.

(6) All insulating materials which were used as binders caused very slight increase in the resistance of coils. Collodion was the most satisfactory.

(7) The use of No. 32-38 Litz gives coils a somewhat lower resistance than coils wound with solid wire of the same cross section. If solid wire is used it is not necessary to use larger than No. 24 AWG gauge.

## 500 Radio Stations To Be Silent To-night for International Tests

Fourth Annual Radio Week Will Be Marked With Programs of Popular Flavor; Listeners in Seventeen Countries To Be at Sets

EVERY broadcasting station in Cuba, Mexico, Canada and the United States will be silent for a full hour this evening, and for four days thereafter, according to officials of the fourth annual International Radio Week Committee who have headquarters here, while three-fourths of the broadcasters in the United States, Canada, Mexico and Cuba will be silent in the same hour on the last two days of the week when broadcasters in North America conduct the first North American distance test.

The test hour will come at 11 o'clock, Eastern standard time, to-night. In the hour preceding this, broadcasters in the United States, Canada, Cuba and Mexico will transmit special programs for the benefit of radio listeners in foreign countries, extra power being used in many cases. Announcers at American stations will give their call letters in several foreign languages in this first period, 10 to 11 Eastern time, and listeners will soon grow familiar with the languages used, so that on the entry of the American silence the voices of foreign announcers who will come on the air in special programs for American fans will have a familiar ring.

### British Broadcasters To-night

In the first night of the tests, British broadcasters will fill the air with their programs, some of the foremost radio stars of England being scheduled to appear before the microphone in special programs. When it is understood, that while 11 o'clock in New York is only 8 o'clock in California, it is 4 in the following morning in London, and 5 at Berlin, American listeners will realize that the foreign stars are inconveniencing themselves considerably in an effort to entertain Yankee listeners. Monday, night stations scattered throughout Continental Europe will be heard, while on the three following nights both English and Continental stations will be on the air, with the possible addition of stations in Scandinavian countries as well. Station OAX, of Lima, Peru, South America, will also be on the air in the International Tests, transmitting at the same period as the foreign stations.

In view of the late hour at which the broadcasters will face the microphone overseas the Radio Week Committee, who have the details of the work in charge, has arranged to receive from the broadcasters overseas who are active, complete logs of their programs, showing how they differ from the advance programs. These confirmation programs, as they are styled, will be prepared and edited by the committee and published a few days after the tests are completed. They will also be available for checking claims of distant reception by local radio fans.

On Friday and Saturday the plan of broadcasting will be varied. In the customary silent hour, instead of hearing the voices of English, French, German and other foreign announcers the listeners will have an opportunity of hearing stations on the North American continent that have perhaps never come into the listener's set before because of congestion caused by local transmissions.

### Local Tests

Beginning promptly at 11 o'clock Eastern time on Friday night, January 29, all broadcasters in the United States, Cuba, Mexico and Canada will shut down as usual, except the broadcasters in the Atlantic and Eastern standard time zones. These stations will have the North American air free for them for fifteen minutes, when it is expected that many Pacific Coast listeners will log Eastern stations for the first time.

Following the first fifteen-minute period the Eastern stations will shut down with the broadcasters of the central time zone occupying the air. At promptly 11:30 Eastern time the central time stations will shut down with the mountain stations filling the air with their programs. At 11:45 Eastern time, or 8:45 Pacific time, the mountain stations will sign off and broadcasters on the Pacific Coast will take up the programs, occupying the air exclusively for the fifteen minutes remaining of the silent period.

North and South Programs On Saturday, January 30, at the customary silent hour, Canadian stations will have the air free in an all Canadian period, broadcasting from 11 to 11:15 Eastern time. The broadcasters in the northern half of the United States will come on the air, when the Canadians sign off for the rest of the silent period, while broadcasters in the southern half of the United States will occupy the air in the third quarter of the hour. At 11:45 Eastern time, all broadcasters will be silent except those in Cuba and Mexico, where special programs have been arranged for Canadian listeners.

Each night after the conclusion of the international test period broadcasters regularly scheduled to operate will come on the air in their regular programs, picking up the schedule at 12 midnight, Eastern time, or 9 p. m. Pacific Coast time. In order that there will be no confusion on the part of broadcasters and station directors, every operator in charge of a radio station participating in the American tests will set his watch each night by the Arlington time signal, which is broadcast not only from Arlington but re-broadcast by several American stations covering practically every section of the country with sufficient volume to bring in the time signal on a single tube set without difficulty.

Setting Receivers In view of the fact that many broadcasters in widely separated sections of the country operate on the same wave length, it is more than possible that fans will find it possible to test their sets in advance, counting on the wave length adjustment to bring in the desired distant station the minute the local broadcaster on the same wave has become silent.

Special programs are being arranged by the station which will participate in the North American tests, with frequent announcements of call letters and station location. In most cases the programs presented will be of the type that has in the past proved itself best for long-distance reception to the operator of the station.

International Radio Week, now in its fourth year, has the endorsement of the world, the activities in the United States being under the direction of an executive committee composed of representatives of more than fifteen radio trade bodies. Executive headquarters for the radio week committee and the international tests are maintained at 1133 Broadway, New York City.

WPG, the municipal radio station, Atlantic City, will open its test program on January 24 with a concert played on the Grand Midmer-Losh Organ, reputed to be the largest organ in the world, which is located in the Atlantic City High School.

During their test program WOC, Davenport, will broadcast announcements in fifteen foreign languages, to enable fans in foreign countries to identify the station. Included in these are Chinese, Japanese, Arabic and Marathi, the language used in Southern India.

Consuls from at least three different foreign countries, perhaps more, will appear on the program of Station WIP, Philadelphia, during the special broadcasts for overseas listeners on January 28. These addresses will be given in the native language of the consul.

It is expected that many radio listeners in South Africa will be able to hear Tuesday evening's program of WOC, Davenport, which is being rebroadcast by WGY, Schenectady, on 41.9 meters from 379.5 meters.

A. Atwater Kent will attempt to provide Europe with a demonstration of American radio development and musical achievement by broadcasting a concert of the New York Symphony Orchestra on Sunday through a chain of fifteen stations, of which WPAF is the controlling link.

Thornton Fisher, famous sport writer and radio speaker, is now in Europe as an envoy of the international radio week committee. He is calling on radio officials and promi-

Schedule to be followed by the European stations participating in the International Radio Week tests will be found on the radio pages, Section 2, of to-day's Herald Tribune

nent stations in England and Europe to arrange final details in connection with the tests.

On the fourth day of the test (Wednesday) TWV, Cincinnati, will broadcast a twenty-three hour program to celebrate its fourth anniversary.

Eric Palmer, member of the international radio week committee, expects to return to America during the tests, and plans to listen to stations on both sides of the water during the tests when his ship will be in midocean.

An address delivered by seven speakers in seven different languages will be a feature of the program to be broadcast by KFUP, St. Louis, for European reception on Sunday.

Station LOX, 375 meters, and LOW, 300 meters, Buenos Ayres, Argentina, both plan special musical programs every evening of the tests from 11 to 12 Eastern standard time.

Paul McGinnis, radio writer and editor, sailed January 20 on the steamship Leconte on an around-the-world cruise and has been appointed official observer by the international radio week committee to listen for American, European and South American broadcasting stations during the tests.

KITS, Hot Springs, Ark., will feature special French programs during the week of the test.

The Mayor of New York City, James J. Walker, will broadcast his greetings to Europe through WNYC on Monday evening.

Station WPAF will feature the grand opera "Martha" on Monday evening during the test period.

WJZ plans to provide Europe with jazz music from George Olsen's dance orchestra on Tuesday evening.

Frank Tower, of Boston, left for Bermuda on January 21, where he will remain during the International Radio Test to make observations.

On Sunday evening between 11 p. m. and midnight three English stations will broadcast for the benefit of America. They are 2LO, London, 365 meters; 6BM, Bournemouth, 368 meters; and 5XX Davenport, 1,600 meters. The stations use 3,000, 1,500 and 20,000 watts of power, respectively.

On Tuesday evening the following English stations will broadcast: 5WA, Cardiff, Wales, 353 meters, 500 watts; 1,500 watts; 2BD, Aberdeen, Scotland, 495 meters, 1,500 watts, and 5XX Davenport, 1,600 meters.

On Thursday evening it is expected 2LO, London, will broadcast.

It has been announced that the programs from Davenport will feature cornet solos and cornet accompaniments as this instrument is known to carry excellently in radio.

The international test program from the Grebe station will be given from WBOQ on Monday evening. The Bel Canto Mixed Quartet will sing at intervals.

Mr. L. A. Nixon, secretary of the International Radio Week Committee, has established his headquarters at the Hotel McAlpin. Communications relating to the tests may be sent to him at that address.

### Goodrich Silvertown Cord Orchestra Under Jos. Knecht

The Goodrich Silvertown Cord Orchestra, which is heard on an unusual hour's program of dance music each Thursday evening by the radio fans of WPAF, WEAR, WEEI, WGR, WJW, WFI, WTAC, WOC, WCCO, KSD, WCAE, WJAR, WADC, WSAI and WLBI from 10 to 11 o'clock, renders its selections before WPAF's microphone under the musical direction of Joseph Knecht, who is well known to the radio audiences through his serving as director of music at the famous Waldorf-Astoria Hotel. Mr. Knecht is the organizer and leader of the Silvertown Cord Orchestra and has lent his wide knowledge of the best music to the development of this popular dance organization.

## European Reception Should Not Be Difficult With a Good Set

Radiation Interference Will Be Chief Drawback to Satisfactory Results; Regenerative Receivers Are the Worst Offenders

THIS, as every ardent radio fan knows, is International Radio Week, during which, it is hoped, many foreign broadcasting stations will be heard in this country. A great deal of care has been exercised by members of the committee to organize a broadcasting schedule and arrange for American stations to "shut down" in order to facilitate reception.

During the last few years many listeners have reported transcontinental reception. This, in the writer's opinion, is a far more difficult feat to accomplish than the reception of European broadcasters. It is a well-established fact that reception over land is far more difficult than over water. This is true because on the water there are not as many barriers to retard the passage of radio waves. For instance, the radio wave coming from a station on the Pacific Coast to New York has the Rocky Mountains to transverse. These mountains, which are the highest in the United States, tend to shield and reflect the radio waves. Then, too, there are a number of large cities located in the Middle West with their steel frame buildings which tend to absorb the radio signals.

On the other hand the radio wave that passes over a water route has practically no obstacles to overcome, and therefore reception of European broadcasting stations ought not to be difficult. Last year's tests were fairly successful. Many fans located along the Atlantic seaboard reported receiving English, French and Spanish stations. This year it is hoped the tests will be even more successful. Listeners are better equipped, as a large majority of them now boast of a "five-tube" radio frequency receiver. With a set of this type 3,000 miles over water should be easy, providing the proper conditions prevail. Advanced weather forecasts show that the atmospheric conditions will probably be of the best for radio reception during the week of the tests.

One problem which still exists, however, and was very much in prominence last year, is interference caused by radiating receivers. This type of set caused considerable interference during the reception of European broadcasters last year. A number of listeners reported that they were on the verge of hearing the call-letters of some station just barely audible, when a "blooper" swished by the wave length and spoiled reception. Other fans reported hearing carrier waves of stations, rather than the programs they did, and tuned around for several minutes trying to hear a voice, only to find out later that it was some other listener with a radiating receiver.

The owner of the "blooping" radio receiver, little realizes that he is the possessor of a miniature transmitting set, and that it is capable of transmitting over a distance of five or six miles. As a matter of fact, licensed amateurs have been able to communicate with other amateurs by inserting a telegraph key in the plate circuit of their receiver. Other amateurs have been able to take an ordinary receiving vacuum tube, apply several hundred volts to the plate and connect it in a transmitting circuit—which is similar to the ordinary regenerative receiver—and communicate with stations several thousand miles distant.

Of the regenerative circuits the worst offender is without a doubt the "single circuit." This type of receiver is slowly but surely becoming extinct, but there are a large number still in existence owned by fans ignorant of their radiating characteristics. The single circuit type of receiver is directly coupled to the antenna circuit. This means that the oscillatory part of the circuit has direct contact with the aerial, which is the ideal condition for transmitting. In addition to the fact that this type of set is an excellent radiator, it is also true that it is very poor for the reception of broadcast signals because of its natural tendency to be non-selective.

Another type of regenerative receiver which radiates an interfering wave is the well known three-circuit tuner. However, when a receiver of this type is in the hands of a good operator it will not cause a great deal of interference to other listeners. It is inductively coupled to the antenna and is called the three-circuit tuner because of its three circuits, namely, antenna circuit, grid circuit and plate circuit.

To prevent a receiver of this type from radiating adjust the coupling between the antenna and the secondary as loose as possible. By loose coupling is meant the primary coil of the coupler should be placed as far from the secondary coil as possible. Then, if the operator controls the plate coil or "tickle" correctly interference will be reduced to a minimum.

In the first place, the detector tube should never be allowed to "spill over," that is, break into audible oscillations. When tuning in a station with a regenerative receiver the "beat note" method should never be used. When tuning in this manner, the receiver is allowed to oscillate and the operator adjusts the wave length control of the set till he hears the carrier wave of the station he desires. This means the set is in the oscillating state during the entire time the set is in operation. Instead the operator of this type of receiver should tune without allowing his receiver to oscillate, and when the desired station is heard the regeneration control may be advanced to a point where the loudest signal is heard without any tendency on the part of the set to oscillate. It must be remembered that with a set of this type, if it is allowed to oscillate the quality of reception is extremely poor.

Most types of radio frequency receivers will not cause interference. However, one must not gain the opinion that radio frequency receivers do not oscillate, because they do—some types more than others. The type which uses a potentiometer to control the feed-back is an excellent radiator. However, if properly handled it will cause no interference whatsoever. The neutralized type of radio frequency receiver is not so apt to radiate, because it is neutralized to prevent oscillations of any kind in the radio frequency and detector circuits. All radio frequency receivers have some device for stabilizing the circuit. If not properly adjusted, it will cause interference. Therefore, owners of this type of receivers should examine them before the tests, to determine whether or not they radiate. All in all, though, little interference is caused by such receivers.

Another type of radio receiver which seems to be growing popular and is capable of being an excellent radiator is the super-heterodyne. This type of set should never be used with an outdoor antenna, as it is apt to cause serious interference. It has what is termed an "oscillator," which is nothing more than a miniature transmitting circuit. However, if this type of set is used with a loop antenna its ability to radiate will be greatly reduced.

The purpose of this article, as has been implied, is to show that any type of receiver, if properly operated, will not cause interference to other listeners.

During the tests which take place this week there is no reason why European broadcasting stations, as well as those in South America and other distant points, cannot be heard. The fan who lives in the Middle Western states will have just as much chance of hearing these stations as those located along the Atlantic seaboard.

### S. S. Paris Orchestra in Special Program Through WOR Wed.

At 9:30 on Wednesday night, an important program in the International Test Week will be broadcast by WOR when the orchestra of the S. S. Paris, of the French Line, plays in the salon of the vessel docked at Pier 57, North River, New York. Officials of WOR and the French Line have made elaborate plans to present a program interesting to both American and French radio fans, and believe that through such programs a greater feeling of goodwill can be established between the French and the American public.

## If Announcers Used an Alphabet Code Calls Would Not Be Misunderstood

BROADCAST fans whose radio sets and ears were sensitive enough to "catch" the mysterious long-distance sounds of the battle fleet in winter maneuvers have had a thrill which the runner after highbrow opera music and common jazz have missed.

It is indeed a mysterious thrill to hear such a message as this: "Hello Cast Oboe Eight; Watch King Five calling. Answer, please!" And the comeback: "This is Cast Oboe Eight answering Watch King Five. What is your QRA? Answer, please!" And so on.

But it gets far more thrilling when quick, flash-like phrases and snapping sentences: "Dog-Abie-Easy-George!" "King-Item-Nan-Boy!" "Squadron M-Pup-Unit-Love . . . Squadron O-Quack-Tare-Vice . . . King!" One with imagination can well understand what is taking place, especially if he has been at sea on one of Uncle Sam's fleet destroyers or massive battleships.

### The Mystery of the Code

Those spoken signals are nothing more than code groups by means of which the evolutions of the squadrons are directed. Radio adapts itself particularly to this work because it is swift, sure and efficient. It beats the flag and halyard signals every time, and isn't in the race for visibility.

The Navy Radio Service is justly proud of its radio system. During the war it developed an alphabet code which was to be used for the new radio-telephone apparatus installed on some of the finest units of the navy. This was long before broadcasting.

Even at that time the problem of pronunciation was a big one, specially for a service with the military significance of

### Are You Able to Recognize These Famous Calls in Their New Dress?

"This is Station Watch-Joy-Zed broadcasting. You have just heard a number given by the Philharmonic Quartet." . . . Or it may be "Station King-Dog-King-Abie on one of its international tests, and then W-Get-Yaw will probably fill your room with voices of a radio playlet.

There will be no mistake in your identification of the call letters. Those stations will be using one or the other of these codes to make it easy for you to tell the one you have at the time: Able, Boy, Cast, Dog, Easy, Fox, George, Have, Item, Joy, King, Love, Mike, Nan, Oboe, Pup, Quack, Rush, Sail, Tare, Unit, Vice, Watch, X-Ray, Yacht, Zed.

Or, as the English would have it, Ac, Beer, Ced, Don, E, F, Get, Ash, I, J, Kur, L, Emma, N, O, Pip, Q, R, Esses, Tot, Up, Vic, W, X, Yaw, Zig.

radio. Every navy man will remember the Able, Boy, Cast, Dog Easy lessons which attempted to fix in his memory the whole new alphabet for use in all of the signalling work.

It was made up of words of one or two syllables, easy to pronounce, and still easier not to confuse. Each one had a distinct sound, and such letters as "e," which has a similar sound to "p" and "d" cannot be taken for one another with this system. The letter "E" is "Easy" in navy code; "P" becomes "Pup" and "D" is "Dog."

### Another Code

The navy of H. M. the King of England had also adopted a system of code alphabet which is still more mystifying than the American one.

It is indeed disconcerting to hear such talk as this while listening to some English broadcasting: "Hullo, Croydon Pip,

Sugar, Orange calling. Switching on and over! Croydon, of course, is the great aviation field near London, and this is an airplane's signals.

This talk is going on at about 900 meters wave lengths, and consequently does not interfere with the usual broadcasting. Once in awhile one will hear an airship asking for a position, and the signals will sound more comprehensible: "Hullo, Croydon! Hullo, Croydon; Imperial Beer Ink speaking! Please give me position!"

It should be explained that the Imperial-Beer-Ink appellation refers to a ship of the Imperial Airways, the call letters of identification being "B.I." French ships are denoted by the make of the machine, such as "Bleriot," while the ships of the Dutch Company are identified by the "KLM" group of letters.

Only occasionally does the airship send out a call for help. And the radio fan

would hardly recognize it as such. "Mayday Mayday Mayday. Imperial Ash Emma. Broken propeller six miles east of Dover."

The American way would be a little more humorous, for the radio listener would hear the following register at his receiving station: "Sail Oboe Sail. Sail Oboe Sail! Engine trouble developing. Sail Oboe Sail!"

However, air "S O S" signals are very rarely recorded and are used only in cases of extreme necessity. In most cases the ships "make port" at the nearest air field without further difficulty.

### Messages Foolproof

So proficient have the operators become in the use of these alphabet signals that they use them with great ease. They make the dangerous business of handling messages absolutely foolproof, and give the message itself a flavor it would be lacking if transmitted in the old flat code-letter style.

It would be interesting if our American broadcasting stations took to the fad of using these special code alphabet letters to denote their own call letter signals.

It is a fact that many broadcast listeners are confused by the similarity of sound between not a few letters of the alphabet. When doing long-distance receiving this deficiency of our tongue is specially to be regretted by the die-hard fan—he who stays up the night to hear some elusive station.

In fact, such call letters as WGY, KDKA, WPAF and KSD have been understood by American as well as foreign listeners to be variously, "WCY," "KTKA," "WCAF" and "KST." At least European

(Continued on page fifteen)











## Government Radio Officials Pleased With Kent Program

Gratification over the announcement by A. Atwater Kent, radio manufacturer of Philadelphia, that the world's leading grand opera soloists and concert artists will be heard over the air in a series of Sunday evening concerts this winter is expressed by government officials who are fostering the development of radio broadcasting.

The concerts, which will be broadcast to millions of listeners through station WEA, New York, and other stations with which it is connected, are strongly in accord with Secretary Hoover's appeal for better radio programs, it was said at the Department of Commerce in Washington.

The department has given much thought to the improvement of programs that go out on the air. Secretary Hoover is said to feel that in view of the millions of individuals it reaches, radio should not be regarded simply as a luxury and something to play with, but that it should render a distinct public service in the character of programs it carries into the home, and that the influence should be uplifting. The contribution by Mr. Kent of the services of artists of the first degree to radio, it is felt in Washington as well as in other cities, is a big step toward raising the standard of radio programs. Expressions of approval are heard in many quarters that influence different phases of our national life.

**Of Educational Value**  
Dr. John J. Tigert, United States Commissioner of Education, expressed the belief that the bringing of the best class of music into homes, which the series will do, would be of great educational value to radio audiences. He said:

"The benefits of hearing the best music are so great that I have always favored making it available to the greatest number of persons possible. Arrangement of this series marks the attainment of an important milestone in this direction, because it will make a vastly greater number of Americans acquainted with the best music and the best musicians."

"Americans recently have taken an increased interest in music, as is exemplified by their support of many worthy bands and the organization of community opera companies. I believe the broadcasting of radio concerts by internationally-noted artists will stimulate that interest, and do much to increase America's contribution to the sphere of music."

Speaking for the homes represented in the National Congress of Parents and Teachers, Mrs. Arthur C. Watkins, of Washington, D. C., executive secretary of that organization, said:

"By carrying the best class of music into homes, radio will enable thousands of persons, who otherwise might scarcely ever hear the great concert artists, to know and appreciate their voices and talent. This will add immeasurably in the forming of musical ideas, especially by the young."

"In my own home we are especially glad to hear that grand opera artists

will be on the air Sunday evenings."

**Means Much to Farmers**

Dr. J. C. Gilbert, of the Bureau of Agricultural Economics of the Department of Agriculture in Washington, said he thought the new program would probably mean more to the farmer than to the city man. Through the county agents of the Department of Agriculture Dr. Gilbert has made a survey of radio on the farm and he knows the farmer's attitude.

"The new program will appeal to the farmers," said Dr. Gilbert. "The farmer is one of us. He has his library, his radio and his phonograph, and he has the best records made by the opera stars. It must be remembered that we have had agricultural colleges for many years and that there are a good many thousand college men on farms."

"Accordingly you will find the farmer just about as appreciative of the saner and better kinds of music as anybody else. In fact, he is not so radical in his taste and his isolation makes him more appreciative of the better and finer things of life. He has not been snubbed and is perhaps not so biased and not so bored with a continuation of that sort of thing."

## Plans for Next Year's Radio Show

J. Clayton Irwin, general manager for Radio World's Fair, has just announced the Third Radio World's Fair will be held at the new Madison Square Garden, Eighth Avenue at Forty-ninth and Fiftieth streets, New York City, September 13 to 20, 1926.

### Jeanne Laval, Contralto, On WEA's Saturday Program

Jeanne Laval, concert contralto, who has been engaged to sing in "Elijah" with the New York Oratorio Society next February, will be a soloist on the program of WEA on Saturday at 7:15 p. m.

Miss Laval's contralto voice has an upper register of almost true soprano quality and much beauty. Although she is able to sing in four languages, on this occasion she will confine herself to selections in English: "The Three Cavaliers," "The Greatest Miracle of All," "Rose in the Bud" and "A Feast of Lanterns."

## Short Wave Signals of KDKA Reported Heard in Yokohama

Asia, the last continent to hear Westinghouse station KDKA's international short wave relay system, has reported reception of the station's program.

A program relayed by the station to the American fleet cruising in Pacific waters has been picked up in Yokohama.

Europe, South America, Australia and Africa have successively reported reception of the station's program relayed by the short wave and have been hearing these programs regularly for months. Asia, because of the lack of radio development in that part of the world, previously had not reported hearing the station's short wave transmissions.

Chief radio officer Gostley of the U. S. S. Chaumont heard KDKA while his ship was lying in Yokohama harbor. The program was brought in at good strength.

This program was put on the air at 5:30 a. m. at KDKA and was heard at Yokohama at 6:30 p. m., due to the difference in time. Captain Oliver, U. S. N., is commander of the Chaumont.

Because of the greater carrying

power of the short radio waves these have been used by the station for relaying programs over long distances to countries abroad, where the transmissions are received by the local stations and re-broadcast. Arrangements are being made for having the Japanese station re-broadcast programs relayed on the short wave by KDKA.

## "Eveready Hour" in Program Of Familiar Numbers

On Tuesday at 9 p. m. the "Eveready Hour" will be made up of hits of former days. The male and mixed quartets and orchestra will revive many numbers familiar to those of the older generation but at the same time beautiful to all. WEEL, WFI, WCAE, WGR, WWJ, WOC, WJAR, WSAI, WCCO and WCTS will be linked with WEA for broadcast the program from the WEA studio in New York.

## Avoid Kinks in Aerial Wires

When laying out wires for the aerial take care that all kinks and twists are avoided, and if formed they should be straightened out carefully in order not to weaken the wires.

# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

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SECTION SIX

SUNDAY, OCTOBER 4, 1925

16 PAGES

## Bob, the Boy Radio Fiend, Lays a Ghost

He Accepts Yaller's Dare, Sleeps in the Haunted House, Catches a Fugitive From Justice, Wins Yaller's Set and Receives a Reward—All in One Night

By H. L. VAN DEUSEN



Sept. 23.—The newspapers called me Radio Bob, the Boy Detective, and all the fellows at school is jellies because I laid the ghost of the haunted house.

—Extract from Bob's diary.

EVER since the night we had the radio entertainment at School No. 4 in Ponckhockie, Yaller Selgood, president of the School Radio Club, has had it in for me on account of what happened then as some of you folks may recollect. All of which leads up to the haunted house and the weird sounds that were heard by those who had to pass it late at night, and believe me even the cop on that beat always went by the haunted house on the other side of the street.

The other day at school me and Billy Rich were kidding Yaller for getting scared the night of the Radio Club meeting and he said he wasn't any more scared than us and anyway he was a good deal braver than us for his Dad used to be a policeman before he retired on a pension and opened a candy store.

"Huh?" says I. "Just because your Dad was a cop don't say you are a hero."

"Is that so?" says he. "Well I bet I am braver than you are."

"What'll you bet?" says I.

"Your old radio set against my new five-tube set," says he.

"That's a bet," says I, picking him up quick. Then I says, "How are we going to prove who is the braver, me or you?"

Well Yaller kinder scratched his head for a minute and then he says: "I bet

"I thought it was Yaller and made a grab for him."

you are afraid to spend the night at the old haunted house alone with me."

**To Decide a Bet**

To tell the truth I was kinder flabbergasted for I didn't dream that Yaller would have the guts to suggest anything like that, but I wasn't going to let him see I was afraid, and I says, nonchalant like, "Suits me; when do we spend the night there?"

"Friday night," says Yaller.

"It's okay by me," says I, "and where will I meet you?"

"At the haunted house at 8 o'clock that night," replies Yaller, and he walked away.

"By golly!" observed Billy Rich. "Who'd a thought Yaller had the nerve to even suggest such a stunt?"

"Oh, I don't know," says I careless like. "I don't believe the old house is haunted anyway."

"It ain't, ain't it?" retorts Billy. "I'll say it is, for I know a feller whose family moved in and only stayed one day, moving out next morning. I was talking with him and he said a family uster live there that had a colored man working for them and one day the family went away leaving the colored man and their three-year-old daughter home."

"The colored man went crazy or something and taking an axe he cut off the girl's head and then chopped off his own. Ever since then you can see him at midnight parading through the house carrying the kid's head and his own in his

arms. I never seen him, but this feller I am telling you of did and you can bet they moved right out the next day and no one has ever lived in there since."

I wasn't right anxious to meet a headless black man walking at midnight, I am free to confess, but I wasn't going to let no Yaller Selgood prove braver than me even if his Dad uster be a policeman, and I told Billy as much.

"Well, it's your funeral, not mine," says he as we walked home.

As we were passing the newspaper office we saw a big crowd around the bulletin board and we stopped, too. There is a notice reading how the county was offering a reward of \$500 for the apprehension of one "Louie the Blood" also known as the "Professor," who was being held on a murder charge for the grand jury and had made his escape from the county jail a couple of weeks back.

Among other things it stated that the "Professor" was a radio bug.

"Gee!" says I to Billy, "that \$500 looks good. We could get a jimicky radio equipment with that much money."

"You know the slogan of the Northwest Mounted," says Billy grinning. "It's 'Get your man.'"

Well things moved along kinder quiet like until the fateful Friday. I was rather hoping that Yaller would back out at the last minute, but he was chipper than ever when I met him and he asked me what doctor he should call in case I fainted from fright or something.

"You'd better get your heart examined," snapped I, "to see if it is strong enough to stand a shock. I wouldn't want to have to send flowers to your house."

**A Little Shaky, but Game**

While I spoke up brisk like still I was kinder shaky at the knees, but I wasn't going to let him know it, not by a jugful. "Better bring along a blanket," advised Yaller, "in case you ain't too scared to sleep in the haunted house."

"That ain't a bad idea at that," says I, forcing a grin, and then I left him, saying I would be on hand prompt at 8 that night.

At supper I told Dad and Ma that I had been invited to spend the night to Billy's house and they didn't raise any objection, 'cept Dad said he hoped I wasn't up to any godsdarned foolishness.

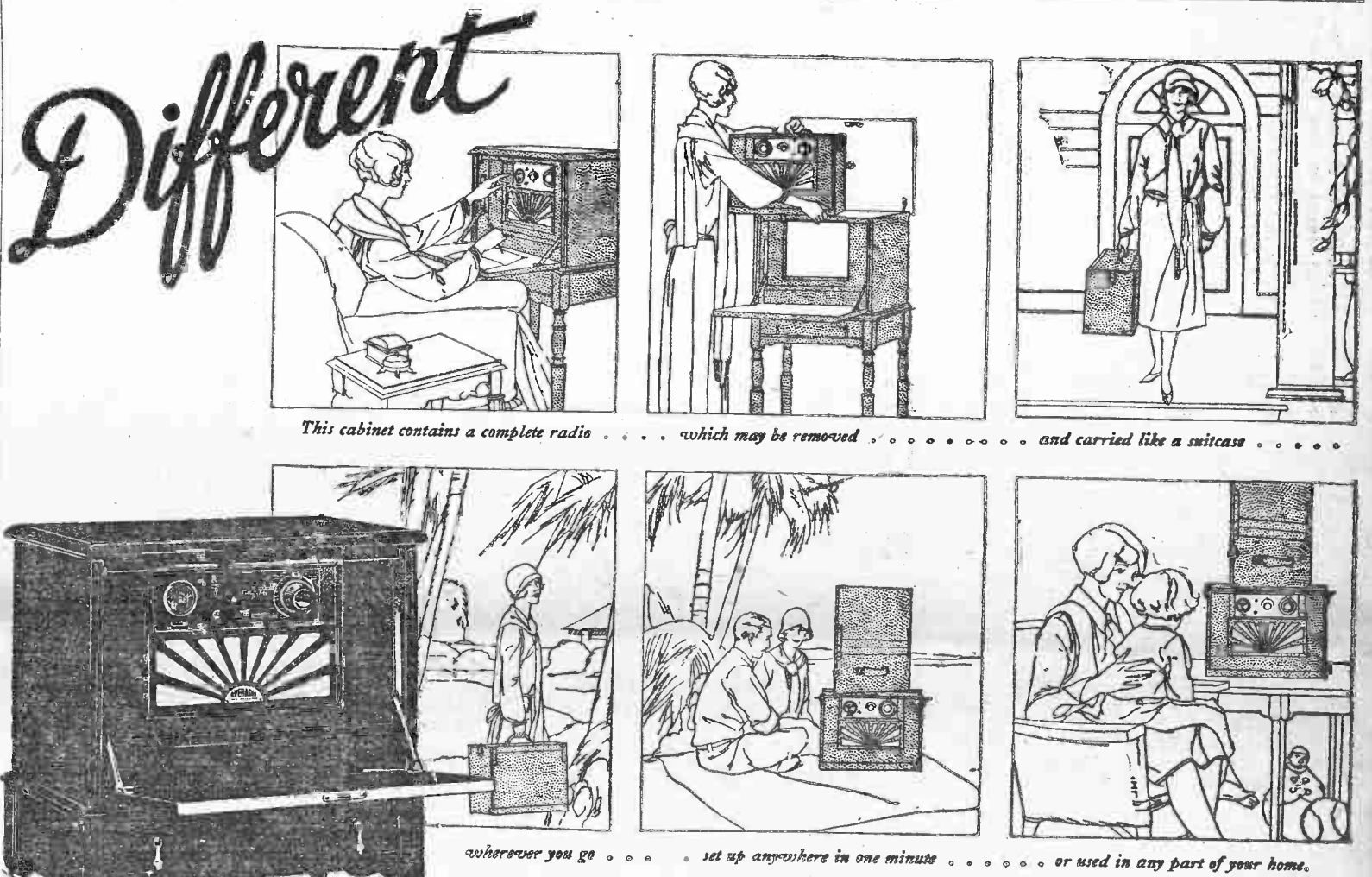
I left the house about 7:30 with a blanket rolled up under my arm and walked over to the haunted house.

Up to the last minute I was hoping that Yaller would be only bluffing, but he was there ahead of me and I knew I had to go through with it for I wasn't going to let no Yaller Selgood make me back water.

We had no trouble getting in the haunted house through a broken cellar window. It was still daylight and we didn't need to light the candle I had brought to find our way about. I suggested we spend the night in the living room.

"That's where the colored man cut off

(Continued on page four)



This cabinet contains a complete radio . . . which may be removed . . . and carried like a suitcase . . .

wherever you go . . . set up anywhere in one minute . . . or used in any part of your home.

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The Operadio idea was conceived sixteen years ago when J. M. Stone built the first successful self-contained radio receiving set, using a kite to carry the aerial wires aloft. The accompanying sketch was made from a photograph taken in 1909.

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# How Ward Fry Wins First Prize at the Mummyville Radio Contest

## The Country Storekeeper's Three-Tube Set Hears Better DX Than Any Other Set in Town

By EDWARD C. HURBERT

EDITORS and readers of this little story must not blame me for concocting a faulty narrative. The source of this story was my tobacco pouch and the blame should fall on that, not upon me.

My alibi is simple. If I hadn't found my tobacco pouch empty while I was wandering around the mountains of Mummyville, Pa., I would not have gone into Ward Fry's general store. And if I had not met Ward Fry I probably would not have any story to tell.

I was not surprised at finding a store out in the middle of the woods, for in the country any one who feels like running a store helps himself, no matter where he is located. If no one buys anything, he should worry. He should, but he doesn't. He considers himself a storekeeper; and that is really all that matters. And Ward Fry was just that sort of Mummy. As he emerged from behind the stove I noticed a shiny head, a sun-bronzed face, muscular arms, snapping black eyes and a growth of beard to match that he had become quite attached to since some time last week. His altitude, in his present bald-headed condition, I approximated as five and one-half feet.

"Howdy!" he greeted, politely, noticing that I was a stranger. "Jes' bin foolin' with the radio. She don't seem ter work jes' right to-day, somehow anuther. Know anythin' 'bout them things? An' wuz kin I do fer you?" He added the last question hastily, remembering, no doubt, Page 14 of the Storekeeper's Guide published by that great institution of learning in Scranton. I purchased a can of Knockcold tobacco, for that was the best he had in stock, and admitted that I was somewhat of a radio fan. So he became friendly and conversational, and I let him go on, without interrupting, for I was enjoying unexpected amusement.

### Won a Radio Contest

"I spect you hearded that I wuz the real winner of that radio contest we had up in these parts last winter—no? Funny, it wuz in the Gouldsboro Weekly Trumpet, my pitcher an' all bout it. Yep, on the front page! Only I ain't never got the prize yit. Course I should hev gotten it, my old woman sed so, an so did the Trumpet. But, accorse you ain't never heard nuthin, so I'll tell you bout it.

"It started like this—las fall a feller from Scranton cum up these parts an give a demonstration of radio in the Mummyville Town Hall. It didn't cost nuthin, so we all went, an the hall was packed like sardines. Well, after the show this feller cum offer the stage an give us an installment plan of gittin a radio jes like hisen. I was all for goin ter home, but the woman she liked the idea, or the feller or somethin, an she kep astermin me until I had ter pay the feller \$10, an I been payin' ever since. Don't seem like I'll never git that darned thing all paid fer. But then, the wimmin they gits what they wants—an they wants a lot these days.

"Even if I ain't got the prize yit I got the fun of laughin at them other fellers what got soaked for the money ter please their old wimmin too. There wuz bout ten other boys that got the same kind what I got, an then some others got a cheaper brand. One feller, Matty Dunning, mebbe you hearded of him—no, well, anyways, he a mean one. Why he's so mean that he didn't even kick off when he was bit by a rattlesnake las summer. Everybody in town sez, they sez, 'Well I pity that poor damned snake,' when they heard that he was bit. Well, ter git on with my story, this yere feller Dunning, he bought a big, five lamp set, jes so as he cud sneer at the rest of usen.

### Dunning Hears Some DX

"The nex time I seen Dunning he wuz tellin' all the boys down at the post-office all the things what he hears on HIS radio. 'I gits Pittsburgh, an Philadelphia, an Scranton, an New York, an—an Pittsburgh,' he sez, real important like.

"Hell, thet ain't nuthin', I up an sez jes ter git him sore. I only got three lamps in mine an I hears China in the Kitchen every night! An all the boys they laughed like hell over that, 'cause they don't like this feller Dunning. He don't belong round here anyways. He cum out from Minyoty on account of his cousin didn't an left him some money an land. Tain't his money! Naw!

"Well, every time I went down ter that postoffice after thet there wuz somebody arguin' bout radio, mostly with Dunning, sometimes twixt each other. None of 'em knowed nuthin' 'bout it, but they wuz arguin' jes the same. 'Course I got sense, so I jes shut up an didn't argue or say nuthin'. But one night I hears a feller on the radio all the way from Davenport, Iowa! WO—what wuz it now? WO—well, anyways, I hearded this yere feller an wrote it all down so as I cud tell Dunning the nex time in the postoffice.

"I told the old woman about it nex day an she sez ter me, she sez, 'Ward, you better not tell nobody, 'cause Dunning is a heap bigger than you are, an I won't take care of no more cripples, on account of thet there accident what you hed las December when somebody that you wuz a deer.'

"But I didn't pay no attention an went right down ter the postoffice after supper ter tell everybody, 'specially Dunning, what I hearded on my radio. He wuz there and so wuz the rest of the gang, all atalkin' 'bout radio. I swaggers up ter the stove, hesitates (for effect you know) an when the whole crowd is a-lookin' at me I sez, 'Dunning, how far you hearded on that radio of yorn?'

### The Fight Starts

"We—h-l, he draws, tryin' ter think up a gud one, I git Chick-ago. Pretty gud ain't it, tho!

"Thet all you hears? I sez with a groan. Lizen, I gits Davenport, Iowa. An thets futher away, an nearer the Pacific Coast then Chick-ago. An I only needs three lamps ter do it, I adds in a voice that the whole store cud hear, even old man Thompson, who wears a ear trumpet.

"Dunning git mad right away an' he sez, 'Ward, you're a danged liar.' Well, I plum ferget what the old woman hed sed, an I up an hits him—like this, fast, you know—on the nose, on account of thet wuz the nearest part of him ter hit. Well, he aimed a hard sock at me, but I ducks—like this—an then the gang they separated us an we stops fightin'.

"'Fergit it, an' shake hand,' sez somebody in the crowd who didn't own a radio. 'I won't fergit an I won't shake hands neither, till thet dam fool Dunning pologizers fer callin' me a liar, an' insulutin' me an' my radio, I sez in my maddest voice.

"'An' I won't pologize, an' I won't shake hands with a little shrimp like you till you pologize ter me fer gittin' fresh first, an' then hittin' me in the eye,' barks out Dunning an' gits in his flivver an' drives away. Seems as how he wuz bout ter leave the postoffice when I got there, cause his pockets wuz as full as they cud git with saltines he picked out the cracker barrel, near the stove.

"Nex' day at the postoffice I didn't see Dunning—guess he wuz ascairt ter show himself—but I did see Jackson Rogers. They call him Jack Rogers fer short, you know. Well, anyway, he's the feller what writes up stuff fer 'The Gouldsboro Weekly Trumpet.' He tells me he hearded somethin' 'bout the big fight, an he asks me all 'bout it an' what I wuz gonna do. I tells him I didn't know an' didn't give a dam, an' he smokes an' thinks a while, an' then a bright idea cum ter him. All of a sudden-like, you know. An' so he tells me how ter git even with Dunning an' make him look foolish.

### Jack Rogers Has an Idea

"'Lizen,' he sez. 'You bring your radio ter the Town Hall two weeks from Friday, an' anybody else what wants to kin bring hissen also, an' I'll offer a prize fer the set what hears the further-off an' gets the best music. I think

your radio is better'n Dunning's an' you'll win, an' the loser 'tween you an' Dunning's got ter 'pologize ter the other feller before the audience. I'll charge 25 cents admission an' get enuf ter pay fer a decent prize. An' I'll put the winner's pitcher in the paper,' he adds as inducement on account of it was an advertisement fer his paper. Folks who'd never saw the 'Trumpet' fore kep gittin' it thinkin' they wuz gonna see their pitcher in the paper.

"Well thet night I git ter thinkin' an' wonderin' if my radio wuz as good or better'n Dunning's. I thot it over careful an' got ter kinda worryin' you know—no cause I was afraid ter not hear as far, but cause I hated the idea of mebbe havin' ter stand up fore all them people an pologize fer insulutin' an hittin' Dunning. So I went over ter Nate Philip's. He's got a durn smart son, Nate has—goes ter college, an' what he don't know ain't worth thinkin' about. Yes, sir! He wuz home on his Christmas vacation an' I tells him all 'bout it. Fine feller, Nate junior, jes like his old man. He sed he wuz takin' engineerin in college an' probly cud fix my radio so it wud work better'n fore. So I bring it over ter his house, an' he nods his head an' mutters some funny words ter himself as he looks at the wiring. An' then he tells me that there wuz too much, er-r—what in hell did he call it now?—well anyways, there wuz too much of this thing an' not enuf the other ter make it very loud, tho he loved as how I probably cud hear Davenport, Iowa.

### Nate Rewires My Set

"So I leaves the set with him a couple of days an' he wired it all up new. Me an' him tried it out a week fore the contest, an' we hearded Chickago, Cleveland, an' then we hears Omaha, Nebraska. 'You'll win thet there contest,' he sez ter me, he sez. An' the nex' day he went back ter college astin me ter write him all 'bout the contest an' how it cum out.

"I asts several of the gang round ter see an' hear my new set, tellin' em thet I'd added a little invention of mine on it. Well, they all set there an' lizened, 's'prised, an' some of 'em what hed entered thet contest got ascairt right away an' dropped out the contest. Somebody went an' tells Dunning that my radio wuz a wonder an' he ort ter see it an' hear it. So he cum ter me, Dunning did, an' tried ter be friendly an' all thet, an' find out what I wuz usin' now. But 'tweren't no use, 'cause I knowed that he'd try ter copy it, or mebbe git ascairt like the rest an drop out the contest. An' I didn't want that. No, sir! There ain't no makin' friends with me when a feller insults me an' my radio, 'less he 'pologizers, an' then shuts up.

"Well, the big night cum 'round an' the Town Hall was fullen Hell on Saturday nights. All the folks with the price of twenty-five cents showed up, an' them thet didn't hev the price stood outside ter tryter hear thru the winders, but accorse they wuz closed, on account of it was cold as Hell.

### The Contest Starts

"Jack Rogers wuz there, an' all dressed up in a fancy suit like they wear fer weddings an' funerals. He hed fixed all the details, picked judges (most of 'em wuz from Gouldsboro 'cause most everybody in Mummyville what owned a radio wuz there contestin') an' he hed brung along a phonograph horn arrangement what he called a loud screacher, or somethin' like that. Then he hed three lamps, he hed, accordin' ter the rules what hed bin posted all over the country, wuz ter be used in the radios, one radio at a time, you understand. He explained thet the radio wuz so as each feller wud hev an equal chance, an' not be bothered by lights what weren't as good as some others might be. You might know thet Dunning wud put up an awful howl 'bout this, 'cause his set used five lamps, an' he sed it wudn't work right with usin' only three. But Rogers told him ter use two

of hisen, along with the three thet Rogers brung, an' ter shut up afore he disqualified him.

"Finely the town band wuz made ter shut up, an' after a little speech, Rogers had us draw numbers from a hat ter see who'd go on first, and so on. Well, thet durn fool Dunning got the lowest number an' he steps up ter his set, connects it onto the aerial and other fixins, puts in three of Rogers's lamps an' two of hisen, an' trys ter look like Henry Ford, or somebody important. After lookin' at the other fellers' numbers I finds thet I hed the largest number an' wud hev ter go last of the bunch. I was a bit disapinted, but Rogers he grins an' sez ter never mind as how I'd be the hit of evenin' anyways.

### Dunning Hears Scranton

"Dunning fooled 'round with his radio fer some time afore he cud even hear anythin', an' then we found out it wuz only Scranton, forty miles away.

"A lot of folks who heard that on a crystal set laughed out loud, and one of the high school fellers shouts out, 'Thot you was gonna hear California, Dunning.' I laughed real hard at that and I could see Dunning was so mad he cudn't hardly tune the dials. But he's stubborn an' he twisted an' turned them dials until he got WDKA, WIP, WTAM, WEA, an' finally he got WGN, Chicago. But none of 'em was very loud an' the people in the audience couldn't hardly hear the ones over a hundred miles. Dunning tried to get 'em louder, but he cudn't do it nohow. He sed Rogers's lamps weren't no good an' put in his own. An' the audience jes' roared, 'cause everythin' was weaker than afore. He was madden the devil on Sundays when the churches is filled.

"He glared over at me an' sez, in a nasty voice, he sez, 'Try ah' do better then yourself. The aerial ain't no good.' Folks who didn't like him, an' few of 'em did, jest busted out laughin', and the high school fellers whistled so dam loud thet the constable hed ter wave his arms an' open his coat an' show his badge afore everybody got quiet agin.

### My Turn Comes

"The other radios were tried out, but they wasn't no better—most of 'em not as good as Dunning's. An' so, soon it cum my turn, an' afore I could git ter the set, Rogers makes a little speech about me—calls me a inventor, an compares me ter Marconi hiself. All of my friends was there an' all of my woman's relations, an' I'll bet they's a hundred of 'em countin' me an' her. Well they stamped an' cheered an' the constable hed ter shut 'em up agin. But somebody drops a bag a peanuts down on him from the balcony an' it was a long time afore I could hear the radio myself, right nex' ter it. I aims at somethin' far off first, an' sure nuff along cum WEA, New York City, hundred miles away. It was twice as loud as any of the rest, an' thet includes Dunning's too. Folks begin ter sit up an take notice, an' so I trys fer more. KDKA cum in fine, an' funny, but WTAM in Cleveland cum in best of 'em all. It was louden Scranton had been on Dunning's fool contraption. Jus' 'bout then I tried ter git Davenport, or somethin' Dunning hadn't got. But somethin' happened an' I couldn't git that set ter squeel nor nuthin. It was twice as dead as Congress.

"Dunning accorse grins an' sez, 'You lose, pologize now.'

"Don't you be in sech a danged hurry—I ain't started yit, I answers, an' the audience claps and laughs. Rogers hurries over an' looks inter the box an' becum very sad over somethin'. 'What's matter?' I asts, kinda disturbed, you know.

"One of the lamps is all wore out—it's dark,' he sez, an' acts helpless like. But then he thinks of a bright idea, only I knew all along it wudn't work. 'Dunning,' he sez, 'we only got two lamps left, an' we can't finish this yere contest till we git another lamp fer Ward. Now if you

(Continued on page four)

### Dr. Cadman Resumes Addresses With "A Great Conference"

The Rev. Dr. S. Parkes Cadman, pastor of the Central Congregational Church, Brooklyn, N. Y., will resume his popular series of addresses at the Men's Conference in the Bedford Branch Y. M. C. A., in Brooklyn, to-day at 3:45 p. m., when WEA, and four other stations will broadcast his address on "A Great Conference."

The addition of WEEL, Boston, Mass.; WCTG, Worcester, Mass.; WCAE, Pittsburgh, Pa., and WSAI, Cincinnati, Ohio, to WEA, will mean a great extension of the audience of this famous inspirational speaker.

Dr. Cadman has just returned from a two months' visit abroad, where in Stockholm, as chairman of the Federal Council of Churches of America, he acted as its representative at the international church conference. His first radio address will describe his experiences, at what he declares was "the greatest religious convention the world has ever seen," where thirty-eight nations were represented by almost every denomination in Christendom.

Special music will be furnished by the Gloria Trumpeters and George Betts, chime soloist, and the singing will be under the direction of Howard Wade Kimsey. Halsey Hammond, the executive secretary, will preside and present the questions to Dr. Cadman following the address. These answers to questions were among the most interesting features of the meetings last season.

### Reinald Werrenrath An Hour's Recital To-night

The first of the series of Atwater Kent Radio Hours, sponsored by A. Atwater Kent, prominent Philadelphia radio manufacturer, presenting for the first time in the history of radio broadcasting weekly concerts by Metropolitan Opera stars and other leading artists of the musical world, will bring Reinald Werrenrath, famous American baritone, before the microphone in the studios of WEA, this evening at 9:15 o'clock, Eastern standard time. For one full hour the radio audiences of ten stations, linked for simultaneous broadcasting with WEA, will enjoy a recital by this noted artist. In addition to WEA, the following stations make up the chain: WEEL, Boston; WJAR, Providence; WGR, Buffalo; WCAP, Washington; WCAE, Pittsburgh; WSAI, Cincinnati; WWJ, Detroit; WOCO, St. Paul-Minneapolis; and WOC, Davenport. WFI and WOO, Philadelphia, will broadcast these concerts alternately, this evening's hour going through WFI. It is expected that other stations will enlarge this chain, and announcement will be made upon their addition.

Mr. Werrenrath will be assisted by Herbert Carrick, piano virtuoso, who, in addition to acting as Mr. Werrenrath's accompanist, will be heard in several piano solos.

### New Radio Call Book

The last issue of "The Citizens Radio Call Book" is just out and contains many new features, including a photographic directory of the principal broadcasting stations' announcers in the United States and pictures of the entertainers of some of these stations; also a complete list of all the broadcasting stations of the United States and the world, together with wave length, kilocycle, transmitting schedules, station slogans and a world of other information. There are ten complete constructional articles in this issue on everything from a two-tube receiver to a nine-tube impedance coupled super. This is a very practical radio call book and encyclopedia and is on sale in all radio stores and news stands. Published by Citizens Radio Service Bureau, 508 S. Dearborn Street Chicago.

### New Factory Necessary

The J. B. Ferguson Company, whose general business offices are at 41 East Forty-second Street, New York City, has leased a new factory site in Eleventh Avenue, Long Island City, and will move into the new plant at once. The plant at 80 Beaver Street, New York City, being entirely inadequate as to space, Mr. Ferguson was obliged to secure more room, and it is expected the new factory will be in operation within ten days with a greatly increased output of Ferguson receivers.

### Battery Co. Gave Dinner

Last Wednesday evening the H. B. Stantz Company, Inc., held the annual sales meeting of U. S. L. battery distributors at the Hotel Empire. The purpose of the meeting was to get together all distributors of the battery. The entertainment feature was Black Bear, the educated pony.

## Additional Radio Programs

(Continued from page nine)

**WRW-TARRYTOWN-273**  
9:05 p. m.—Musical program; sports.  
9:45 p. m.—Alma Entertainers.  
10:05 p. m.—WVW Orchestra.  
10:30 p. m.—Alma Entertainers.  
11:05 p. m.—WVW Orchestra.

**WGR-BUFFALO, N. Y.-319**  
2:30 p. m.—World series game.  
6:30 p. m.—Dinner music.  
9 p. m.—Gertrude Townsend.  
9:30 p. m.—Dinner music.  
11 p. m.—I. A. M.—Supper music.  
11:30 p. m.—Theater organ.  
11:50 p. m.—Theater orchestra.  
7:30 p. m.—Weather forecast; markets.

**WJAR-PROVIDENCE-306**  
10 a. m.—Housewives' Exchange.  
1:45 p. m.—World series game.  
2 p. m.—Margaret Reid, story teller.  
3 p. m.—"Fire and the Law."  
8:15 p. m.—Choir of State Hospital.  
9 p. m.—Maiden Hour.

**WVCA-BIRMINGHAM-478**  
2 p. m.—World series, play by play.  
6:30 p. m.—Young people's period.  
7:30 p. m.—Dinner music.  
8:30 p. m.—Dinner music.  
10:05 p. m.—Dance music.  
11:30 p. m.—Popular half hour.  
11:50 p. m.—Dinner music.  
10:30 a. m.—Bible readings.  
10:45 p. m.—Victrola orchestra.  
1 p. m.—Concert orchestra.  
2 p. m.—Dance orchestra.  
3 p. m.—Kiddie Klub.  
6:30 p. m.—Dinner dance.  
8 p. m.—Polyanna Entertainers.  
9:30 p. m.—Jim Maloney vs. King Solomon bout.

**WVCA-BOSTON-349**  
6:45 a. m.—Health exercises.  
10:45 a. m.—Betty Crocker's talk.  
11:45 a. m.—Sackett and artists.  
6:30 p. m.—Big Brother Club.  
7:20 p. m.—Lost and found, scores.  
7:30 p. m.—Sage's half-hour.  
8 p. m.—Neapolitan program.  
9 p. m.—Musical.  
10 p. m.—Marimba Band and Orchestra.  
10:15 p. m.—Theater orchestra.  
6:30 p. m.—Leo Reisman's Ensemble.  
7:15 p. m.—Market report.  
8 p. m.—Morris Ernest, tenor.  
8:45 p. m.—Lido Morgan, contralto.  
9 p. m.—J. J. Clark, tenor.  
9:15 p. m.—Daniel J. Morgan, songs.  
9:30 p. m.—Sid Reinherz, piano.  
10:30 p. m.—McKenzie's Orchestra.  
10:45 p. m.—Radio chat.

**WVCA-WASHINGTON-469**  
10 a. m.—Women's hour from WJZ.  
1 p. m.—New Willard Orchestra.  
2 p. m.—Theater orchestra.  
6 p. m.—Book reviews, scores.  
7:15 p. m.—WCAE-WASHINGTON-469.  
7:45 p. m.—"Hooking up a Radio Set."  
10:15 p. m.—Dinner music.  
9:15 p. m.—"National Capital."  
9:30 p. m.—Wardman Park Trio.  
10:15 p. m.—Concert and sports results.  
10:30 p. m.—Children's period.  
8:30 p. m.—KDKA String Quartet.

### SATURDAY

**WEAF-NEW YORK CITY-492**  
6:45-7:15-7:45 a. m.—Health exercises.  
7:15-7:45 a. m.—World series game, play by play description.  
4 p. m.—Elmer Grosse's Orchestra.  
6 p. m.—Dinner music.  
7 p. m.—"Old New York," Henry Brown.  
7:15 p. m.—Boris Popovitzky, pianist.  
7:30 p. m.—Boris Popovitzky, pianist.  
7:45 p. m.—Pasadena Warblers.  
8:10 p. m.—Pasadena Warblers.  
8:30 p. m.—United Picture Artists' Band.  
10 p. m.—Edgar Brown, baritone.  
10:15 p. m.—Caroline Thomas, violinist.  
10:30 p. m.—Caroline Thomas, violinist.  
10:40 p. m.—Caroline Thomas, violinist.  
10:50 p. m.—Caroline Thomas, violinist.  
11:12 p. m.—Vincent Lopez's Orchestra.

**WJZ-NEW YORK CITY-455**  
1 p. m.—Theater orchestra.  
2 p. m.—Theater orchestra.  
4:55 p. m.—News, baseball, racing results.  
5 p. m.—Emil Coleman's orchestra.  
6 p. m.—Stock market closing prices and quotations.  
7 p. m.—Bernhard Levittov's concert.  
8:15 p. m.—Honest Ballot Association.  
8:25 p. m.—Radio Franks.  
8:40 p. m.—To be announced.

**WGHS-NEW YORK CITY-316**  
10 a. m.—Timely talks with Terese.  
10:40 a. m.—Fashion Quiz.  
10:50 p. m.—Hilda Sebel, soprano.  
1:35 p. m.—Hilda Sebel, soprano.  
2 p. m.—Kruh's College Orchestra.  
3 p. m.—Theater orchestra.  
6 p. m.—Uncle Giesbe.  
7:10 p. m.—The Dilemmians.  
7:30 p. m.—The Dilemmians.  
7:40 p. m.—Milton Yokeman, tenor.  
7:50 p. m.—Milton Yokeman, tenor.  
8:10 p. m.—John Cassidy, baritone.  
8:20 p. m.—John Cassidy, baritone.  
8:40 p. m.—John Cassidy, baritone.

**WVCA-BOSTON-280**  
2:50 p. m.—Harvard vs. Middlebury football game.  
6:30 p. m.—WCAE-WASHINGTON-469.  
7:35 p. m.—The Metropolitan Theater.  
9:30 p. m.—Dan To be announced.  
9:45 a. m.—WEEI-BOSTON-349.  
7:45 a. m.—Morning Watch, organ studio.  
7:50 a. m.—Morning Watch, organ studio.  
8:30 p. m.—Popular program.  
8:30 p. m.—Band and orchestra.  
8:30 p. m.—Eisenberg's dance music.  
8:30 p. m.—Eisenberg's dance music.  
8:30 p. m.—Harvard vs. Middlebury football game.

**WRC-WASHINGTON-469**  
1 p. m.—New Willard Orchestra.  
2 p. m.—Theater orchestra.  
3 p. m.—Bible talk.  
6:15 p. m.—Musical program.  
7:30 p. m.—Children's period.  
10:30 p. m.—Westinghouse Band.

**WRNY-NEW YORK CITY-259**  
9:45 a. m.—News flashes.  
10:30 a. m.—Women's hour.  
12:30-1:30 p. m.—Trio.  
2:30 p. m.—Matinee program.  
4:15 p. m.—Radio Reminiscences.  
4:45 p. m.—Studio program.  
7:05 p. m.—Sport flashes.  
7:15 p. m.—Whose Birthday To-day?  
7:20 p. m.—Fairy Tales.  
7:40 p. m.—Dentistry.  
7:45 p. m.—Charles Houbert, pianist.  
8 p. m.—Roosevelt Orchestra.  
8:30 p. m.—Iris Brussels, pianist.  
9 p. m.—Kings of Sports.  
9:15 p. m.—Fiction.  
9:15 p. m.—Fiction.  
10:15 p. m.—Chaffin's Dance Demonstration.

**WHN-NEW YORK CITY-361**  
9 p. m.—Martineau's Chanty Ball.  
9:15 p. m.—Martineau's Chanty Ball.  
2 p. m.—World series game.  
7 p. m.—Dance program.  
7:30 p. m.—Dance program.  
7:30 p. m.—Dance program.  
8:05 p. m.—Joint recital.  
8:30 p. m.—Sam Kall, violinist.  
8:30 p. m.—Sam Kall, violinist.  
9:00 p. m.—Marie Muller, soprano.  
9:15 p. m.—Marie Muller, soprano.  
9:30 p. m.—Marie Muller, soprano.  
9:45 p. m.—Francis Capone's baritone.  
10:10 p. m.—Francis Capone's baritone.  
10:30 p. m.—Francis Capone's baritone.  
6 p. m.—Olcott Vail's String Ensemble.  
6:30 p. m.—Acquisto's Orchestra.  
7:30 p. m.—Frank Cohn, tenor.  
7:45 p. m.—Christine Thompson, pianist.  
8 p. m.—"What's Happening Now?"  
8:15 p. m.—Christine Thompson, pianist.  
8:30 p. m.—Christine Thompson, pianist.  
9:11 p. m.—Musical entertainment.  
11:15 p. m.—Ernie Goldstein's Orchestra.

**WFBH-NEW YORK CITY-273**  
2 p. m.—Sunlit Serenaders.  
3 p. m.—Bert Lowe's Entertainers.  
4 p. m.—Scores (quarter hourly).  
4:15 p. m.—Montana Ramblers.  
5:15 p. m.—Bob Schaeffer, Fred Fisher, songs.  
5:45 p. m.—Adele Esprit, soprano.  
6 p. m.—Southern Serenaders.  
7 p. m.—Chris Meehan, tenor.  
7:15 p. m.—Low Henry's Synopators.  
7:30 p. m.—Dance orchestra.

**WOKO-NEW YORK CITY-233**  
8 p. m.—Christine Thompson, pianist.  
8:15 p. m.—Elizabeth Flaurack, soprano.  
8:35 p. m.—Christine Thompson, pianist.  
8:50 p. m.—Beatrice Melney, recitations.  
9:05 p. m.—Kenneth Molitz, tenor.

**WHAP-BROOKLYN-240**  
6-7 p. m.—Science music.  
8 p. m.—Violin and tenor solos.  
8:20 p. m.—Bible questions and answers.  
8:40 p. m.—Tenor and violin solos.

**WAHG-RICHMOND HILL, N. Y.-316**  
12 midnight—Benton Harbor Orchestra.  
**WOR-NEWARK-405**  
6:45-7:15-7:45 a. m.—Civic class.  
6:15 p. m.—"Words Mispronounced."  
6:30 p. m.—Solal program.  
7:05 p. m.—Talks by aviators.  
7:15 p. m.—Sports, Bill Wathey.  
7:30 p. m.—Archie Bachman, tenor.  
8 p. m.—Mabelanna Corby's artist: Mme. A. Corby, soprano; Veronica Wiggins, contralto; Dr. Howard Applegate, baritone; Genevieve Applegate, accompanist.

**WVCA-BOSTON-349**  
8:45 p. m.—Dick and P. Bernard, songs.  
9 p. m.—Arthur Baecht, violinist.  
9:15 p. m.—Sol Sabino, mandolinist.  
9:30 p. m.—Dick and P. Bernard, songs.  
10 p. m.—Archie Bachman, tenor.  
10:15 p. m.—Ida Twerdowski, pianist.  
10:30 p. m.—Shelton dinner music.  
10:45 p. m.—Earl Rossmann, "Alaska."  
11 p. m.—Gladie Elkins's Orchestra.

**WVCA-BOSTON-349**  
7 p. m.—Al Makon's Orchestra.  
8 p. m.—Alice Laurie, soprano.  
8:15 p. m.—Jolly Bill Steinko.  
8:30 p. m.—Andrew Hays, tenor.  
8:45 p. m.—Samuel Silverberg, reader.  
9:10 p. m.—Andrew Hays, tenor.  
9:30 p. m.—Andrew Hays, tenor.  
10 p. m.—Hartley Joy Boys.  
2:45 p. m.—Songs; race results (half hour).  
3 p. m.—Ukelele Lou Hays; readings.  
3:45 p. m.—Johanna Cohen Trio.  
4:15 p. m.—Indians Orchestra.  
4:30 p. m.—Science music.  
6:45 a. m.—Setting-up exercises.  
6:50 p. m.—Organ recital.  
7:15 p. m.—Dinner music.  
7:30 p. m.—Bedtime story.  
7:45 p. m.—Science music.  
8:15 p. m.—The Mandolin Club.  
11:05 p. m.—Dance music.  
11:30 p. m.—Dance music.

**WVCA-BOSTON-349**  
11 a. m.—Philco A and B Socket Power.  
12 noon—Luncheon hour.  
1:30 p. m.—Grand organ; trumpets.  
2:30 p. m.—Dinner music.  
2:45 p. m.—Philco A and B Socket Power.  
3:45 p. m.—Concert orchestra; recital.  
4:15 p. m.—Concert orchestra; recital.  
4:30 p. m.—Concert orchestra; recital.  
4:45 p. m.—Concert orchestra; recital.  
4:55 p. m.—Concert orchestra; recital.  
5:10 p. m.—Concert orchestra; recital.  
5:25 p. m.—Concert orchestra; recital.  
5:40 p. m.—Concert orchestra; recital.  
5:55 p. m.—Concert orchestra; recital.  
6:10 p. m.—Concert orchestra; recital.  
6:25 p. m.—Concert orchestra; recital.  
6:40 p. m.—Concert orchestra; recital.  
6:55 p. m.—Concert orchestra; recital.  
7:10 p. m.—Concert orchestra; recital.  
7:25 p. m.—Concert orchestra; recital.  
7:40 p. m.—Concert orchestra; recital.  
7:55 p. m.—Concert orchestra; recital.  
8:10 p. m.—Concert orchestra; recital.  
8:25 p. m.—Concert orchestra; recital.  
8:40 p. m.—Concert orchestra; recital.  
8:55 p. m.—Concert orchestra; recital.  
9:10 p. m.—Concert orchestra; recital.  
9:25 p. m.—Concert orchestra; recital.  
9:40 p. m.—Concert orchestra; recital.  
9:55 p. m.—Concert orchestra; recital.  
10:10 p. m.—Concert orchestra; recital.  
10:25 p. m.—Concert orchestra; recital.  
10:40 p. m.—Concert orchestra; recital.  
10:55 p. m.—Concert orchestra; recital.  
11:10 p. m.—Concert orchestra; recital.  
11:25 p. m.—Concert orchestra; recital.  
11:40 p. m.—Concert orchestra; recital.  
11:55 p. m.—Concert orchestra; recital.

**WHAM-ROCHESTER-278**  
5 to 6 p. m.—Eastman Theater organ.  
7:30 p. m.—Eastman Theater orchestra.  
7:50 p. m.—Eastman Theater orchestra.  
**WJAR-PROVIDENCE-306**  
1:45 p. m.—World series game.  
2:50 p. m.—Harvard vs. Middlebury football game.  
6:30 p. m.—WCAE-WASHINGTON-469.  
7:35 p. m.—The Metropolitan Theater.  
9:30 p. m.—Dan To be announced.  
9:45 a. m.—WEEI-BOSTON-349.  
7



## WESTON Quality Products



### WESTON RADIO PLUG

LOOK at your friends' radio—nine times out of ten the contact point from his ear-phones is a Weston Radio Plug. You'll find another Weston Plug on his loud speaker. This one detail of equipment has become the hallmark for quality—quality in the performance of his set.

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## TALKING TAPE

THE PERFECT RADIO AERIAL

## Letters Aid WGY Engineers to Determine Super-Power Results

Now that several schedules of super-power broadcasting have been transmitted, the following statement by the radio engineers of the General Electric Company will be of considerable interest to those who are following this recent development. Careful conclusions are given based on the first tests which were carried out at the request of the United States Department of Commerce. The data on the more recent transmissions are not yet sufficiently digested to be included herein.

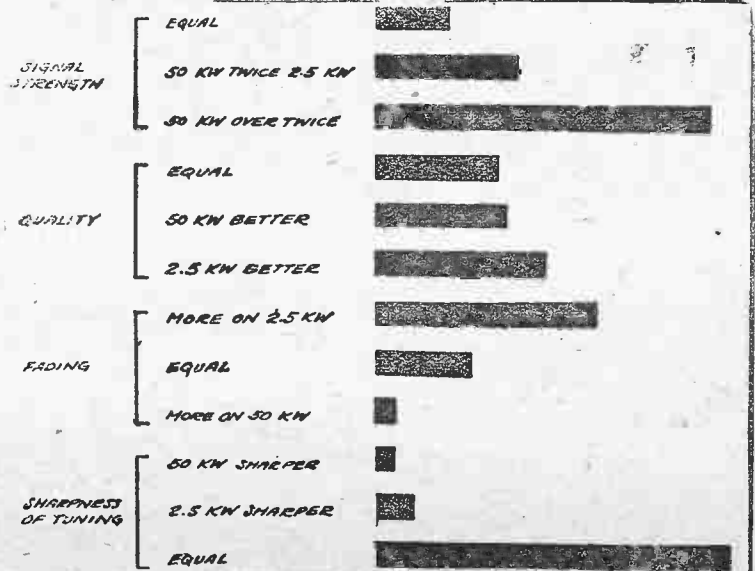
Some thousands of letters were received by the company on the tests of August 22, 24 and 25, and they have been of great assistance in permitting a careful analysis of the value of super-power in furthering the cause of a universal broadcast service. It is hoped that the listeners will respond as helpfully in further series of tests. Their co-operation is essential in improving broadcasting.

Fifteen hundred letters selected at random have been carefully recorded

show the true general feeling of the public in each case.

In drawing conclusions from such a test it must be remembered that there are naturally many conflicting reports. Some listeners may have peculiarly bad locations and others good ones, so that their observations conflict with the average. But the average is, nevertheless, the best index of the general satisfaction with the transmission.

Most of the letters state that the super-power was more than twice as loud as the ordinary power, and a number have been received where the increase was ten to one. Thirty per cent of the reports say that there is no choice between the two in quality, and the remainder are fairly evenly split in favor of one or the other transmission. Fading is shown to have had much less effect on the high power. Reports on the sharpness of tuning are practically unanimous in showing that it was just as easy to tune out the high power as the regular set, only a very few of



by dividing them into groups, following the method suggested by the Department of Commerce. All statements of signal strength, for example, were separated into three groups according to whether they reported the 50 kw. equal to the 2.5 kw., the 50 kw. twice the 2.5 kw. or the 50 kw. signal more than twice the 2.5 kw. Quality reports were grouped so as to separate those reporting the 50 kw. better, those reporting the 2.5 kw. quality better and those reporting equal quality. Fading, sharpness of tuning and the answers to the other questions were divided in a similar way. Then all the letters in each group were counted and averages taken to

the letters complaining of any "blanketing effect" due to the high power.

In general the super-power produced the desired effect of increasing the signals at a distance without unduly preventing reception of other stations near the transmitter. This represents a real advance in the art of broadcasting. And the quality of high power as shown by the last two nights of test can be made perfect by skilled design of transmitters.

We look forward to the further co-operation of the public in sending us reports of our transmissions, so that we may make the best use of our extensive developmental facilities at the South Schenectady laboratory.

### Crystal Set Operates Speaker



This picture shows Morris S. Strock, of the Radio Laboratory of the Bureau of Standards, Washington, demonstrating a crystal set developed by the bureau that will operate a loud speaker

#### A Compact B Eliminator

A compact B battery eliminator which is but six inches square has been placed on the market by A. H. Waage, 6 Reade Street, this city. The device, which is known as the Waage-B-Eliminator, is supplied in two styles, one for alternating current and one for direct current. The direct current instrument is complete in itself and the alternating current type requires a 201 A tube to rectify a current. Both types are guaranteed for one year.

#### Radio Booklet for Amateurs

"Enter Your Radio World" is the title of a pocket size booklet published by Charles W. Down, of 711 Eighth Avenue, this city. Mr. Down has had a great deal of experience in installing and repairing radio receivers. The booklet contains a digest of this experience which should be helpful to all radio amateurs. A number of well arranged radio log sheets are included.

FREE! Write for Autoformer Hook-Up Bulletin

There is no variation in amplification over the entire range of musical frequencies with Thordarson Autoformers. No note is too low—no note is too high to be fully amplified by the Autoformer.

Unconditionally Guaranteed

## THORDARSON Autoformer

Trade-Mark Registered

### All Frequency Amplifier

Introduces Four Great Improvements in Amplification:

- 1 Full amplification of those bass notes hitherto largely "lost"
- 2 Greater clarity on all signals
- 3 Improved reception of distant programs
- 4 Better volume control

This latest Thordarson development—the Autoformer—utilizes for the benefit of your radio set, the same principle used in the line amplifiers adopted by the more recent high-powered broadcasting stations. The excellent tone quality of these stations—due to perfect amplification—offers proof of Autoformer effectiveness. Write for hook-up bulletin.

Autoformer amplification is for those who seek the finest reproduction of programs to be had. May be used with any set in place of regular audio transformer hook-up. Full directions, with diagrams, supplied with each instrument. Autoformers are \$5 each. Sold by the leading dealers.

THORDARSON ELECTRIC MFG. CO. CHICAGO

## this new transformer amplifies without transformer distortion at a high ratio—1 to 5

Here's a new Audio Transformer that "lets through" the deep and the high tones. Its perfect amplification of the overtones makes for mellowness and reality.

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## TALKING TAPE

THE PERFECT RADIO AERIAL

Use the Radio Exchange Column if you want to Buy, Sell or Exchange anything in Radio

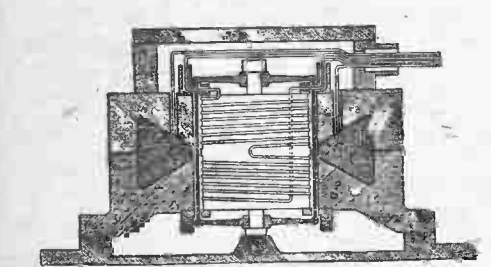
# Combined Wireless and Submarine Signaling in Ship Navigation

## The Fessenden Oscillator Helps the Navigator Locate the Position of His Vessel in a Fog

By A. DINSDALE  
Member of the Radio Society of Great Britain

THROUGHOUT the history of navigation men have endeavored by every means in their power to counteract the dangers of navigating near coasts by installing warning devices at or near, the most dangerous points. Thus we have lighthouses and lightships all around our coasts.

In foggy weather, however, a light cannot be seen, so for centuries it has been the custom during the prevalence of such weather to sound some form of foghorn. Now it has been found that sound waves traveling through air are subject to all



Cross-section diagram of the Fessenden oscillator

sorts of freakish variations, and have proved thoroughly unreliable, particularly when it comes to estimating, in fog, the true direction from which the sound comes.

Faced with such a situation, inventors, long before wireless was thought of, devised or attempted to devise some method of projecting sound waves through the water. Not only is water a more stable and reliable medium for the transmission of sound waves, but it transmits sound many times faster than does air.

Submarine signalling, as the projection of sound waves through water is called, has continued to be developed till at the present time it is fairly highly perfected. By means of it ships in the vicinity of lightships may listen for the submarine signals sent out by it and roughly determine their position. This is done by fitting one sound receiver, or pick-up device, on each bow of the ship, and by comparing the relative strength of signals received from each side—some idea of the bearing of the light-vessel can be obtained.

This method is only very approximate, however, and can only be used at a range of a few miles. Some idea of distance can also be obtained, but only by rough estimate.

### The Radio Compass

Such was the position when the wireless direction finder, or radio compass, was invented. This instrument is undoubtedly one of the greatest aids to navigation that has ever been invented since the discovery of the magnetic compass. By its use it is possible to determine accurately and without any other means, the position of a ship in the densest fog, and that at ranges of 100 miles or more.

This is done by taking bearings of two or more coastal stations whose positions are known. Lines representing these bearings are then drawn on the chart, through the positions of the coastal stations made use of, and where these lines intersect is the position of the ship concerned.

This is only one of the uses to which the radio compass may be utilized. When in mid-ocean, in fog or other bad weather conditions which might give rise to a collision, a ship can locate other vessels

which, owing to the strength of their wireless signals, are suspected of being too close.

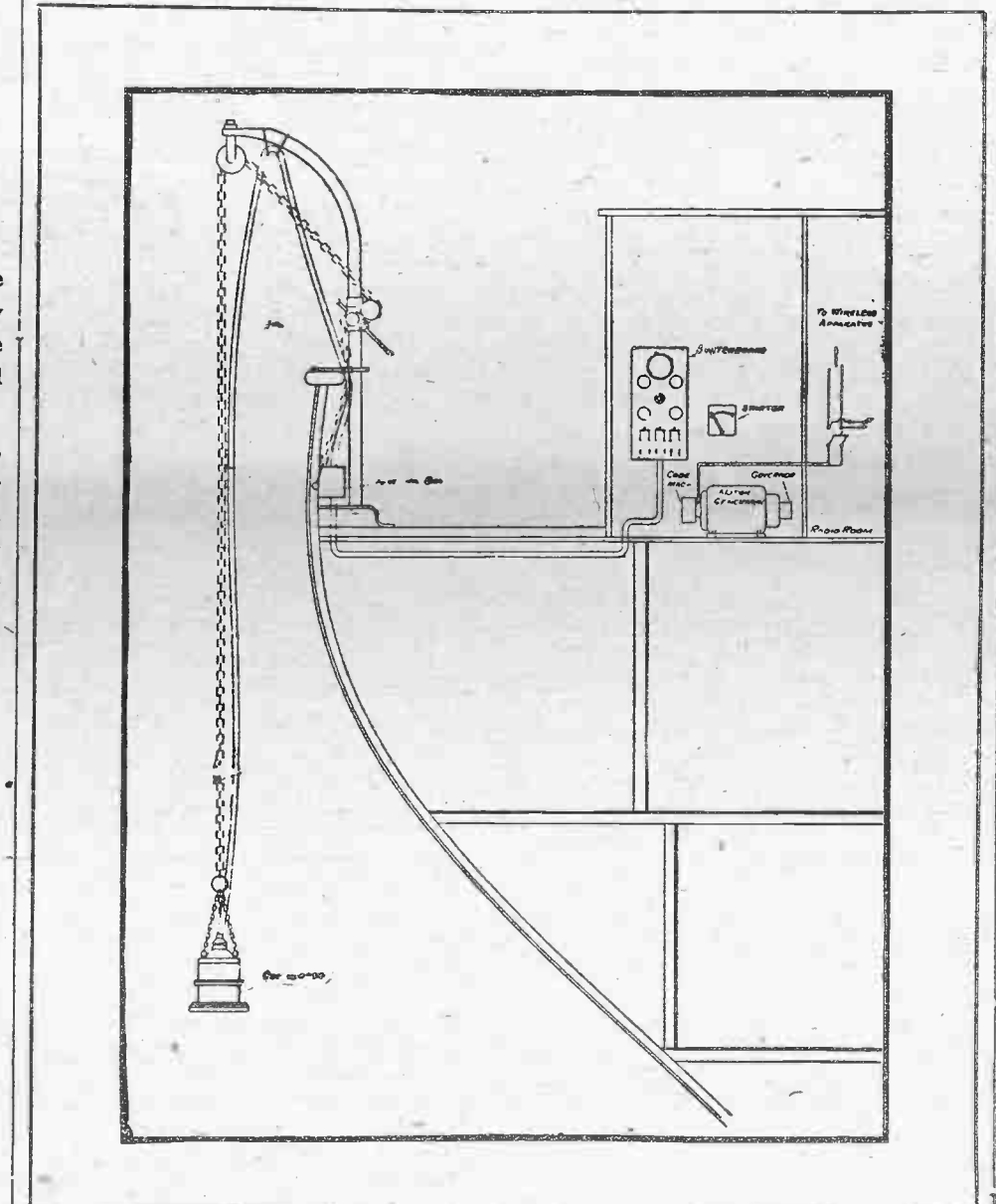
Similarly, in the case of a ship in distress which has sent out the wrong position, it is a simple matter to swing the radio compass on her and steer straight up to her, thus saving much valuable time which, prior to the invention of the direction finder, was wasted in searching for the distressed vessel in the vicinity of the position given.

Ships heading for seaports frequently have to make turns round headlands or shoals in the vicinity of the coast, and it is at such points that lightships are usually placed. Besides being fitted with submarine signalling apparatus, such ves-

sound signals are used simultaneously and in conjunction with each other for the purpose of measuring distance.

Readers are well aware that wireless, or radio, signals travel with the speed of light, which, for all practical purposes, is instantaneous. Sound signals in sea water, on the other hand, take 1.3 seconds to travel one mile, so that, as a mariner can hear the arrival at his ship of the submarine signal, all that is necessary is to provide some means of informing him precisely when it left the lightship. By dividing the time interval (in seconds) between the transmission and reception of the signal by 1.3 the distance in miles may be determined.

Wireless signaling is the method em-



A complete lay-out of apparatus showing the controlling units

sels are now being equipped with low-power wireless transmitters, and when a fog comes up these transmitters are caused to transmit continuously and automatically some characteristic signal, or group of signals, so that ships fitted with radio compasses can take bearings at any time and find out if they are steering the proper course.

Like submarine signaling apparatus, the radio compass has the disadvantage of not being able to tell exactly the distance between the ship using it and the wireless transmitter of which bearings are being taken. A skilled operator can, however, form a very fair idea of the distance, provided he is familiar with the particular transmitter under observation.

An approximate idea is better than none at all, but wireless engineers have been engaged for some time in trying to find some way of measuring distance exactly, and no doubt this problem will be solved some day. Meanwhile, in an effort to still further assist mariners, a plan has been evolved whereby wireless and submarine

played to inform the mariner of the time of departure of the submarine signal, the method being known as synchronous signaling. Simply defined, synchronous signaling is the simultaneous transmission of the same signal through two or more different conducting media, the media in this case being the ether and the sea.

### Method of Operation

The method employed for determining both the bearing and distance from a lightship is for the latter to transmit, first, a series of prearranged signals, which serve not only to identify the transmitter, but also for simultaneous bearing observations to be taken by both the navigator and the wireless operator.

The navigator's bearings are, of course, only approximate, and, with a radio compass on board, serve little useful purpose. When the operator has completed his observations he informs the navigating bridge to that effect, and both navigator and operator listen together on their respective instruments for the succeeding

signals, which take the form of a series of about twenty dots, sent at intervals of 1.3 seconds.

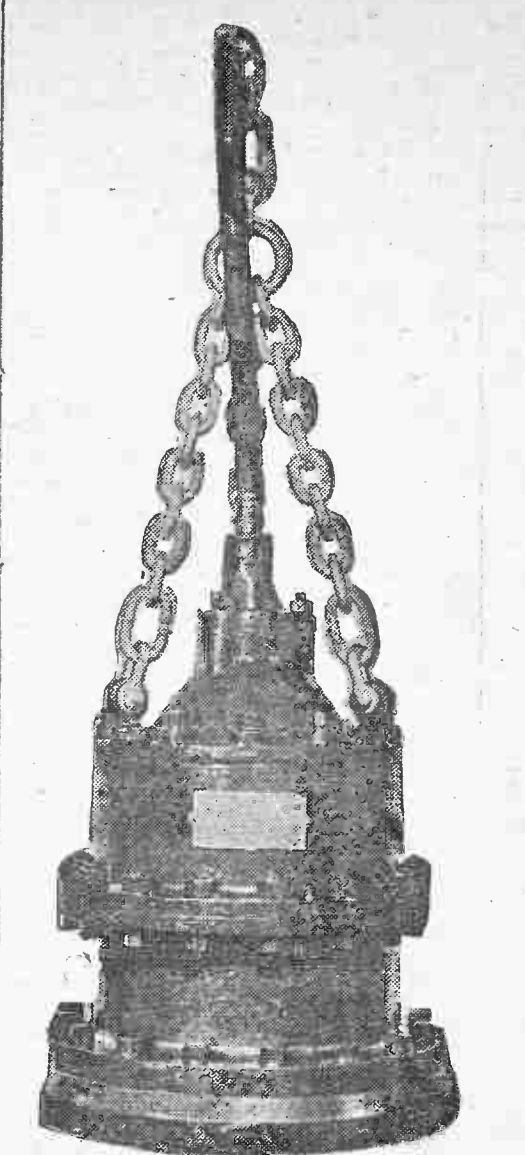
The operator naturally begins to hear the series first, and he counts the number of dots he hears. Immediately the navigator hears the first dot of the series, on his submarine signaling receiver, he signals the operator, who then informs the navigator how many dots he heard before receiving the signal from the bridge. This number of dots represents, in miles, the vessel's distance from the lightship.

Thus the bearing of the lightship and the distance from it are both known, and the exact position of the incoming steamer may be plotted on the chart. Subsequent observations can be made at frequent intervals and the ship's course checked to see if it is being affected by tide or ocean currents.

The importance of such observations will be readily appreciated when it is realized that steamers generally have to alter course after passing a lightship, and in clear weather the necessary observations are made visually. Those readers who have ever driven an automobile in a thick fog and missed that vital turning off the main highway will understand the position thoroughly.

### Progress of the System

These latest developments in combined wireless and submarine signaling have been adopted mostly in Europe, where the following four lightships have been



A lightvessel oscillator

equipped: The Gyedser Rev. Lightvessel, off the Baltic coast; the Graa Dyb Lightvessel, off the North Sea coast of Denmark; the Borkum Riff Lightvessel, off the entrance to the River Ems, Germany, and the Maas Lightvessel, anchored off the

(Continued on page four)



# Combined Wireless and Submarine Signals

entrance to the river of that name, in Holland.

On the American side of the Atlantic there is only one lighthouse fitted so far, and that is the Nantucket Lightvessel. As Nantucket is the first fixed point to be made for by trans-Atlantic shipping, its special importance will be readily understood.

Readers are more or less familiar with radio transmitters in general, but it may be of interest to outline briefly the history of submarine signaling, and the state of its development to-day, particularly as it owes a great deal of its present success to the genius of an American inventor, Professor R. A. Fessenden.

The first experiments in submarine signaling were made nearly 100 years ago by Colladon and Sturm. These gentlemen succeeded in hearing the striking of a submerged bell across Lake Geneva, but, until comparatively recently, little advance was made over this method of communication.

One of the greatest difficulties in the way of long-range submarine signaling lies in the fact that water is practically incompressible, but in order to propagate sound waves through any medium it is necessary to set up compressional waves, or strains. To do this in water requires a vast amount of power, which was not available in convenient form till electricity became available in practical form, and modern developments in its application enabled Fessenden to solve the problem successfully.

The principle followed by all inventors who have tackled the problem electrically is to arrange for some form of submerged diaphragm to be vibrated by the intermittent magnetic field of a powerful electro-magnet fed with alternating current of chosen frequency.

Devices operating along these lines are known as oscillators, and the general form taken by the Fessenden oscillator is shown in the figure. A powerful ring-shaped electro-magnet is mounted around a cen-

tral core, and in the annular space between the magnet and the core is located the moving part, or diaphragm, which in this case is a copper tube. Owing to the particular design and arrangement of these parts, the tube acts as a closed secondary to the core winding.

The ring magnet, when energized, produces an intense magnetic flux, amounting to over 15,000 lines of force per square centimeter. The magnetic circuit is from one pole the ring magnet across the air gap (which contains the upper part of the copper tube diaphragm), through the central fixed armature, across the other air gap to the lower pole face of the ring magnet, and back to the upper pole face through the yoke of the magnet.

In operation direct current is continuously applied to the winding of the ring magnet from a 4-kw. dynamo, and signaling is accomplished by switching on to the winding of the central stationary armature a powerful alternating current having a frequency of about 500 cycles.

This alternating current induces a similar current in the copper tube, which, being free to move, vibrates in the field set up by the ring magnet. This vibration transmits a rapid in-and-out motion to a metallic diaphragm which is attached to the tube. This latter diaphragm is made of steel, five-eighths of an inch thick, and forms the base of the oscillator.

The whole apparatus is lowered in the water to a depth of twenty-five or thirty feet on the end of a chain, and with it goes an armored cable which carries the current supply.

## Considerations of Operation

The complete apparatus weighs about 100 pounds, which is comparatively light when the power applied to it, which is necessary to overcome inertia of parts and, particularly, the strain of transmitting compressional strains to the water is taken into consideration. To construct heavy apparatus of this type so that it

will respond to alternating currents having a frequency of 500 cycles is no simple task.

A frequency so high as this is necessary in order that the signal as received by listening ships may have a distinctive high note, which can be easily identified through interference from extraneous noises, and, particularly, the wash of water against a ship's side. Observations of submarine signals are always taken with the ship going full speed, unless she is slowed down for some reason or other, and the noise made by water passing over the receiving diaphragms is surprisingly loud.

These receiving diaphragms consist of circular plates fitted one on either bow, well below the water line, and connected up, through a sensitive detecting device, to the navigating bridge. The navigator listens for the signals with a pair of telephone receivers, one being connected up to the diaphragm on the port bow, and the other to that on the starboard bow.

If the ship is heading direct for the source of the signals they will be equally strong in each phone, but if she is inclined at an angle to the source, the signals will be received louder in that phone which is connected to the receiving diaphragm nearest to it.

The detecting apparatus is very similar to the oscillator, only it is built on a lighter scale. The sound waves striking the pick-up diaphragm cause it to vibrate, and these vibrations are transmitted to the copper tube. The vibrations of the latter within the magnetic field set up currents in the central core winding which may be heard in a pair of telephones. Considering the heavy nature of the parts, it is indeed surprising that they will respond to such minute sound vibrations.

Besides being of value for warning ships of their approach to dangerous spots and its value in conjunction with wireless for measuring distance, submarine signaling has other valuable uses.

For the two purposes mentioned above, prearranged signals are sent out at regular intervals of a few minutes, automatically, but the apparatus can also be used for intercommunication between ships by means of the Morse code, the operating key being placed for this purpose in the A. C. circuit.

The ordinary average range of the Fessenden oscillator, with a ship going full speed, is between twenty and thirty miles, or more if the ship is stopped, thus silencing interfering noises from the wash of the waves, the throb of the propellers and the beat of the engines.

Another use to which the submarine oscillator is put by the United States Navy ice patrol ships is that of locating icebergs which drift down annually on to the Atlantic steamer lanes. For this purpose oscillator impulses are sent out and immediately listened for. If such impulses should strike an iceberg the sound waves will be reflected back to the transmitting source again, and the listener, by timing the interval between the emitted signal and its return to the origin, may calculate the distance between himself and the iceberg.

In addition to its adaptability to telegraph communication, the submarine oscillator can also be used, at very short ranges, for telephonic communication. The method is not nearly so perfect or satisfactory as the radiophone, of course, but intelligible speech can be transmitted and received.

In conclusion, it is interesting to note that, although the practical range of submarine oscillators is not very great, the French Hydrographic Service, in the course of experiments, proved that the explosion of a depth charge weighing one kilogram can be heard under water at a distance of over 200 miles.

Thus it may not be long before ships, by combining submarine signaling with radio compass bearings, will be able to determine their position when still more than half a day's run from land.

# Bob, the Boy Radio Fiend, Lays a Ghost

the girl's head and chopped off his own," says I, trying to keep my teeth from chattering.

"Any room suits me," says Yaller cheerfully, and I could have kicked him for his chippiness.

You could see that no one had lived in the house for a long time for the dust lay thick on the cellar stairs and in the living room. We didn't investigate the rest of the house. I was too scared to suggest it, and I hoped Yaller was too.

I had brought along a supply of corn silk and papers and rolled myself some cigarettes and offered Yaller some. Yaller had brought along a radio magazine to read to pass the time.

Well we must have smoked and talked for a long time for it gradually got dark and I lighted the candle and stuck it in an empty milk bottle.

After a while I said I felt kinder sleepy. Yaller said he was too. So we unrolled our blankets and took off our shoes and stockings. That was Yaller's idea and I didn't want to let him see I was afraid to.

"Shall I blow out the candle?" says I. "Might as well leave it lit," says he, and then we both flopped down side by side.

## A Dreadful Yell

We must have talked ourselves to sleep, for the last thing I remembered was Yaller asking me if I was scared yet, and I said: "No, are you?" And he says something that I didn't catch.

I don't know how long I slept, but I was suddenly awakened by the most unearthly scream of terror that fairly chilled me through and through.

As I leapt to my feet half awake it was to find myself in dense darkness for the candle had either burned out or been blown out. I reached down to feel for Yaller, but he wasn't there.

(Continued from page one)

Then I heard his bare feet go pitter-patter over the bare floor as he was making a mad dash for the front door.

I own up I was scared too and as I didn't want to go bumping into any head-

less man in the dark I frantically searched for a match. As I did so there came a weird sound that made me gasp with fright, and forgetting all about a match I made a plunge for where I thought the

## How Ward Fry Wins a Prize

(Continued from page two)

be a sport you'll lend one of yorn ter finish up this contest an' see who wins."

### The Contest Ends

"But Dunning knew dam well who would win, so he sets ther an' shrugs his shoulders, like this, you know, an' sez, 'Tain't my fault if the lamp burns. Some fellers don't know how ter operate a radio noways. My lamps is part of my set an' you can't ast me ter lend my set ter this yere feller, kin you?' I knowed Dunning an' so did the rest of the fellers, an' so everybody gits up disgusted an' starts ter go ter home. 'Wait a minute,' Dunning shouts out, 'This yere feller, Ward Fry, he lost an' he's got ter make an apology right now.' Well, the audience an' judges took sides an' all you could see was arms an' fists aswinging an' landing, now an' then, on some feller's jar. I 'sprised the old woman by knocking out Dunning, even tho he is twice as big as I am. I found her cheerin' an' wavin' my coat an' hat up in the air an' we walks outta the hall with a big crowd cheerin' us all down Main Street.

"Now acourse you understand I really won the radio contest and shud hev gotten the prize an' all that. It wasn't my fault one of them lamps was defective an' burnt out, so I cuden't hear Chicago, or something' futher away. Folks all knowed thet an' I got the laugh on Dunning—thet's what counts. He ain't so dam smart these days, an' he never talks 'bout radio to nobody anymore.

### The Newspaper Report

"But this feller Dunning is a slick one, an' he tells Rogers thet if I git thet prize

he'll tell his brother, who's a lawyer, an' hev us all arrested fer conspirin' agin him. An' so I guess Rogers is afeared ter do anythin' with the prize. He tells me thet he lost it in the fight thet night at the contest, an' mebbe he did at that, you can't tell, you know. But anyways, I got my pitcher took in Scranton, an' the 'Gouldsboro Weekly Trumpet' printed it on the first page! An' along with it they puts a piece all 'bout the contest, how the lamp wore out, an' all 'bout the big fight. They sez, 'Ward Fry was the knockout of the evenin'. Gouldsboro an' Mummyville is proud of him an' his inventions. He won, most folks think. But owing ter the fact thet Judge Charley Smith has went away from town since he got outta the hospital, there's a deadlock twixt the judges as ter who won, an' nobody knows which side Smith wuz fightin' on, an' when ast he sed he didn't know hisself. Lemme sez they sed somethin' else, but thet's all I memorized. Jes' a minute an' I'll go upstairs an' hunt up the paper fer you an' show you my pitcher an' then'—"

Ward Fry was interrupted just at that moment by the ringing of the telephone, and I saw an opportunity to break away, and incidentally get my dinner. But he noticed my maneuvers toward the door and commanded me to "wait a minute."

He kept his word and was back again in considerably less time than I had expected a rural telephone call would take. "Waddy think," he exclaimed in a excited voice. "I'm gonna git thet there prize! Rogers jes found out thet Dunning ain't got no lawyer brother—in fact, he ain't got no brothers at all!"

front door was and bumped into somebody.

I thought it was Yaller and made a grab for him and was punched on the jaw and knocked down. That made me mad and I made a flying tackle for his feet and we both came down with a crash. As we struck the floor there piled into the room Billy Rich and about a dozen other fellers all with lighted lanterns and with them was Yaller in his bare feet.

As I saw Yaller I gasped, "What the heck!" And then I looked down at the feller I had tackled, thinking I was seeing double.

I wasn't though for he was a stranger to me. He had struck his head against the door jamb and had been knocked unconscious. There was a gash in his head from which the blood was oozing. "Great guns! It's 'Louie the Blood,'" gasped a man's voice.

I turned and there was Officer Britt, the cop. He had heard the racket and had investigated. He snapped the handcuffs on the unconscious man and sent one of the boys for the nearest doctor.

### They Figure It Out

Afterward me and Billy put two and two together and figured it all out. There was no ghost after all. What had sent Yaller screaming out of the house was my bare feet. I never could sleep in one place but was always all over the bed, and when Yaller felt my cold feet alight on his face; yet you know what happened.

As for "Louis the Blood"—it was him all right—he had just camped out in the haunted house until the excitement of his escape had died down. He had heard of the house being haunted and to help it along had fixed up an old radio set he had found in the attic so it would receive static if nothing else.

That was what folks heard who passed the house at midnight, just plain static, and it had scared even me, a died in the wool radio fan.

But that \$500 reward compensated me for being scared all right, and anyway I proved I was braver than Yaller and he had to fork over his new five-tube set to me. The only unfortunate part of the affair was that Dad made me put the \$500 reward money in the savings bank.

## Broadcast Listeners Cause 50% Of Preventable Interference

The Canadian Department of Marine and Fisheries Sends Circular Letter Instructing Fans on the Operation of Regenerative Sets

The following circular letter, addressed to Canadian broadcast listeners and prepared by the Canadian Department of Marine and Fisheries, should be of interest to American listeners, as it tells how to operate a regenerative receiver without causing interference.

A RECENT departmental survey of radio broadcast reception conditions in the more populated centers in the Dominion of Canada indicates that approximately 50 per cent of the "preventable interference" which prevails is caused through the incorrect operation of regenerative receiving sets by the broadcast listeners themselves.

The survey further indicates that most of this interference is due to a lack of knowledge of correct methods of adjusting a regenerative receiving set, and it is accordingly hoped that a material reduction in the same may be effected if the broadcast listeners can be persuaded to co-operate in an endeavor to clear the air of regenerative whistles, and with this end in view the following instructions for operating this class of receiving set have been drafted.

The principle of regeneration as used in radio receiving sets is that the part of the output of the detector vacuum tube feeds back into its own input and thus greatly increases the volume of the signal.

The electric waves reaching the receiving set from the transmitting station travel down the aerial wire through the primary coil in the set and so to earth down the ground wire. The weak electric current resulting from this influence the vacuum tube in such a way as to set it functioning. The resulting output from the plate circuit of this tube is fed back in such a manner as to set up a "field" or influence in the part of the circuit connected to the input (the grid) of the tube. This "field" induces in the input circuit a current of electricity of the same frequency as that of the received electric waves. The energy, therefore, which comes down the antenna wire is automatically strengthened by an impulse from the output of the detector tube.

### What Is Oscillation?

Unless controlled this action will continue until the saturation point or climax is reached, the tube being then said to be in a state of oscillation. When a receiving set is in oscillation it causes howling and squealing in your own and your neighbor's receiving sets. Regeneration should therefore never be allowed to proceed to this point, as it then constitutes a public nuisance.

On commercial receivers regeneration is not always described by this name and the dial which controls this feature of the equipment may be designated by any of the following terms: Regeneration, amplification, reaction, varind, tickler, sensitivity and feed-back.

When a radio receiving set in a state of oscillation is being tuned to a broadcasting station:

1. It causes whistles in radio receiving sets of all types which are tuned to the same station; this interference may be heard up to a distance of several miles.
2. It distorts the quality of your own music.
3. It uses more B battery power and, therefore, the life of the B battery is reduced.
4. It tends to reduce the life of the detector tube.

When a radio receiving set, in a state of oscillation, is exactly tuned to a broadcast station it is said to be in the state of zero beat. This distorts the broadcast reception and also interferes with neighboring receiving sets which are tuned to the same station.

In a word, regeneration carried to oscillation causes great annoyance to your neighbors, poor reception and expense to yourself, and has no advantages whatever.

### Do You Cause Interference?

The interfering whistle which you hear in your receiving set may originate in your own set, or it may be interference caused by your neighbor. In order to determine this point you may make the following test:

Leave the regeneration control in a fixed position, slowly rotate the tuning dial, and note particularly the change in sound of the whistle. If the whistle rises and lowers in pitch sympathetically with the movement of your tuning dial it indicates that your receiving set is in a state of oscillation and probably causing interference to other sets. On the other hand, if the whistle does not change in pitch corresponding to each movement of your tuning dial, but simply varies in volume, the whistle is not caused by your receiving set, but is

interference produced by some other oscillating receiving set in the neighborhood.

Many so-called non-radiating receivers will, under certain conditions, radiate and thus cause interference. Make it your business to see that your set is not causing trouble.

If you are in doubt as to whether your set can cause interference, you can check the same by making the following test, but be careful to do so at a time when only a few persons are listening in, so as not to cause annoyance:

Call a neighbor on the telephone and ask him to listen in on a particular station at a prearranged time, and then tune your own set to the same station. Turn up your detector tube filament control to its maximum; move your tuning dial five times slowly across the point corresponding to the tuning of that station, then telephone your neighbor and ask him if he heard the interference corresponding to these five movements of the dial on your receiving set. If he heard your interference, the probability is that hundreds of others also have been annoyed at times by radiation from your receiving set. You should therefore learn how to operate without causing this interference.

### How to Adjust a Set

If you will take the trouble to observe the rules which follow you will obtain greater satisfaction and enjoyment from your radio receiving set, and at the same time cause minimum annoyance to your neighbors.

- (1) Practice on tuning powerful stations first, and do not try to pick up weak distant stations until you become expert.
- (2) Use both hands, one hand for the regeneration control and the other hand for the tuning control.
- (3) Keep the regeneration control always just below the point of oscillation, your set is then in the most sensitive condition. This is the reason for using your two hands for tuning.
- (4) If your set then accidentally breaks into oscillation, turn back the regeneration control at once.
- (5) Do not try to find a station by the "whistle." If your set is tuned just below the whistling point, the signals will come in clear and your regeneration control can then be tuned a little further to increase the volume.
- (6) Do not force regeneration in an attempt to obtain loud speaker volume from a set not designed for the purpose.
- (7) Do not force regeneration in an attempt to hear stations beyond the range of your set.

The fact that you once heard a distant station on your receiving set is no indication that you can hear this station regularly, for occasionally a radio broadcast from a distant station is received with extra strength due to some freak condition. When you have tried to tune in a station in the correct manner for a minute or two and are not able to hear it, do not unduly increase your regeneration and persistently wiggle your dials, for in so doing you may be causing annoyance to some other broadcast listener who would otherwise be able to receive this distant station on a multi-tube receiving set.

You can accordingly assist in eliminating these whistles by:

- (a) Learning to operate correctly yourself.
- (b) Not allowing children who are not old enough to understand the correct method of operation, to cause interference from your set.

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**Radio Announcers Of America Elect Board of Governors**

Keen interest was displayed when the first announcement of the board of governors of the Radio Announcers of America was made at the Radio World's Fair recently held in New York. The board is made up of the following: Bob Emery, of WEEL, Boston; G. V. Willets, of WRNY, New York; George S. Cruger, of WOO, Philadelphia; Lambdin Kay, of WSB, Atlanta; Harold Hough, of WBAP, Fort Worth; John Daggett, of KHG, Los Angeles; Richard V. Haller, of KGW, Portland; Corley W. Kirby, of WWJ, Detroit; Charles Burke, of WHT, Chicago; and A. W. Ryan, of CNRO, Ottawa.

Membership in the Radio Announcers of America is limited to persons of good standing, citizens of the United States of America or the Dominion of Canada, who are either announcers or alternates of a listed broadcasting station, or those persons or corporations owning or operating a listed radio broadcasting station within the United States or Canada and directors of these stations.

Members are to be elected by the board of governors, which also has control of the management of affairs and the property, funds and finances of the association. It is to make radio an even more perfect form of entertainment that the Association of Radio Announcers of America has been formed. Its chief aim is to raise broadcasting and announcing to an even higher level by creating a central unit, through which literature may be distributed, and in general to act as a source of guidance and improvement to the radio announcers of America.

**Youth Accelerates**

How much radio is indebted to the younger generation was indicated recently in a public address by Edward H. Jewett, president of the Jewett Radio and Phonograph Company, when he said:

"There is one section of the public to which I want to make a special acknowledgment—that is, to the youth of this land, the youngsters and 'kids' on the lighter side of twenty-five. They have done wonders. If every company has had as much of its progress aided by youth as ours has had, then truly radio is eternally indebted to them."

"Long ago we made it a rule never to turn down a youngster who thought he had an idea. This got about, and they came to us by dozens and wrote to us by thousands. Naturally, most of them were going over plowed ground, but not all of them. Some of the best ideas we have utilized in our products have come from such youngsters as these I tell you of, and I am proud to say that two of the outstanding features of our new receiving set are due wholly to them. We were fortunate in drawing them to us, and you may be sure their rewards will be great. Most fortunate, though, is the public, because the real fruits of all radio development go to them."

"Our experience with youth has been so wonderful that I often wonder whether the old saying, 'Youth will be served,' ought not to be changed to read something like this: 'Encourage youth and it will serve.' Never knowingly would we do anything which would hurt the spirit, the enthusiasm of any youngster. A little patience, a little understanding brings forth fine results from these young men. If they are granted this they never know when they are licked. No problem confounds them. And that is the spirit which makes radio progress."

**"Laughing Song," Requested By Children in Program**

The "Laughing Song," made popular by "Dusty," the barytone of "The Gold Dust Twins," and "Dolcey Jones," a pre-Civil War song by Stephen C. Foster, will be the vocal features on their program on Tuesday at 8:30 p. m. from WEAF and eight other stations—WEEL, WFI, WCAE, WGR, WWJ, WOC, WJAR and WCCO.

Hundreds of requests, many of them from children, have asked for the repetition of the "Laughing Song," and it will be given in compliance with their requests. "Roll On Silver Moon," another before the war song; "Good-by, Eliza Jane," "Me and My Partner" and "Oh, Didn't He Ramble," a popular song of twenty-five years ago, are included in the vocal offerings.

**23 Stations to Send News on World Series**

The world series games, beginning October 7, will be described by Graham McNamee through the WEAF chain of stations as follows: WEAF, New York; WJAR, Providence, R. I.; WEEL, Boston; WTIC, Hartford, Mass.; WOO, Philadelphia; WCAE, Pittsburgh; WCAP, Washington; WCTS, Worcester, Mass.; WGY, Schenectady, N. Y.; WGN, Chicago; KDKA, Pittsburgh; and WMAQ, Chicago. On October 10 and 11 station WSAI, Cincinnati, and on October 11 station WLW will be added to the list.

Among other stations broadcasting these games are KSD, St. Louis; WPG, Atlantic City, N. J.; WJZ, New York City; WOR, Newark, N. J.; WRC, Washington; WGBS, New York City; and WNYC, New York City; WWJ, Detroit; KOA, Denver, Col.

**College Studio of KDKA to Open**By Mary Frances Philput  
Manager University of Pittsburgh Studio

"The Campus of the Seven-League Boots," though sounding somewhat like an inverted Arabian Nights tale is, as a matter of fact, merely a twentieth century reality, the most extraordinary part about it being that any one may be "on" this campus simply for the wishing. And, mind you, the boots that such a campus—in point, the one at the University of Pittsburgh—dons are light fairy things, invisible, traveling through space and carrying their load right around the world!

All this is but to say that the University of Pittsburgh radio studio, in co-operation with Station KDKA, has extended its campus not only over the whole of the United States and Canada but to South America, to islands of the Pacific, to Europe and to Africa as well. Indeed, if alphabetical lists were to be prepared on the basis of letters received from any single talk, it would be quite a common occurrence to find that on one side of you had sat a radio classmate in Glasgow, Scotland, while on the other side had been some one in Porto Rico, "you" standing for any one in any corner of any state in the United States.

Dr. John Gabbert Bowman, chancellor of the University of Pittsburgh, will open the 1925-26 season of broadcasting from the university studio on Monday evening, October 5, by speaking to the members, new and old, of the "Campus of the Seven-League Boots" on the subject, "Spare Moments."

Following the opening night programs will be put on the air from 7:45 to 8 every night in the week except Saturday and Sunday. These are broadcast as a regular part of the KDKA evening program.

Building on a framework of a year's experience in providing "educational features" for KDKA, the university has arranged its programs for the coming year largely according to the types of broadcasts which have in the past seemed to give to the radio listeners the highest degree of satisfaction. The broadcasts fall into two major classifications. First, there is the cultural material—discussions of literature, music, art and philosophy. Last year, for example, a series of talks on Greek philosophy—the professor called the series "Conversations With a Philosopher"—met with enormous success. Then, in the second place, there is the material of a so-called more practical nature which has a wide appeal. In this category are talks on science, and especially in its allied fields, talks, indeed, on every subject in which there is current interest and a consequent eagerness on the part of people to get hold of facts which will help in forming judgments and in crystallizing opinions. At the university studio two nights a week have accordingly been set aside for a series of talks that will follow these two lines.

Occupying the periods for the remaining nights, one will be devoted to readings from standard authors, while another night will be used for a current events forum. Friday night will be held, as a rule, for special features.

**Radio Listener in Switzerland Finds Alps Staticless**

Did you ever hear of a location which in mid-summer is free of static, where in the middle of July one may listen in on distant stations as undisturbed by this pest of radio reception as on the most favorable winter night?

Such a Utopian place actually exists, one of the European observers of Westinghouse Station KDKA has reported to the station.

The place is on the slope of the famous Jungfrau Mountain, in Switzerland, a peak of the Bernese Oberland Mountains which towers nearly three miles toward the sky.

This snow-capped mountain is one of the show places of the Swiss Alps, and a good view of it may be had from Interlaken.

Another place where the "grinder" variety of mid-summer static is seldom found is on a shelf of the Lauterbrunnental, another Swiss peak.

The discoverer of these static-free spots is Stanley McClatchie, an American electrical engineer, who is living in Stuttgart and who is one of the large group of regular observers who report to KDKA on the reception of its short wave transmissions in every corner of the civilized globe.

"I was in Switzerland two weeks in mid-summer and tried out reception in various locations in the Alps," Mr. McClatchie writes. "I tried reception in some places where probably no radio set had ever been."

**Ideal Conditions Found**

"I listened in for five nights at Murren, on the shelf of the Lauterbrunnental, at a height of about one mile. Here I found far better reception conditions than I ever had experienced in summer weather. On two of the five nights the air was practically clear of static disturbances by 10 o'clock. All European stations of any consequence could be heard so clearly that speech was quite understandable. This is saying a great deal when one considers that distances up to 800 miles were involved and that European stations have nowhere near the 'kick' that American stations possess, regardless of the high power ratings here in vogue. On the other three nights reception was not as clear as these other two, but still was nearly equal to what we have in Stuttgart in winter."

"I next listened in for four nights in Kleine Scheidegg, in the lap of the Jungfrau, at a height of a mile and a quarter. The broadcast stations of Europe stood out clear cut against a silent background. It was an almost uncanny experience. I was able to hear Glasgow, Oslo, in Norway, and Barcelona as clearly as Zurich."

"On the third night reception was slightly marred by occasional cracks, but the ruinous 'grinder' variety of static was at all times absent, except around the sunset period. Sunset brought with it moderate static disturbances, but these gradually disappeared as the evening advanced; by 10 or 11 o'clock there was absolute silence."

**Static Heard**

Mr. McClatchie later tried reception on the very tip of the peak of Mount Niesen, a mile and a half high, but static here, in contrast to conditions on the slopes of the higher peaks, was as bad as in Stuttgart or American cities during summer.

"This peak (Mount Niesen) is at a distance of some fifteen miles from the High Alps and has a free and commanding position," Mr. McClatchie writes. "On all three nights reception was poor, just about as poor as summertime reception in the city. Static was so bad that it was not worth while listening to any station further away than Zurich."

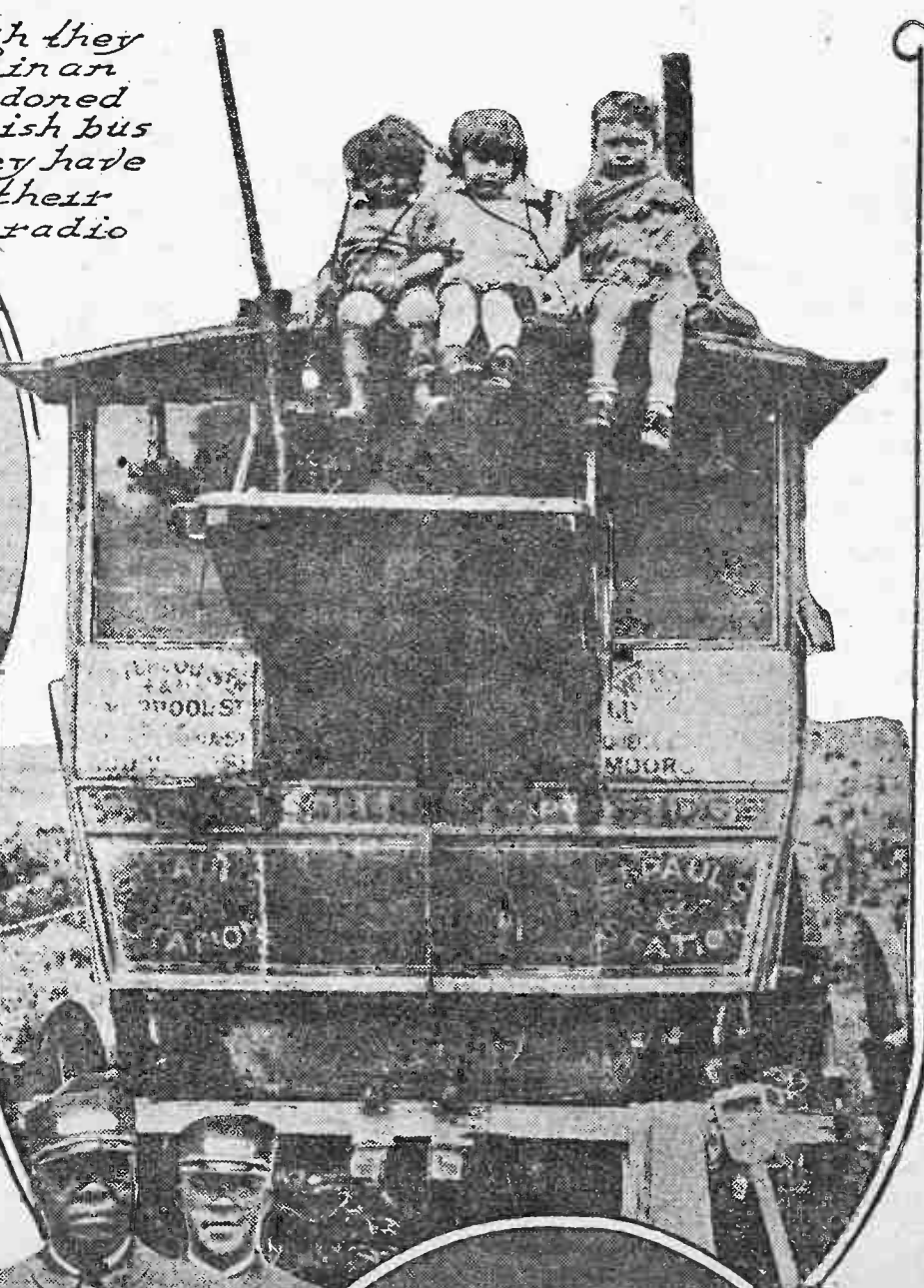
"I was surprised to find that the great height brought no improvement in the strength of the signals, although my aerial was practically over the very tip of the mountain and a very good ground was available. Distant stations were heard no louder here than at much lower points or even in Stuttgart."

The absence of static on the slopes of the Jungfrau and Lauterbrunnental Mr. McClatchie ascribes to the influence of the snow-covered peaks which tower more than a mile above the places where he rigged up his receiver. Lightning never strikes at Scheidegg, Mr. McClatchie learned; high potential electric disturbances are absorbed by the peaks above.

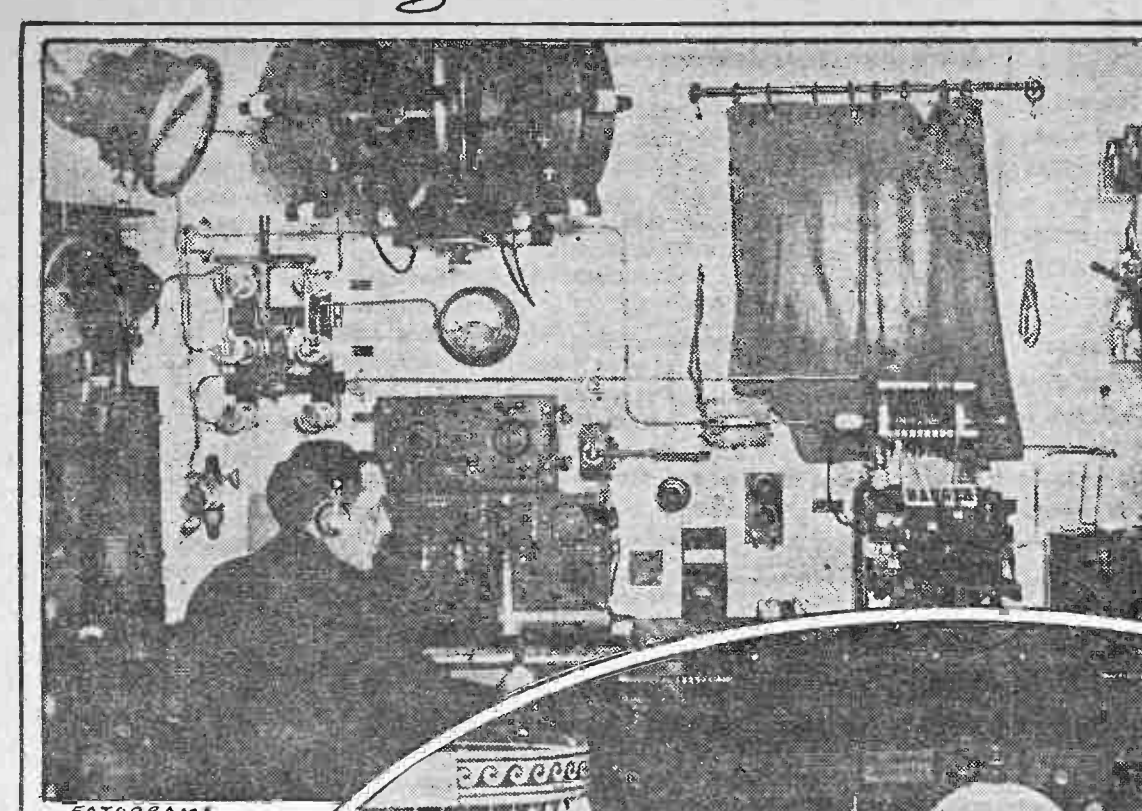
It was Mr. McClatchie who arranged for rebroadcasting of KDKA programs by the Stuttgart station, the programs being relayed by the station's international short wave relay system.

**Up-to-the-Minute News of Radio in Pictures**

Aimee Semple McPherson, Los Angeles woman evangelist, uses airplane and portable radio when traveling



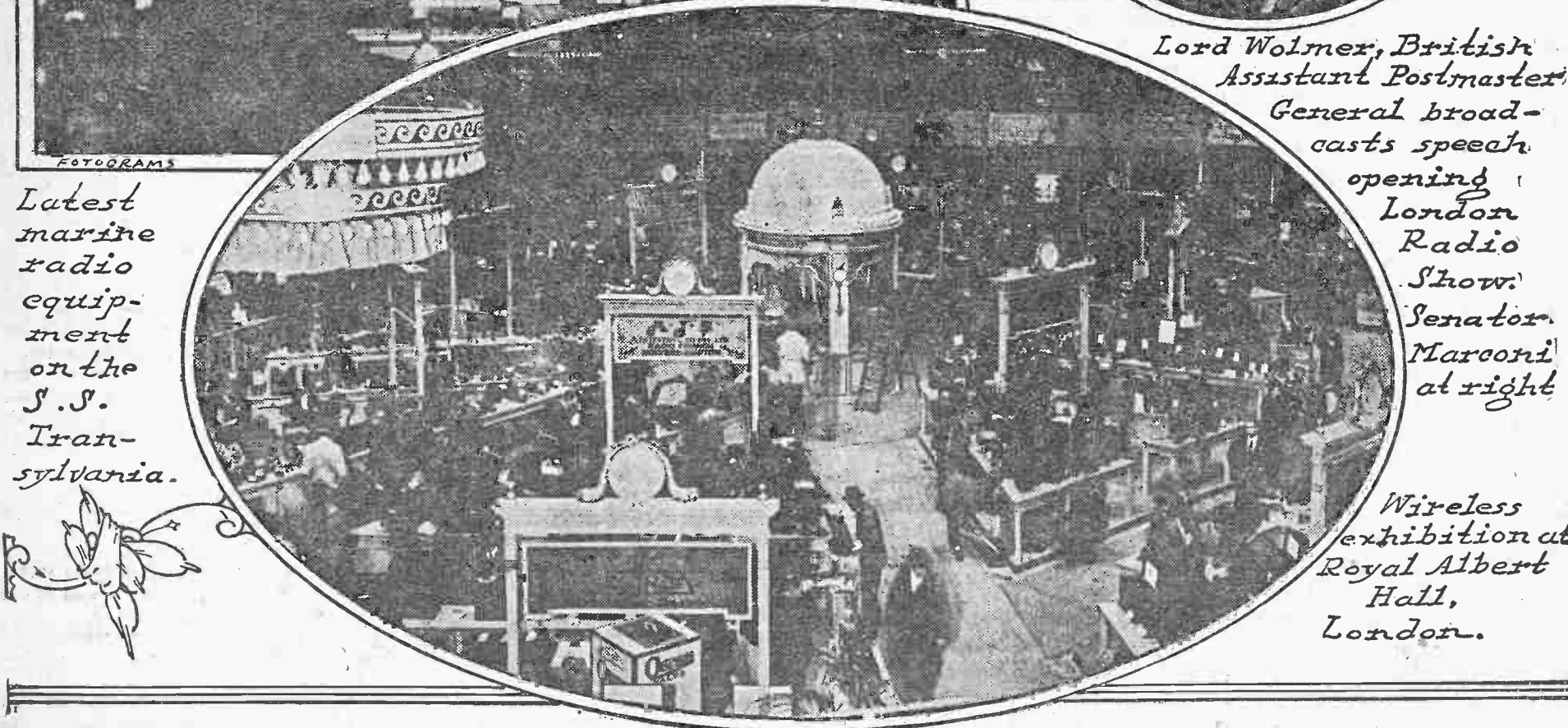
Pullman porters' octette sings from station WEAR during the National Safety Convention



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Lord Wolmer, British Assistant Postmaster General broadcasts speech opening London Radio Show Senator Marconi at right



Wireless exhibition at Royal Albert Hall, London

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# Measuring the High Frequency Resistance and Distributed Capacity of Coils

## Determining These Characteristics of Inductances Is Simpler Than Generally Supposed

By WILLIAM H. FORTINGTON

WE ARE now living in a low loss era. That is at least the term applied to designate the quality of certain inductances and condensers. The number of low loss coils available to the public to-day is legion, and for some obscure reason the serious minded experimenter seems to be returning to the old time form of coil construction, which, as every one remembers, was the fiber tube, with the coil wound upon it, constituting what is generally known as a solenoid.

The solenoid may be regarded as the parent and standard of all inductances. This is borne out by the fact that com-

a known frequency is to be measured, G a thermocouple galvanometer or hot-wire milliammeter used as an indicator of the resonance point of the two circuits. C a variable condenser of approximately .001 microfarad, R a variable resistance.

The condenser C must have extremely low losses at the frequency to be measured, and should be selected with great care by the experimenter. The writer uses an excellent condenser of the grounded rotor low loss type, whose stator plates are supported on insulating insulators, and whose losses are practically immeasurable until the extremely high fre-

quency is used. In such a case the results obtained will be absolutely fallacious.

After a record is taken of the amount of current flowing in the test circuit the resistance R is then substituted for the coil X, and the capacity of the condenser C varied, thereby retuning the circuit until the resonance point is again reached as indicated by the galvanometer. The resistance R is then varied until the same deflection on the meter is obtained as when the coil X was in circuit in place of the resistance R.

The amount of energy flowing in the test circuit is then equal to the previous amount as indicated by the meter. The value of the resistance R then equals the

pursuance of high frequency measurements. L is a coil wound on a three-inch former having forty turns. The plate coil of the oscillator tube is composed of thirty turns of the same wire, which may be 22 double silk or double cotton covered wire, and is wound about one-fourth of an inch from the other coil on the same tube. Care should be taken that the two coils are wound in the same direction.

The transformer shown in the diagram is an ordinary audio-frequency transformer having a ratio of about 3 1/2 to 1. The modulator tube is responsible for the production of the audible note, which may be varied by varying the filament current of this tube.

After the circuit has been set up as shown in figure 2 the condenser C, which should be calibrated, is rotated until the fundamental wave length of the oscillator is heard with maximum intensity. The coupling between X and L must be fairly loose in order that the note of the oscillator is not heard over too great a section of the dial. When the fundamental wave length has been tuned in sharply and accurately, the condenser capacity reading should be noted.

### Relation to Frequency and Capacity

The condenser should then be rotated until the first harmonic of the upper frequencies of the oscillator is heard. This first higher frequency harmonic, it must be remembered, will be found upon a lower wave length. It is obvious then that the condenser capacity must be decreased. Now the value of the inductance whose distributed capacity is to be measured may be assumed constant, and since the frequency varies inversely as the square root of the capacity, it will be seen that the capacity required to tune in the harmonic is a little less than one-fourth of the capacity required to tune in the fundamental frequency.

We may express this in formula as:

$$(Kf + K) = 4(Kh + K)$$

$$\text{Hence } K = Kf - 4Kh$$

Where Kf is the capacity required to tune in, the fundamental Kh is the capacity required to tune the first harmonic, and K is the parasitic on distributed capacity of the inductance under measurement. Providing the experimenter exercises sufficient care in reading his condenser capacities he will find this method to be very accurate.

### Precaution to Be Taken

The amount of coupling between the inductances will be governed by the intensity of the harmonic signal in the telephones, which will be of course much weaker than on the fundamental frequency. The same amount of coupling should be used for checking at both frequencies.

It must be understood that all factors in the circuit with the exception of the capacity of the condenser C must be kept constant during this test, as otherwise the results obtained will be somewhat erratic. The value of obtaining these characteristics of coils will be of great aid in the designing of good inductances for radio receivers, but obtaining the actual constants of one coil is of little value. The value does, however, lie in the fact that if more than one coil has been constructed accurate comparisons may be made between the two. In this manner it is possible to distinguish a good inductance from a poor one.

A perfect coil would be one which offers no resistance to the flow of an electric current and which has no distributed capacity. In other words, its only electrical characteristic should be inductance. However, this condition is impossible for the simple reason that the substance which has no electrical resistance is yet to be discovered. Then, again, inasmuch as the turns of wire of the inductance are wound parallel, there is bound to be capacity between each turn. It is therefore easy to see the value of determining the high frequency resistance and distributed capacity of an inductance will be a great aid in the construction of truly "low loss" coils.

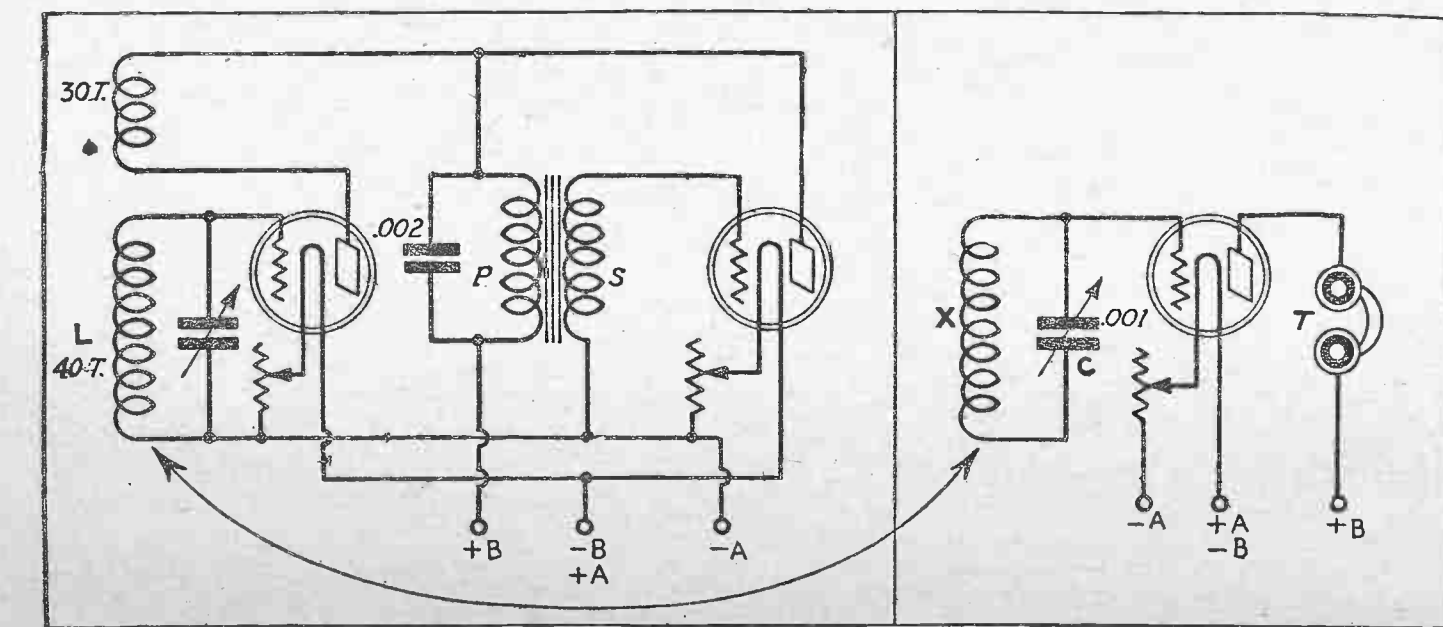


Figure 2—The wiring diagram of the oscillator to be used for measuring the distributed capacity of an inductance

petent electrical and research bodies accept this form of winding for their standard of inductance. It is the intention of the writer to present to the experimenter two reliable means of two equally essential high frequency measurements rather than make a qualitative analysis of the various coils available. An efficient inductance might be defined as a coil having a high inductance value, when compared with its resistance at all frequencies. The absorption due to dielectric losses and the distributed capacity should be reduced to a minimum. It is common knowledge that as the frequency of the induced current in a coil is increased, the resistance to that frequency also increases. This is perhaps the most important factor to be considered in designing an efficient coil.

The measurement of high frequency resistance is much simpler than might be generally supposed, providing certain precautions are exercised during such measurements. Perhaps the best known method of high frequency resistance, measurements consistent with a fair amount of accuracy and ease of application, is the use of the plotron or vacuum tube oscillator, whose application to radio frequency measurements is many and varied. This is more generally known as the substitution or direct comparison method.

Figure 1 represents schematically the set-up required for measurement of the high frequency resistance of a coil. V is a radio frequency oscillator, or vacuum tube heterodyne wave meter, delivering a radio frequency output of about five watts at a known wave length or frequency which might be for all practical purposes 200 meters, which is equal to 1,500,000 cycles per second.

This oscillator may take the form of a simple single circuit regenerator, provided of course the circuit delivers an output of sufficient power. L is the coupling coil, X the inductance whose resistance at

quencies are reached. The resistance R must also meet some stringent requirements. Its inductance value must be immeasurable and should have no inherent shunting capacity across it. Its resistance at all frequencies must be constant. It will be seen by these requirements that this resistance must take the form of a short piece of extremely fine high resistance wire having a high ohmic resistance within a very short length.

### The Measurement of Resistance

The oscillator V is set in action at a known frequency and the inductance L coupled to the coupling coil of the oscillator. The condenser C is varied until the galvanometer indicates a maximum current deflection, which will be of course at the

resistance of the inductance X at the frequency measured.

The energy transference from the oscillator to the other circuit must only take place through the inductance L. For this reason it is desirable to shield the rest of the circuit from any inductive coupling which may take place from the oscillator. On no account must there be any stray coupling between X and the oscillator V. The circuit may be screened by a metal plate or a gauze screen surrounding the circuit, leaving the coil L exposed.

The inductance whose resistance is to be measured should be supported upon insulating pillars away from any surrounding objects, as the proximity of surrounding objects may in extreme cases affect the high frequency resistance of the coil.

One method of measurement of distributed capacity of inductances which is

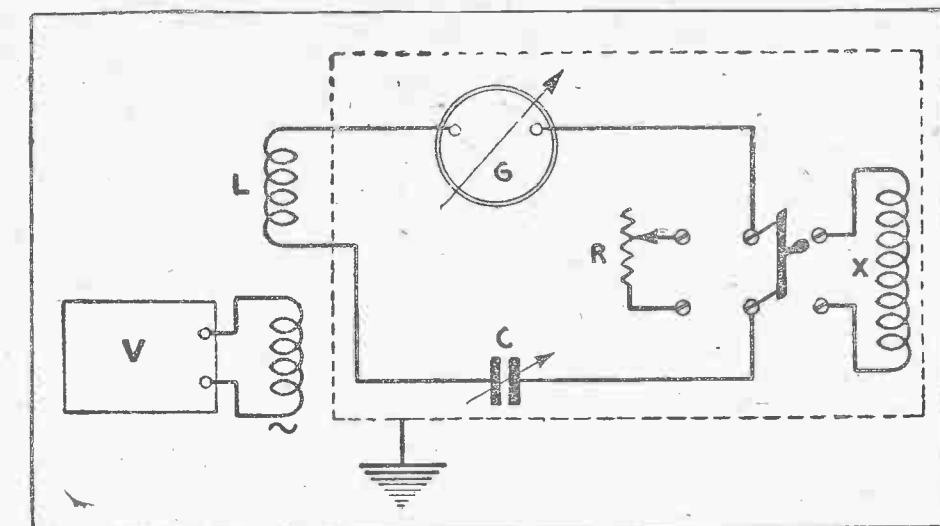


Figure 1—Set-up for measurement of the high frequency resistance of an inductance

resonance point of the two circuits. The amount of deflection upon the scale should be carefully noted, care being taken that the eye is directly in line with the needle at the time of reading.

The experimenter must not be fooled in any manner, such as obtaining a reading on the indicating instrument when the test circuit is in resonance with one of the harmonic frequencies of the oscillator. This is easily done if a wrong value of L

very popular among experimenters is the "wave length square" method. The writer, however, prefers the plotron harmonic method, since the limits of accuracy are decidedly closer.

The oscillator to be used in conjunction with the measurement of distributed capacity of inductances by the writer's method should be a continuous wave oscillator delivering also a sharp note of audible frequency. The circuit of such an oscillator is shown at Figure 2. This instrument has many useful purposes in the

### Schedule of Standard Frequency Signals

The Bureau of Standards transmits, twice each month, continuous wave radio signals of definitely announced frequencies, from the standardization of frequency meters (wave meters), transmitters and receivers. The signals are transmitted from the bureau's station WWV, Washington, D. C., and from station 6XBM, Stanford University, California. The complete frequency transmission included a "general call," a "standard frequency signal" and "announcements."

The schedule of standard frequency signals from both stations is as follows:

Time	Oct. 5	Oct. 20	Nov. 5	Nov. 20	Dec. 5	Dec. 19
550	1500	3000	125	300	550	
10:00 to 10:08 p.m.	(545)	(200)	(100)	(2400)	(1000)	(545)
630	1650	3300	133	315	630	
10:12 to 10:20 p.m.	(476)	(182)	(91)	(2254)	(952)	(476)
730	1800	3600	143	345	730	
10:24 to 10:32 p.m.	(411)	(167)	(83)	(2097)	(869)	(411)
850	2000	4000	155	375	850	
10:36 to 10:44 p.m.	(353)	(150)	(75)	(1934)	(800)	(353)
980	2200	4400	166.5	425	980	
10:48 to 10:56 p.m.	(306)	(136)	(68)	(1800)	(705)	(306)
1130	2450	4900	205	500	1130	
11:00 to 11:08 p.m.	(265)	(122)	(61)	(1463)	(600)	(265)
1300	2700	5400	260	600	1300	
11:12 to 11:20 p.m.	(231)	(111)	(55)	(1153)	(500)	(231)
1500	3000	6000	315	666	1500	
11:24 to 11:32 p.m.	(200)	(100)	(50)	(952)	(450)	(200)

\* Eastern standard time for WWV, Washington, D. C. Pacific standard time for 6XBM, California.

In the above table the numbers represent the frequency in kilocycles and the numbers in parentheses the approximate wave length in meters.

## Prominent Artists Reciprocates With Radio Manufacturers Increase Aesthetic Value of Radio

The institution of the radio programs by prominent concert and opera stars as announced by A. Atwater Kent, the well known radio manufacturer, will settle once and for all the question of the aesthetic value of broadcasting, in the opinion of S. R. Wiley, president of the National Radio Service League, the newly formed organization of broadcast listeners.

"In the past self-appointed critics of radio, particularly people in the theatrical profession, found themselves attracting profitable publicity whenever they publicly deprecated the value of broadcasting," says Mr. Wiley. "The more dispirited attitude they adopted, the more attention their remarks earned, so for a while we heard radio mercilessly denounced as an endless procession of blatant jazz bands, silly bedtime story tellers, medical quacks and pernicious advertising propagandists."

"No one can make such criticism now, for the artists Mr. Kent has engaged are without peer in the musical world. Who can call radio broadcasting crude and uncultured when such stars as Reinold Werrenrath, the world famous singer; Louise Homer, contralto of the Chicago Civic Opera Company; Mabel Garrison, of the Metropolitan Opera; Anna Case, Frieda Hempel, Mischa Levitzki, pianist; Toscha Seidal, renowned Russian violinist; Edward Johnson, of the Metropolitan, and many others will face the microphone and deliver their best efforts into it? Of course, we will always have our dance orchestras, for even the most intellectual folk must have diversion and entertainment, but if one wants to hear the best there is to be heard in serious music, a radio set will now bring it to him in clear and undistorted form."

### World Series Games To Be Reported in Detail by WOR

A most timely feature scheduled on the WOR program each afternoon, commencing October 7 will be the broadcasting play by play of the world series games to be staged at Washington and Pittsburgh. It was decided by the WOR executives that detailed news of the games would transcend in importance any other entertainments that could be sent over the air and accordingly arrangements were perfected with "The Newark Evening News" to supply complete details of the games played by commencing October 7, will be the contestants for the American classic. All the games will be reported faithfully with the exception of the Sunday game, which will be omitted, due to the fact that the WOR broadcasting schedule does not operate on Sundays.

A schedule of the games to be broadcast follows:  
Wednesday, October 7... 2:45 to 4 p.m.  
Thursday, October 8... 2:45 to 4 p.m.  
Friday, October 9... 2 to 4 p.m.  
Saturday, October 10... 2 to 4 p.m.

The United States Navy has just granted a license to the Patent Electric Company of New York whereby the latter radio manufacturing organization is permitted to make use of valuable patents controlled by the navy. These include the important German radio patents taken over by the government since the World War, especially the basic radio-frequency circuits, the reflex principle and other radio developments of prime importance.

In return for the navy license the Patent Electric Company has granted certain rights to the United States Navy, among them the basic radio plug and improved radio plug patents, patents on rheostats and potentiometers, as well as numerous refinements and improvements in radio parts. The basic radio plug patent was granted upon application made by L. G. Pacent at the very beginning of radio broadcasting, and to-day a number of plug manufacturers are licensed under it and are paying a royalty for manufacturing rights. Quite recently still another has been added to the extensive Pacent plug patents, this last dealing with a specific refinement.

### Small Dimensions Increase Tone Quality of Loud Speaker

By H. H. Shotwell

Chief Engineer, the Operadio Corporation

I have been asked repeatedly how we obtain such a natural tone and clearness of enunciation from our loud speakers. My answer is 50 per cent due to compactness of the sound chamber and 50 per cent to the proper design of the diaphragm and the shape of the sound chamber.

It is well to consider that any loud speaker of the horn type is operated on the principle that a column of air increasing in cross section with distance from the diaphragm is set into vibration at the diaphragm. While the sound wave is relatively small at the diaphragm it is amplified to the big opening of the sound chambers or horn. Some loud speakers have too dark a tone because the column of air which must be displaced is so long that the sharpness of the original sound vibration as it leaves the diaphragm is greatly diminished, with the result that from these loud speakers we obtained a muffled tone or a tone with too much "wool" in it.

So for this very reason we are using a loud speaker of relatively small dimensions; the column of air to be displaced is quite short—about eighteen inches. Mellowness of tone is not sacrificed, as it is obtained where it should be—in the diaphragm. The diaphragm is so designed as to give a mellow tone.

Sam Siegel Presents Program  
Sam Siegel, mandolin virtuoso, is scheduled to continue in his series of concerts on Wednesday evening at 9:15 o'clock, presenting a semi-classical program of solo numbers.

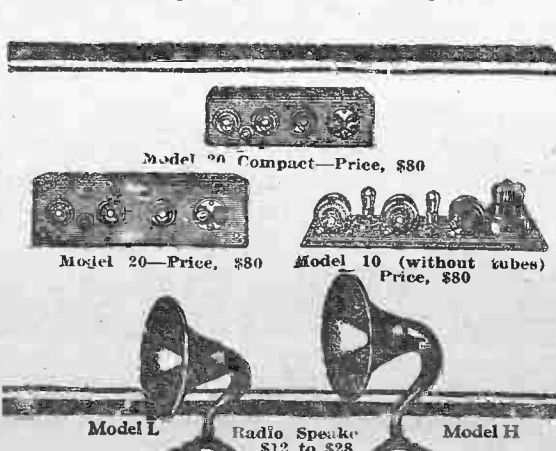
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WCAE...Pittsburgh  
WSAI...Cincinnati  
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WCCO...Minneapolis-St. Paul  
WOC...Davenport  
WCAR...Washington  
WGR...Buffalo

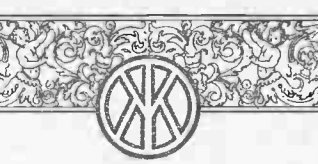


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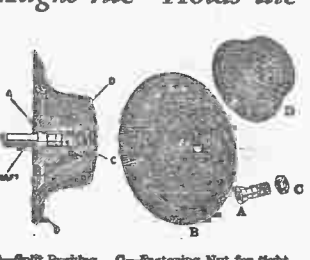
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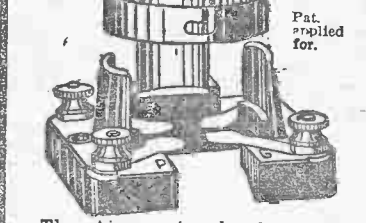
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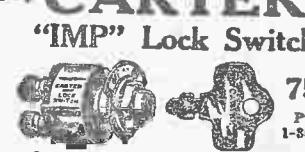
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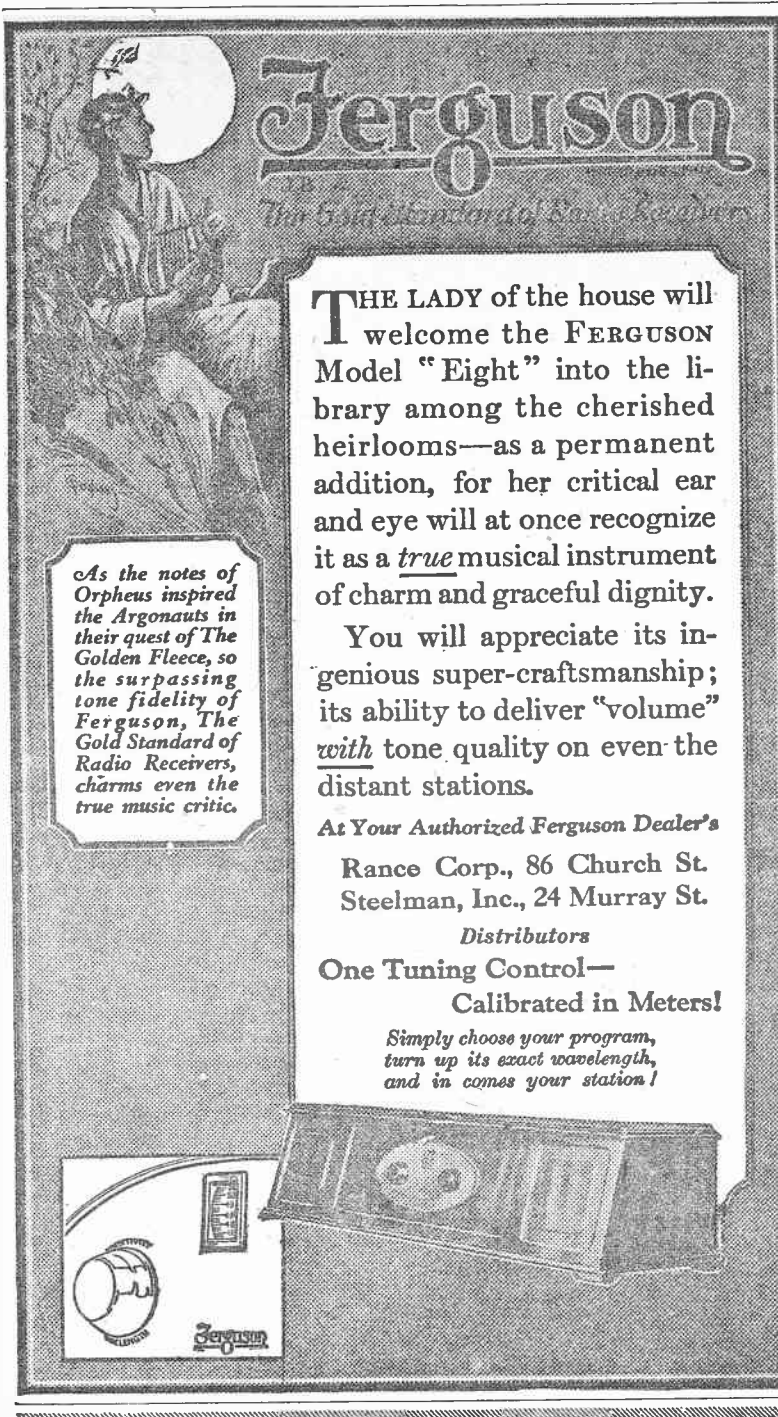
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## Causes of Radio Interference Laid to Electrical Devices

### Power-Line Induction Is One of the Most Frequent Kinds of Disturbance and May Be Eliminated by Proper Location of the Antenna

RADIO reception is, in some localities, seriously disturbed by interference arising from electrical apparatus in the vicinity. A brief outline of the sources of such interference and the methods usually used in mitigation are given herein together with references to further information. The only general remedy for electrical interference is co-operative effort, on the part of users of radio and users or owners of the electrical sources of disturbance, to reduce or eliminate the causes of the trouble.

Much of the work in mitigation of electrical interference results in an improvement in the operation of the electrical devices or supply lines and is thus a double gain. There are, however, some electrical devices which, even when in perfect working order, cause disturbances which result in interference with radio reception. In many cases it is possible to provide filters, shields, chokes, etc., either at the source of disturbance or at the receiving set, which do much to relieve the difficulties.

Part of the disturbance from electrical devices is practically inevitable and must be regarded, like atmospheric disturbances, as part of the inherent limitation of radio reception. In other words, the limitation upon radio reception is not only the distance and the power of the transmitting stations and the sensitivity of the receiving set but also the omnipresent background of slight electrical disturbances which drown out signals below a certain intensity. This background of electrical disturbances is the underlying reason why reception from local stations is inherently superior to reception from distant stations.

#### Power-Line Induction

A frequent cause of interference is the presence of alternating current power wires near the antenna or receiving set. Low frequency voltages (usually 60 cycles) are induced and the resultant current flowing in the receiving circuit causes a "humming" sound in the telephone receivers. The low pitch of the hum will usually identify this source of interference. A method of eliminating or at least reducing the magnitude of this interference is to place the antenna as far as possible from the wire lines and at right angles to them. When the interference cannot be eliminated by such means the proper choice of a receiving set may help. An inductively coupled two-circuit receiving set is less susceptible to such interference than a single-circuit set. The use of one of more stages of radio frequency amplification should also help to filter out the audio frequency interference. It has been suggested that audio frequency interference might be shunted around a receiving set having a series antenna condenser by connecting between the antenna and ground terminals of the set a high resistance, which will offer lower impedance to the audio frequency than will the receiving set itself.

#### Sparkling Apparatus

Sparks are produced in the normal operation of many types of electrical apparatus, such as motors, doorbells, buzzers, gasoline engines, X-ray apparatus, violet-ray machines, some forms of battery chargers, rural telephone ringers and heating pad thermostats. Sparks are also sometimes produced at defective insulators, transformers, etc., of electric wire lines. Sparks usually give rise to electric waves which travel along the electric power wires and by them are radiated out and are then picked up by radio receiving sets. The noise thus produced in a radio set may come from a disturbance which has traveled several miles along the electric power wires.

One remedy for such types of interference is to eliminate the spark. This is possible if the spark is an electrical leak and not necessary to the operation of the machine in which it occurs. Many very useful electrical machines, however, require for their operation the making and breaking of electrical circuits while they are carrying current, and whenever this happens a spark is produced. It is impossible to eliminate these machines, so that it is necessary to make the spark of such nature or so arrange the circuits that the radio-frequency current is reduced or prevented from radiating.

To prevent the radio-frequency current produced by a spark from getting on to the lines connecting the

interested in finding and eliminating this type of trouble than the radio listener. Large leaks and sparks may often be observed at night, especially in hot weather. However, sparks which are too small to be readily noticed may cause serious interference to radio reception.

#### Commutators

Where d. c. motors are in operation near a radio receiving set interference is sometimes caused, especially when the brushes on the motor are sparking badly. The sparking should be reduced as much as possible by cleaning the commutator and proper setting of the brushes. The remaining interference is sometimes overcome by placing two condensers (about 2 microfarads each) in series across the power supply line and connecting their midpoint to a good ground system. This is substantially as outlined above under "Sparkling Apparatus."

#### Bell Ringers

Another source of interference is the ringing machine used in rural telephone exchanges. Telephone engineers can reduce or eliminate interference by connecting a filter between the machine and the ringing keys.

#### Precipitators

Many cases of radio interference have been caused by electrical precipitators which are used to prevent smoke and noxious fumes or material from leaving the chimney. The precipitator operates by establishing a highly charged electric field inside the chimney of such a nature and direction that particles going up the chimney are charged and driven against the walls, where they stick. Precipitators cause interference for the reason that the high voltage used in their operation is obtained from a rectifier which produces sparks and generates radio frequency alternating current as well as the direct current which the precipitators need. If the precipitator is so designed and arranged that the distance between the rectifier and the chimney is only a few feet or if the entire apparatus, including all leads, is housed in a metal building there is usually no trouble. But if the rectifier is separated from the chimney the radio frequency which joins them forms a good antenna which will radiate and cause interference for twenty miles or more. Interference from these precipitators can be eliminated by placing a grounded wire screen entirely around these wires and thoroughly grounding the wire screen and the rectifier. If screening of the various parts is impracticable damping resistances can be inserted at various points in the wire line which will reduce the amount of power radiated. Tuned circuits connecting across the spark gap of the rectifier will assist by absorbing the radio frequency power.

When any connections are made to the power line, in order to avoid fire and personal injury, only apparatus that is carefully tested as to voltage and current-carrying capacity should be used, and the power company should be consulted before making the installation. Additions to the power lines should be made only by qualified persons.

#### Location of Interference

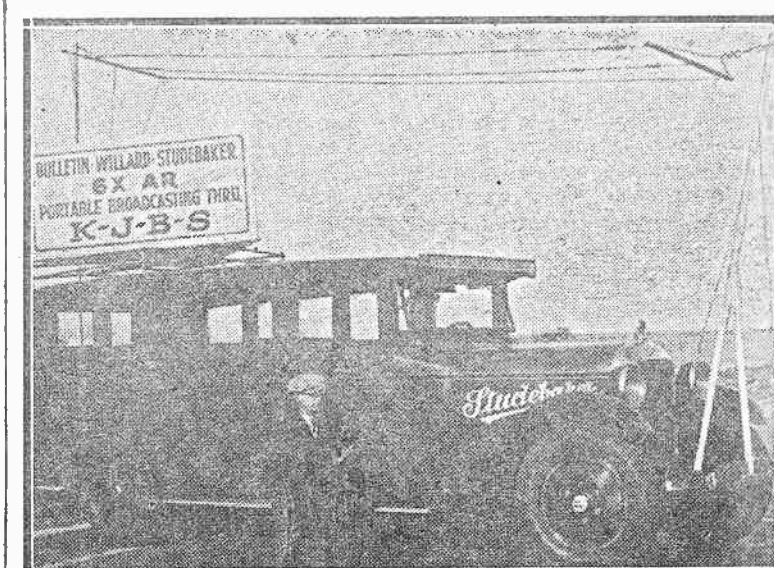
The first thing to do in tracing the source of trouble is to make sure that it is not in the receiving set itself. The next thing is to open the electric switch at the house meter; if the interfering noise is still heard in the radio set the source is then known to be outside the house. It is then desirable to report the situation to the electric power company. Many of the companies have apparatus for the purpose of following up complaints of this kind. Usually a sensitive receiving set with a coil antenna is used to determine the direction from which the interfering noise comes, and this outfit is taken from place to place until the source is found. The location of such sources is often a very difficult and baffling undertaking. The trouble sometimes comes from a spark discharge over an insulator to ground, or between a pair of wires, or it may be that the wire is touching some object such as a tree, pole, guy wire, etc. Such a spark discharge is a loss of power to the operating company and a potential source of serious trouble and for these reasons the company is probably more interested in finding and eliminating this type of trouble than the radio listener.

### Market and Weather Reports For the Farmers' Benefit

For the benefit of the farmers who are rapidly becoming radio fans WEAJ is now giving the consolidated market and weather reports supplied by the United States Department of Agriculture and the New York State Department of Farms and Markets, together with "The American Agriculturist," each day except Saturday and Sunday at 12 noon.

These reports are of great importance to the farmers in determining the correct prices they should receive for their produce and in planning their work, which is directly dependent upon the weather.

### Portable Broadcasting Station



Above is shown the radio equipped car of Station KJBS. The transmitter is operated from storage A and B batteries and consists of a fifty-watt oscillator and modulator. While the vehicle was in motion successful re-broadcasting was accomplished at a distance of four miles from the main station. The call letters of the portable outfit are 6XAR.

## New Type Variable Condenser Solves Interference Problem

### Straight-Line Frequency Instruments Improve Tuning Characteristics of Sets, but Present Mechanical Problems for Maker

By William M. Henderson

SEPARATING stations operating on wave lengths between 200 and 300 meters so that one may listen to one without interference from another has been a difficult task. In an effort to simplify the tuning of short wave stations engineers have experimented with and designed two types of variable condensers.

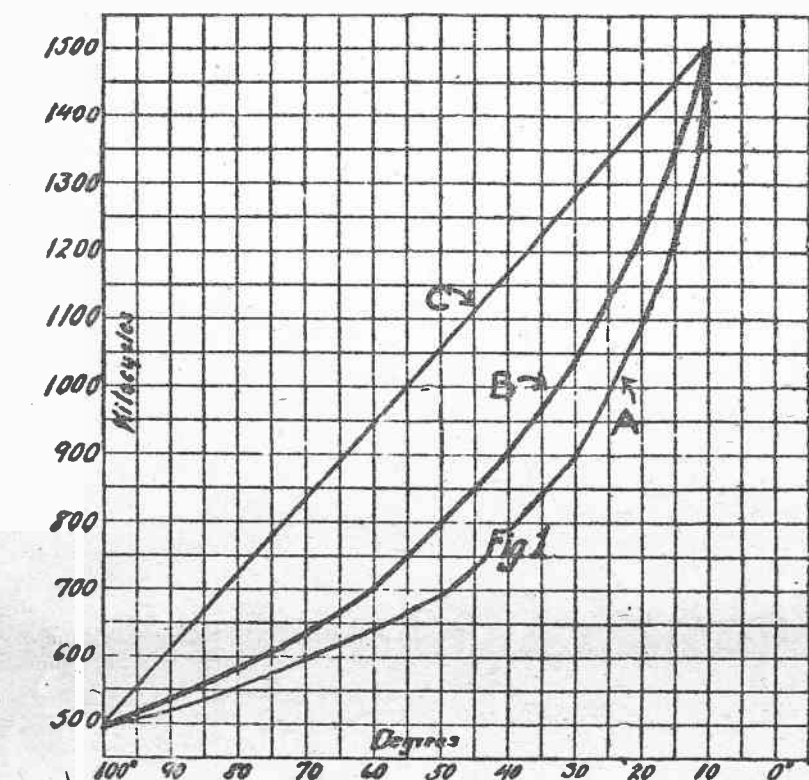
The first type, known as the straight line wave length condenser, differed from those formerly used in that the wave length changes in the circuit proportionally to the dial setting, appeared many months ago. If the government had assigned broadcasting stations to definite wave lengths and separated them by so many meters this condenser would have accomplished simplicity in tuning. However, station assignments are made in frequency and the separation between stations is in kilocycles. Therefore this condenser was only a step in the right direction.

The straight line frequency condenser, which is the second type, length change at this point. This is easily proved by the well known wave length and frequency tuning formula.

Curve B in Figure 1 was obtained with a straight line wave length condenser. This curve, it will be seen, is much better than the former one, but still the stations are crowded at the lower dial settings.

The straight line wave length characteristic of the condenser is obtained by shaping the plates so that the capacity change is slower on the lower dial settings than on the upper.

Curve C given in Figure 1 was made with a straight line frequency



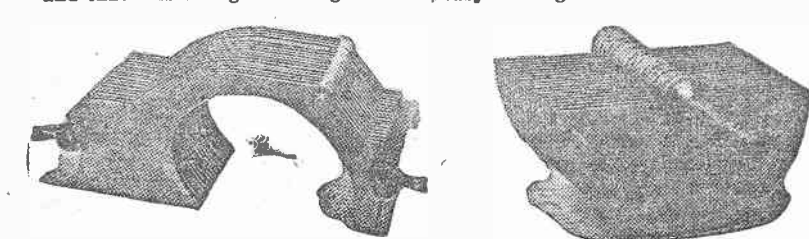
mentioned, has just been placed on the market and does offer the solution to the problem of separating short wave stations as easily as the long wave stations.

With the new condensers the frequency of the circuit changes proportionally to the dial setting, thereby giving an equal frequency separation between stations whether they be short or long wave lengths.

The straight line frequency condenser not only simplifies tuning to a great extent but also, through the equal separation of stations, increases the selectivity of the circuit, especially on the formerly jammed short waves.

To show further the advantages of the straight line wave length and the straight line frequency condenser over the old type straight line capacity condenser three curves are given in Figure 1. These curves were obtained from an actual tuning circuit such as is used in every radio set to-day that employs variable condensers as the tuning control.

Curve A shown in Figure 1 was obtained with a straight line capacity condenser. This condenser is the old familiar semi-circular plate instrument in which the capacity changes proportionally to the dial settings. A glance at this curve will show that the frequency change of the circuit is extremely large below 300 meters and that this change is brought about



within a comparatively small range of the condenser's capacity.

The reason for this crowding on the lower dial settings is that a small change in condenser capacity causes relatively large changes in wave length and frequency when tuning in short wave stations. The frequency change is even greater than the wave

length change at this point. This is easily proved by the well known wave length and frequency tuning formula. Curve B in Figure 1 was obtained with a straight line wave length condenser. This curve, it will be seen, is much better than the former one, but still the stations are crowded at the lower dial settings.

The straight line wave length characteristic of the condenser is obtained by shaping the plates so that the capacity change is slower on the lower dial settings than on the upper.

Curve C given in Figure 1 was made with a straight line frequency

### WGY Links Western N.Y. Cities by Wire

Leading musical events of western and central New York State cities will be made available to the international audience of WGY as a result of wire-connecting Buffalo, Rochester, Syracuse and Utica to the transmitting equipment of the Schenectady station. WGY is already connected by wire to Albany, Poughkeepsie and New York and through WJZ and WRC. Leading musical events of Washington are conveyed to the General Electric Company's Eastern station.

In the past two years the chain-station idea of broadcasting has been growing. For example, WGY, WRC and WJZ of New York are frequently linked to broadcast simultaneously some event which originates in Schenectady, Washington or New York. Another and larger chain has grown up to permit broadcasting of a common program which usually originates with the same station in New York.

By means of the line connections between WGY and the western New York cities, programs originating in any of the connected cities may be relayed by wire to New York and Washington. In Buffalo, Syracuse, Rochester and Utica will be remote control stations and studios. Engineers will supervise the pick-up either in studio or in outside auditorium and the electrical impulses, first amplified at the source, will be conveyed by wire to the control room of WGY. Here they will be amplified again and sent on their journey to the transmitting equipment from which they will be transferred to the antenna to make the remainder of the journey via air to the tuned receivers.

By the extension of its wire facilities to the west WGY is expanding its facilities and increasing its program material. Instead of transporting large groups of artists to the studio of WGY that station stretches out many miles of wire and practically takes its transmitter to Buffalo, Syracuse, Rochester and Utica. Artists in those cities who might not otherwise be heard via radio may be introduced to the microphone and to the great audience of WGY. Special events will be carried by wire to WJZ and WRC and may be heard from any one of the three great stations.

#### Sets in Hungary Prohibited

The governmental decree which will contain regulations governing the sale and operation of radio sets has not as yet been issued and consequently the sale of radio sets and parts is not legally permitted. Interest in radio is, nevertheless, apparent and it is believed that, if permitted, the use of radio receivers will develop rapidly subsequent to the issuance of the regulations. Electrical supply houses are the most likely prospective dealers.

Always give a new hook-up a thorough try-out before attempting another design.

## Radio Vacuum Tube May Be Employed for Many Purposes

### This Wonderful Device, Which Is Known as the Heart of Wireless, Is Also Used by Telephone Engineers, Doctors and Scientists

By Dr. C. B. Jolliffe

Radio Laboratory, United States Bureau of Standards

IT HAS been said that without the development of electron tubes the present system of radio broadcasting would never have been possible. Certainly, the electron tube is the essential part of our radio telephone broadcasting system as it has developed. Every broadcast transmitting station uses several electron tubes in order to make available radio signals that may be picked up by receiving sets, the majority of which are likewise equipped with electron tubes.

The tubes used in the transmitting stations vary in size from 2 1/2 inches long by 1/2-inch in diameter to tubes more than a foot long and six inches in diameter. The higher power stations are using tubes that must be continually cooled by water. These tubes are made almost entirely of metal and are capable of producing several kilowatts of radio frequency power. The action of these large tubes does not differ from the action of smaller ones used in receiving sets. The difference is only a matter of size and power supplied.

#### Tube Has Two Functions

The electron tube is capable of performing two functions, amplification and detection of alternating current voltages. Its action as an amplifier makes possible a third function, that is, generation or production of alternating current.

This third function is used primarily in transmitting sets, although some receiving sets make use of it also. A disturbance is started in the circuit associated with the input of the tube which is amplified by the tube, given to the output circuit, which, by virtue of some form of coupling, gives it back to the input and the cycle is repeated continuously. Because of this the disturbance is not allowed to die away but is sustained, the power being supplied from external sources, such as batteries. Since the electron current has no inertia effect the action is instantaneous, and alternating currents having frequencies from a fraction of a cycle a second to several million cycles per second can be generated by the same tube simply by altering the circuit arrangements which determine the frequency of the set.

In the broadcasting stations of this country the frequencies of the currents produced are from 550,000 to 1,600,000 cycles per second. The oscillator tubes generate this carrier frequency which is capable of radiating waves into space. Other tubes take the feeble alternating currents from the microphone which have frequencies from 20 to 10,000 cycles per second and amplify them. However, these currents cannot radiate, so another set of tubes impress these amplified voice currents on the radio-frequency generating tubes and modify the radio-frequency current so that it carries into space not only the radio frequency but also the lower frequency voice currents.

The Detector Tube's Job

When the radio-frequency current is induced in the receiving antenna, the audio frequency cannot be heard unless the radio frequency is partially destroyed. This is done by using the detecting property of the tube. The detector tube utilizing the second function of the tube, detection, takes the audio frequency of the carrying wave and makes it audible. This audible signal may not give a strong enough signal, so it is introduced into a tube adjusted to amplify. Thus the signal is strengthened up to any degree desired. On the other hand, it is often desirable to amplify the radio frequency signal before detection. This is also done by means of the electron tube. All of these different uses are brought out by the correct arrangement of the circuit constants such as the inductance, capacity, grid voltage, grid leak, etc.

The different possible sizes and adjustments of the various circuit constants, make up the many hundred different types of receiving sets. Up to very recently the development in electron tubes in this country for radio use has been to develop general purpose tubes so that any tube can be used for any purpose, in most types of receiving sets with only small adjustments. The choice of a tube for a particular receiving set is usually a matter of filament power consumption and power output of the set. Recently there have been some tubes put on the market designed for special purposes, which are explained in the advertisements.

The use of the electron tube, however, is not limited to radio alone. Electron tubes so arranged as to amplify telephone currents, have been inserted in the long distance telephone lines, and have made it possible to extend the distance limit of the telephone, which was formerly about 1,000 miles, so that any one in the United States can now talk to any one in the United States.

In the not too distant future even this limit will be removed, as it has been shown that it is possible to combine radio and wire telephony, and before many years the telephone system of America will be interconnected with the systems of other continents. The amplifying property of the electron tube has also been used to aid those persons who have defective hearing. The sound waves that are strong enough to be heard by the normal persons but not by the person with defective hearing are received on a microphone and transferred into electrical vibrations. These are amplified by means of one or more electron tubes and then transferred back to sound of much greater intensity than the original by means of a telephone receiver, thus serving the same purpose as raising the intensity of the original sound.

#### A New Use for Tubes

Another entirely different use of the electron tube is in the heating and melting of metals. The tube is used to generate alternating current of a high frequency, as in radio. This current flowing in a coil surrounding the metal induces in it similar currents which because of the resistance of the metal increase its temperature to the degree desired. This makes it possible to heat metals that are contained in a vacuum or in some particular gas and so control the conditions very accurately.

Electron tube amplifiers make it possible for a large assembly of doctors simultaneously to hear the heartbeats of a patient. Electron tubes have made it possible to send pictures by wire and radio, and just recently there was produced at a distance the image of moving objects sent by radio using electron tubes. Going still further afield, the electron tube has been used to measure the rate and method of growth of a plant root, which illustrates how it has been adopted in other fields far different from radio.

There has been put into the hands of the engineer and the scientist a wonderful tool which is capable of many diverse applications. New uses are being found every day and a tool which found its greatest development in radio and telephone engineering will soon be used in many phases of science.







## Rebroadcasting on Long Wave Lengths Proves Successful

Station WCAD, the radio station at St. Lawrence University, was successful in accomplishing a feat in radio that may not mean much to the average man but which does mean much to the radio experts who conducted the experiment and to the future of WCAD and of radio generally. In short, on October 26 station WCAD for forty minutes, from 8 p. m. to 8:40, received from 2XAH, the developmental station of the General Electric Company at Schenectady, the WGY musical program sent out from that station on 1,560 meters and rebroadcast it so clearly that messages were received from Canton, Ogdensburg and other points reporting the clearness of the program and the surprise of the recipients that the WGY program was coming in to them.

Preparations for the test have consumed over a month of time. For that period H. K. Bergman, operator of WCAD, has been listening to the long wave length from WGY station to assure himself of the regularity of its wave length—that station using 40½, 109, 380 and 1,560 meter wave lengths and rebroadcasting having been accomplished heretofore on the short but not from the long length. A test made a few nights ago from the radio room in Carnegie Hall at St. Lawrence University was unsuccessful, due, as Professor Ward C. Priest, of the chair of physics at St. Lawrence, determined, to interference from power lines. For the recent test the instruments, a special set loaned for the occasion by the General Electric Company, were taken down into the fields of the open country behind the college and set up in a barn. It was felt by the experimenters that if happy location had anything to do with it the location in the barn was a most happy one. In any event the experiment was a success. Received at the barn and transmitted to the station in Carnegie Hall, the treatment there was the same as when matter is transmitted from the gymnasium, athletic field, college chapel or other source on the college campus.

**"La Gioconda" Over Radio**  
By WEA F Grand Opera Co.  
The first tabloid opera to be presented on the new schedule of Monday night broadcasting presentations by the WEA F Grand Opera Company will be "La Gioconda" to-morrow at 10 p. m., to be broadcast by WEA F, New York; WOO, Philadelphia; WTAG, Worcester, Mass.; WJAR, Providence; WCAE, Pittsburgh; and WCAP, Washington. "La Gioconda" has plenty of melody, generously embellished with interesting harmonies and colorful orchestrations. The "Dance of the Hours" is to-day one of the most popular of orchestral selections.

## Stromberg-Carlson New Models Displayed

A beautifully grained American walnut cabinet with space provided inside the cabinet for all batteries. The performance of this receiver equals its beauty. Volume, selectivity, distance, range and tone quality really a revelation!

**ADDITIONAL SUGGESTIONS:**  
NEW FADA  
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**SPECIALS—**  
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NEW STORE  
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Radiohome Co.  
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Phone Tremont 6037  
Mail Orders PROMPTLY FILLED

## College Man Produces Wave 29 Inches Long

A wavelength of but one five-hundredth the length of that used by the larger broadcasting stations, or equivalent to 74 centimeters (29 inches), has been produced by Winfred W. Salisbury, of Iowa City, working with the radio department of the University of Iowa. Comparing this with the wave length of a station operating on 484 meters, the latter wave would be approximately one-third of a mile long. Salisbury obtained these measurements by using laboratory methods. In regular outdoor experimental work he has produced a wave length of 1.3 meters, or a little over four feet, and with this has successfully broadcast over a short radius.

## Radio Teaches Languages

The owner of a radio set in England or France has to be an accomplished linguist in order to enjoy all of the programs that he receives. The small European countries are so close together that the owner of a set in any one of these countries can tune in programs in five or six languages during one evening. Radio should be a valuable asset to the schools of these countries in teaching foreign languages.

## Listeners in New York Do Not Need A Silent Evening

The suggestion for a silent Friday night for the metropolitan broadcasting stations is not meeting with the approval of the National Radio Service League, a listeners' organization, from whose headquarters at Aeolian Hall a statement containing objections to the plan has been issued.

The passing of the "distance" craze in New York and its replacement by a desire on the part of listeners for genuine entertainment are held by S. R. Wiley, president of the league, as being the main reasons why the silent night scheme is not desirable.

"Two years ago the plan would have been very successful," says the organization's head. "At that time when people went to buy a radio set the first question they asked was, 'How far can this set receive?' but now what they ask is, 'How clear is it?' A silent night then would have helped dealers sell sets on the basis of their DX capabilities, but a silent night now would do more to hurt sales than to increase them. Not only are the DX stations usually scratchy and noisy but the actual programs themselves are inferior to those of the New York broadcasters. The fact that New York programs are relayed to

Mid-Western stations is proof enough of their superiority." Wiley states further that a canvas made of the members of the National Radio Service League indicates that the majority of set owners will not be enthusiastic about the silent night idea. Most of them seem to be satisfied with the high grade programs furnished by the local stations, and do not care to have any of the many fine musical features taken off the air.

## Columbia Evening Lectures To Be Broadcast by WEA F

WEA F in co-operation with Columbia University will broadcast evening lectures by noted speakers on the program of the Institute of Arts and Sciences direct from the lecture halls.

Chief among them are Gilbert Chesterton and Stephen Leacock, who will lecture on America and England, respectively; Dr. Putman Cady, who will talk on "Iceland and the Mid-night Sun," and Dr. Montrose J. Moses, who will speak on "The Romantic Aspects of the American Theater." Other features will be a program of "Negro Folk Songs From the South"; lecture recitals by Professor Dorothy Scarborough; "The Creative Spirit," by Professor Walter Brown, of Carlton College, and "Democracy and the Main Street Mind," by Norman Angell. The exact dates and further details will be announced from time to time.

## Security League Luncheon and Seaman's Ceremony on Air

Two events of interest will be broadcast by station WJZ on Thursday afternoon. The first, at 1:30, will be the speeches at the luncheon of the National Security League at the Bankers Club. The chief speaker will be Frederick Hale, Senator from Maine and a member of the Committee on Naval Affairs. The other event is the laying of the corner-stone of the annex to the Seaman's Church Institute at Front Street and Coenties Slip, when the Right Rev. William T. Manning, Bishop of the Episcopal diocese of New York; Edmund L. Baylies, Rear Admiral William S. Sims and Dr. John H. Finley will be heard. The music for the occasion will be furnished by the choir of Old Trinity Church. The Seaman's Church Institute bears the reputation of being the most active organization in the city in the welfare of seamen, and holds as its supporters some of the most prominent people in the country.

**Substitute for Pliers**  
If no round-nose pliers are available, bus wire can be bent by driving two nails close together in the workbench.

**A Ground Substitute**  
A wire fence often makes an excellent substitute for a ground. Its action is that of an efficient counter-pole.

# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

SECTION TWELVE

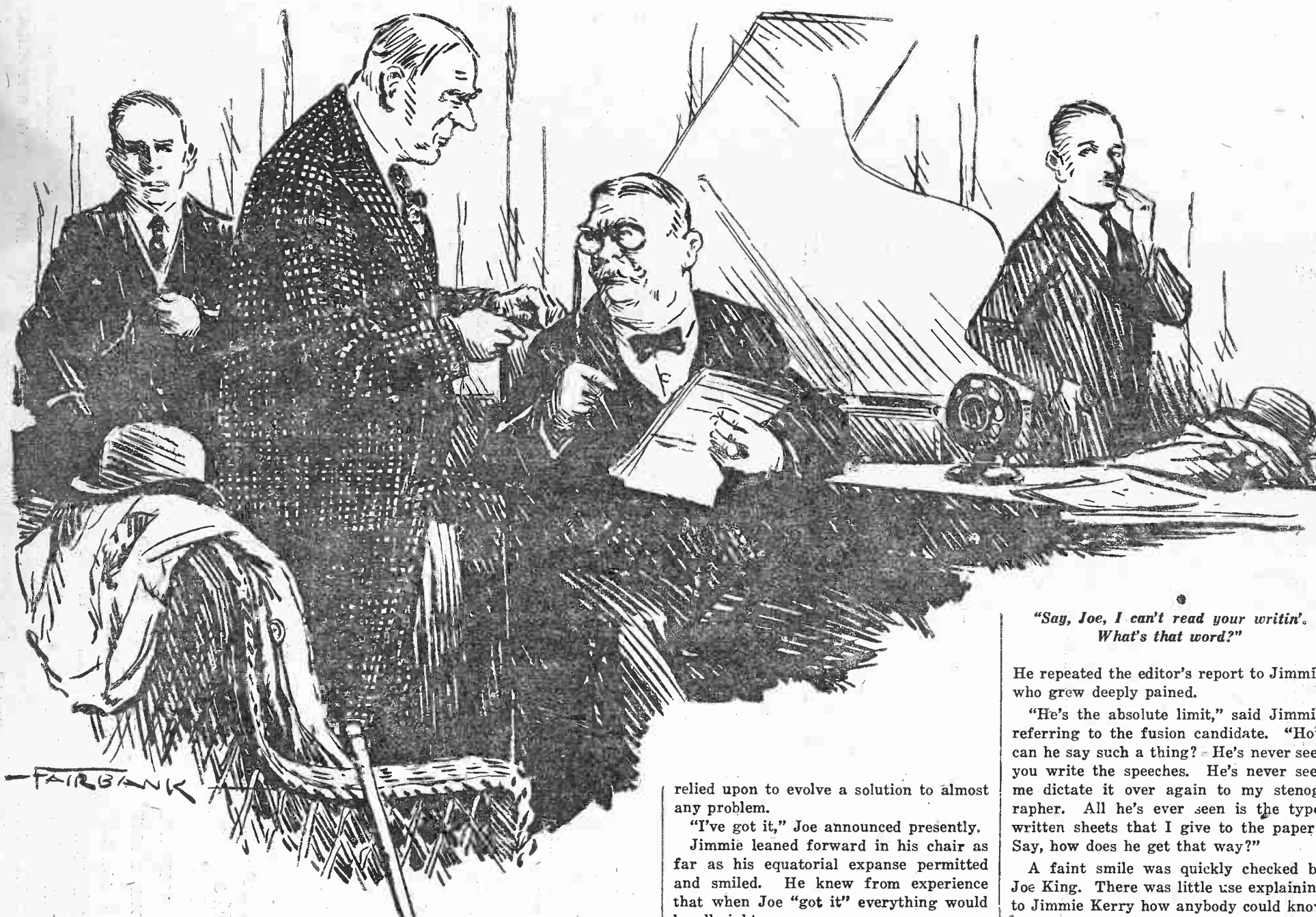
SUNDAY, NOVEMBER 1, 1925

16 PAGES

## Old King Kerry—A Radio Election Story

How the Big Political Boss of Mythington Went Down to Oblivion Through Broadcasting a Campaign Speech He Didn't Write

By CHARLES ROLAND



"Sag, Joe, I can't read your writin'. What's that word?"

He repeated the editor's report to Jimmie, who grew deeply pained.

"He's the absolute limit," said Jimmie, referring to the fusion candidate. "How can he say such a thing? He's never seen you write the speeches. He's never seen me dictate it over again to my stenographer. All he's ever seen is the type-written sheets that I give to the papers. Say, how does he get that way?"

A faint smile was quickly checked by Joe King. There was little use explaining to Jimmie Kerry how anybody could know the extent of his mental powers. One glance at Jimmie proved the truth of the theory of compensation. His avoirdupois clearly made up for his cerebral lightness. Nevertheless, a halo should hang over the head of a candidate for the mayoralty, and Hadden's new charge struck home.

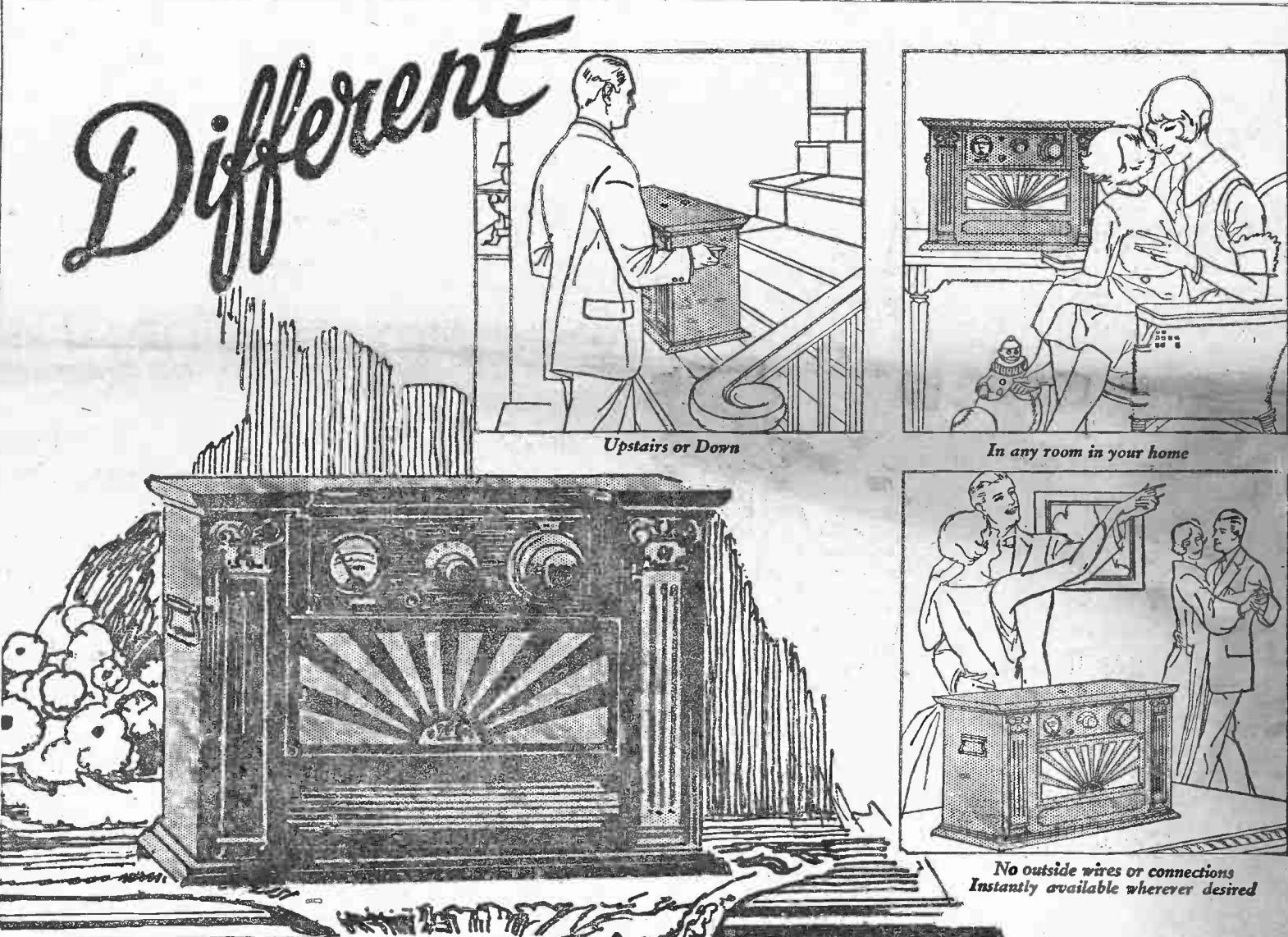
"I've got to write this speech that you'll deliver over the radio to-morrow night," said Joe, "and write it in such a way that no one can say it isn't yours."

"Exactly," agreed Jimmie. "But I can't let down the tone too suddenly," continued Joe. "After all, some of the speeches were pretty high flown, come to think of it." "That one I delivered at the dedication of the swimming pool," Jimmie reminded him.

"What was it you said?" "Something like this," Jimmie recalled: "These mermaids, disporting themselves gracefully and healthily, proclaim to anything the proposition that its good government lies reflected in the sparkling waters of our municipal natatorium!" King reflected again, tapping the alternate fingers on his desk.

"Do me a favor and go home," Joe said frankly. "I've got to think out a good speech."

(Continued on page four)



## The New Operadio Consolette Particularly Adapted for Apartment Use

The Operadio may be purchased in the mahogany Consolette model shown above, or in a smart looking carrying case, which may be closed and taken with you anywhere. For those who want the beauty of a furniture model combined with the convenience of absolute portability a distinguished walnut cabinet—The Tudor—is available for housing the portable set in the home.

**PRICES**  
Without tubes or batteries  
Portable . . . \$160 Tudor Cabinet, \$68  
Consolette . . . \$180 (For housing portable)

Mail this coupon for full particulars

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Please mail me illustrated booklet giving full particulars of Operadios and their distinctive features.

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The new Operadio Consolette not only offers you a finer quality of radio reception, and greater beauty of design, but also the extremely important additional advantage of convenience.

It appeals particularly to those who live in apartments, both on account of its compactness and because it does away with the troublesome problem of outside aerial. No wires or connections of any sort are required. The set is absolutely complete, with loudspeaker, six tubes, powerful battery supply and all parts contained in the jewel-like case.

Pick it up—while it is playing if you

wish—and carry it to any part of the house. Its performance challenges that of the most intricate and expensive sets on the market today.

In the Operadio are embodied the latest approved developments of radio engineering—dry cell and loop operation, straight line frequency tuning, single dial control, the power tube for the last stage of audio amplification and low wave-length tuning.

Women, particularly will appreciate this exquisite and easily tuned instrument. See it at any good dealer's or have it demonstrated in your home.

THE OPERADIO SALES CORPORATION  
1476 Broadway New York

# OPERADIO

The Original Self-Contained Radio

THE candidate for Mayor and his campaign manager were in conference. Election fell on Tuesday, only four days away, and the town of Mythington, in the State of Boom, was all agog over the battle. James Kerry, the machine nominee, was plainly worried. Joe King, boss of the machine, was puzzled.

"I don't like the whole thing," Kerry complained. He shifted his cigar to the far corner of his mouth, settling his two-hundred-and-twenty-pound bulk in the sturdy armchair. "They ain't playin' the game fair," Jimmie continued. "This here campaign is different from anything we've ever had before."

Joe King could not deny this contention. As boss of Bailey Club he ruled the town with an autocratic hand. In eight years of leadership he had not lost a campaign, and yet this lawyer, Asbury Hadden, a novice in politics, was doing surprisingly well as fusion candidate for Mayor.

Instead of attacking the machine Hadden made fun of it. He drew sarcastic pictures of Joe King and ridiculed Jimmie Kerry. Hadden ignored the campaign issues of taxes and good roads, devoting his whole time to laughing at the King-

Kerry combination. He charged that they used the municipal radio station, OIC, for broadcasting their political propaganda. His charge, of course, was true, and it rankled.

"What's this song I hear they're singing?" inquired King. "It's something Hadden wrote. Goes like this:

Old King-Kerry, Old Kerry-King,  
Old King-Kerry is a Merry Old Thing."

"I suppose he thinks that's funny," mused King.

"I tell you, Joe, it takes a lot to get me worried, but I am worried, and that's the truth," Kerry confided. The real campaign was to close the next day—Saturday. Kerry was scheduled to speak at eight-thirty over Station OIC. Asbury Hadden suddenly had announced a mass meeting in the high school auditorium, at which the better element of the town was to be represented.

"Most of them are radio fans," Kerry said, "but I'm afraid they're goin' down to the high school to hear Hadden instead of staying at home to listen to me."

His campaign manager knitted his brow, tapped his desk with alternate fingers and remained silent a moment. His fertile brain was at work and could be

relied upon to evolve a solution to almost any problem.

"I've got it," Joe announced presently.

Jimmie leaned forward in his chair as far as his equatorial expanse permitted and smiled. He knew from experience that when Joe "got it" everything would be all right.

## They Hire a Jazz Band

"We'll hire the Nicholas Jazz Band from New York to come down here," said Joe. "Suppose they do charge \$500 for the night. We'll have them broadcast three numbers before you talk and two more when you're through. Then folks will have to stay home. Every radio in town will tune in."

Jimmie chuckled. That old King-Kerry combination was invincible after all. Joe telephoned the editor of "The Morning Myth" asking him to announce to-morrow night's radio program in extra black headlines. He suggested, too, that his favorite newspaper might properly forecast Kerry's victory by 10,000 votes.

The editor of "The Myth" heartily approved the idea of the Nicholas Jazz Band. He warned Joe King of a new development, however. The opposition newspaper, "The Daily Dawn," was coming out with a charge, on the authority of Asbury Hadden, to the effect that Kerry's speeches, so eloquently broadcast by radio, had all been written by King. The article would say, in effect, though in polite phrases, that Jimmie Kerry was a fat and good-natured nincompoop who was barely able to read the speeches prepared by King, let alone write his own. Joe hung up the receiver, puzzled anew.





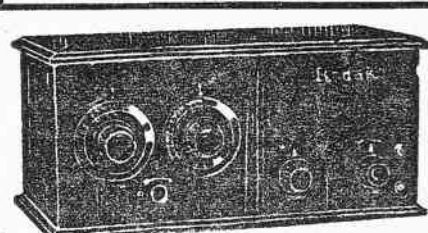


# Radak

The Famous Nationally Advertised  
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## — SETS —

Manufactured by Clapp Eastham Co., the oldest manufacturers of Radio Equipment in the world. Every one of these sets fully guaranteed by the manufacturers



SET ONLY  
**\$11.98**

Genuine Bakelite Panel — hand-somely engraved.  
High grade cabinet.  
Circuit — Armstrong regenerative, double tuner.  
Tubes — 3 — either dry cell or storage battery.  
Battery cable ready to attach to batteries.  
No posts or wires on front of cabinet.  
Only two controls — very simple to operate.  
**RESULTS — ANYTHING WITHIN 1,500 MILES**

SETS ARE IN ORIGINAL  
SEALED FACTORY CARTONS  
THIS PRICE FOR CASH ONLY

## — FREE —



**2 BROOK-RAD \$2.10**  
45 VOLT "B" BATTERIES

MAIL ORDERS PROMPTLY FILLED  
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SEND ORDERS TO 577 MYRTLE AVE., BROOKLYN, N.Y.

**THE BROOKLYN RADIO SERVICE**  
All Stores Open Evenings  
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SMITH & LIVINGSTON STS.  
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All Stores Open Evenings  
**DEALERS** Get in touch with us for special Prices on these Sets and any other Sets or Parts.

## News and Notes of the Radio Trade

### New Hydrometer

The Robert Bosch Magneto Company, Inc., of New York City, have recently put their new "non-drip" hydrometer on the market. In addition to the "non-drip" feature, which prevents acid from dripping on furniture, clothes, etc., accurate readings are insured because the float is constructed so that it cannot stick. The hydrometer has a small diameter barrel which permits a reading to be obtained with a small amount of acid. This feature makes the device ideal for testing storage B batteries.

### Johns R. E. Thompson

Walter A. Heppner, formerly of the Western Electric Company, has joined the R. E. Thompson Manufacturing Company and will take charge of the laboratory force as chief assistant to Dr. L. F. Fuller, vice-president and chief engineer. Mr. Heppner, who is well known as a radio engineer, has had widespread experience in laboratory and field work with the Western Electric Company. At the request of the War Department, in Washington, he was granted leave of absence from the Western Electric to supervise important work with the United States Army Signal Corps, at Camp Alfred Vail, in New Jersey. He completed his work there just before joining the R. E. Thompson Manufacturing Company.

### Battery Chart

The United States Light and Heat Corporation, of Niagara Falls, N. Y., have made up a chart which gives the correct type and size of battery to be used with every make and model of receiver as recommended by the set manufacturer. Copies of this chart may be obtained direct from the United Light and Heat Company.

### French Loudspeaker

The Brunet "Duo-tone" Loudspeaker, made in France, has recently been placed on the American market. A special feature of this instrument is the lever for altering the impedance of the coils. In one position of the lever the coils are in series, giving a total resistance of 4,000 ohms; in the other position the coils are switched into parallel, giving a resistance of 1,000 ohms, with a consequent altering of the impedance.

The usual lever for tone regulation is also incorporated in this instrument so that with the facility of altering the impedance plus the adjustment for volume, the instrument is readily adjustable to give the best reproduction for any given item being transmitted.

### Book of Radio Sets

"Radio Sets that Jack and Dad Built — and How They Built Them," by M. B. Sleeper, editor of "Radio Engineering," is the title of a 48-page booklet published by the Hard Rubber Manufacturing Division of the Rubber Association of America, Inc. The booklet describes and illustrates

five standard "hook-ups." It tells how Jack inoculates his sceptical Dad with the "radio bug" by making a crystal set. Dad's interest aroused, he and Jack build first an Ambassador set, next an RX-1, then a Brownie-Drake "five," and with their final 8-tube "Cotton" Super-heterodyne, win the prize in a radio set building contest.

Besides assembly instructions for each set, the booklet contains many helpful suggestions regarding antennae, grounds, dry cells, storage batteries and current tap devices.

### Loudspeaker Console

The Windsor Loudspeaker Console, manufactured by the Windsor Furniture Company, of Chicago, is a very good-looking console featuring a loudspeaker unit and horn made of special composition.

**Al Walker, Oldtime Minstrel, Writes Old Songs for 'Twins'**  
Two old-time minstrel numbers on the program of the "Gold Dust Twins" broadcast by WEA and nine other stations on Tuesday have a human interest story connected with them which will doubly enhance the pleasure of hearing them.

"I'm as Happy as a Big Sunflower," made popular by Billy Emerson and Bobby Newcomb and the team of Delchany and Hengler, was requested by an old-time minstrel, Al Walker, who has been retired from the boards for thirty years. Although he is nearly blind, he took the trouble to write out the words and music for the Twins, who, he says, are the successors of the old-time minstrels with whom he worked so many years.

"Shoo Fly," an old-time song and dance that achieved great popularity and had a very long run with Bryant's Minstrels in 1899-'70, is the other number to be heard from WEA, WEE, WFI, WCAE, WGR, WWJ, WOC, WJAR, WCCO and KSD during "Goldie" and "Dusty's" program.

### Ernest Hutcheson and String Quartet in Steinway Concert

The second of the Steinway series of classical music programs to be broadcast by stations WJZ, WGY and WBZ at 8:30 to-morrow evening will present a strong array of the world's finest talent. The opening half of the concert will be given over a piano recital by Ernest Hutcheson, the famous English pianist. Mr. Hutcheson has prepared a most elaborate program for this occasion. The latter half of the period will be devoted to Schumann's Quintet, played by the New York String Quartet, with Mme. Fannie Bloomfield-Zeisler at the piano. This will be an attractive feature, for the New York String Quartet, composed of Ottokar Cadek, first violinist; Jaroslav Siskovsky, second violinist; Ludvik Schwab, viola, and Bedrich Vaska, cello, is one of the leading units of its type in the world, and Mme. Fannie Bloomfield-Zeisler bears the distinction of being the oldest living concert pianist.

**Mexico Made Use of Radio**  
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.



George H. Kolbs (left), chief radio officer of the steamship President Harding, greeting Cino d'Ambrasio, chief radio officer of the steamship Ignazio Florio, shortly after the heroic rescue at sea when the steamship President Harding saved twenty-seven men of the crew of the other.

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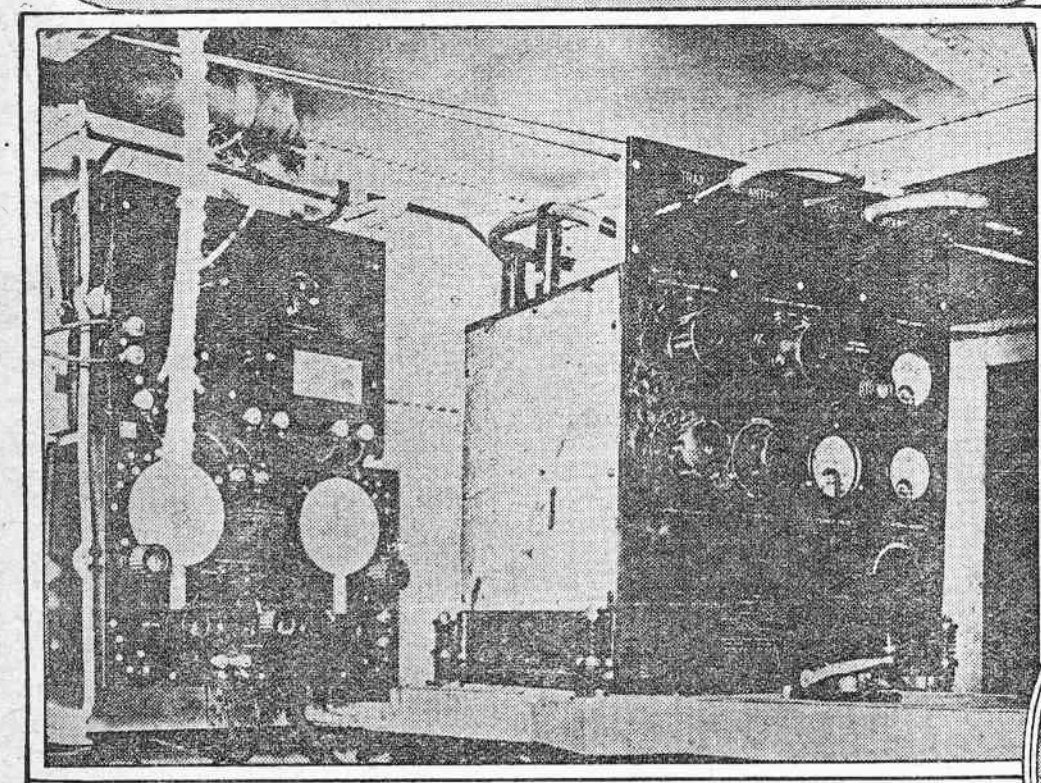
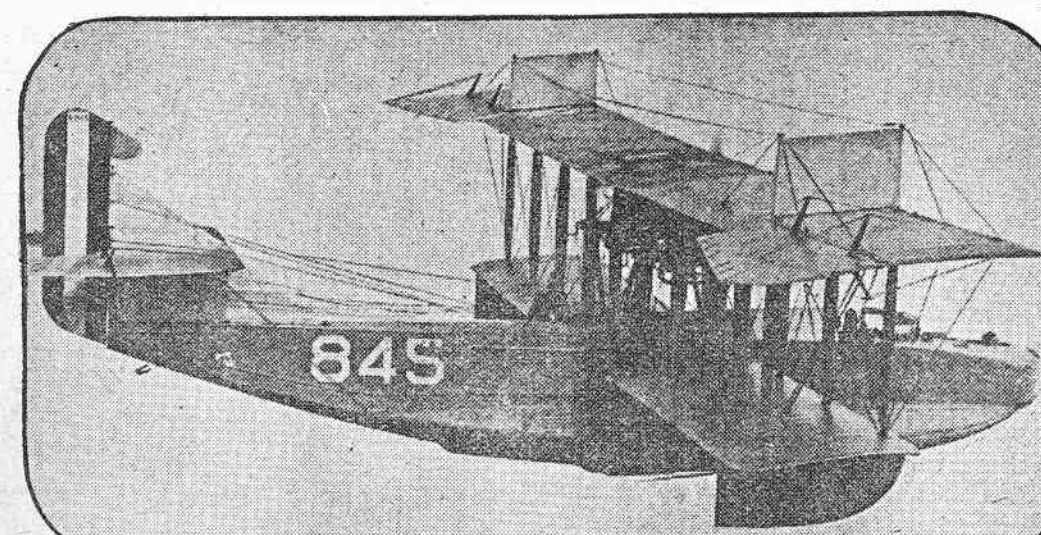
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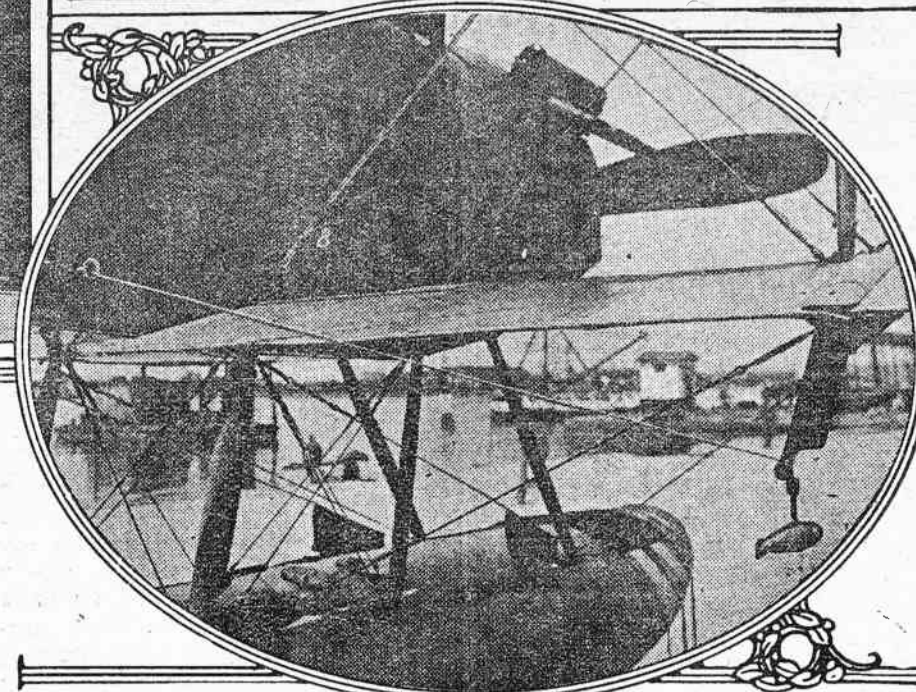
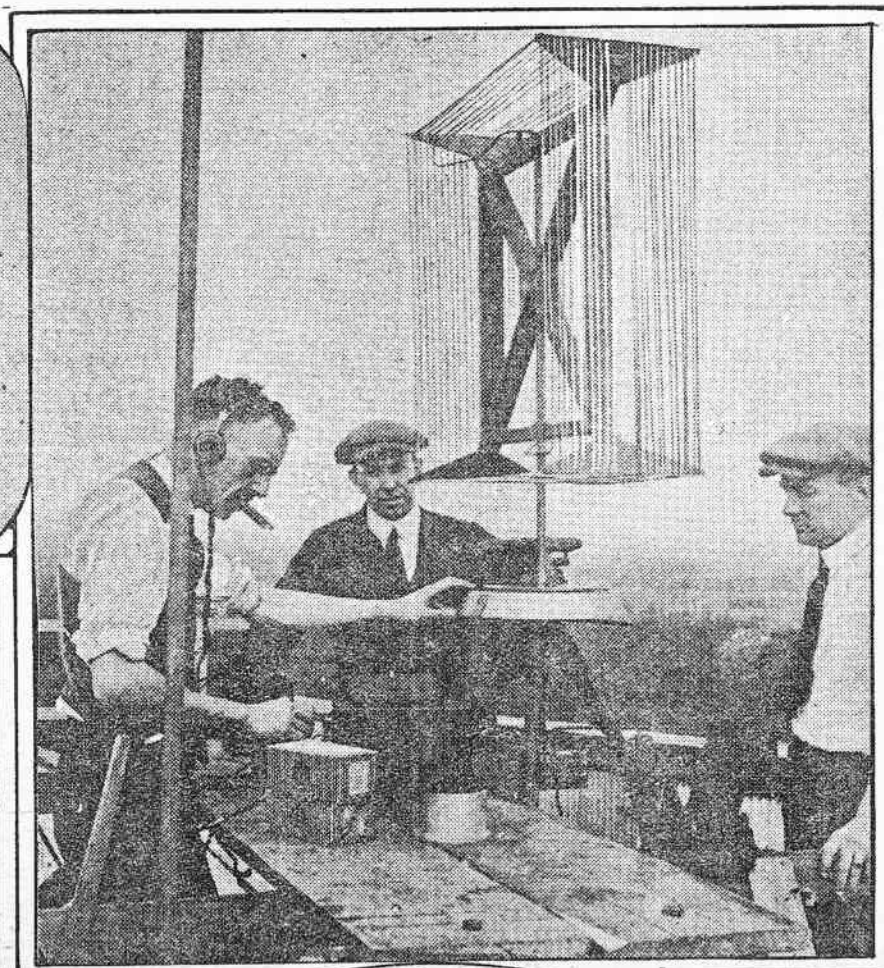
# By Use of Navy Radio It Is Possible to Send Half-Way Around the World

Some of the Naval Wireless Developments Which Have Been Made in the Last Few Years

By LIEUTENANT COMMANDER T. A. M. CRAVEN  
Radio Section, U. S. N.



The method employed in installing an antenna on top of the flying boat F-51 is shown above. Below — The radio installation on a PN-9 seaplane



Above — Receiving tests conducted at Lakehurst, N. J., with a radio compass station. Below — Radio antenna on the N-9 seaplane

THROUGH its chain of forty high-powered and ninety-five intermediate shore radio stations the navy is always in direct touch with the whole world, and, of course, its warcraft at home and abroad. This radio station investment cost the government approximately \$22,000,000, but in view of its constant official use and, in emergencies, commercial and humanitarian service, it is regarded as worth far more.

Governmental dispatches, most of them secret naval orders and, in many instances, important messages pertaining to aid, relief and the safety of life are flashed instantly to whatever point it is necessary. Sometimes the naval radio service distributes news items of importance.

### Practical Demonstration

One of the first examples of what the radio facilities of the navy could do was demonstrated prior to the trans-Atlantic flight of the NC planes in 1919. Just previous to the main flight, when the three planes were flying off the coast from Nantucket to Newfoundland, several newspaper correspondents were gathered in the radio room in the navy building waiting for news of the first lap of the long trip. Nothing had come from Commander A. C. Reed, time was hanging heavy and the conversation swung to more speedy subjects. One of the big press association reporters mentioned that his association could flash news to every part of the country within five minutes by wire. In the spirit of jest a naval officer replied that the naval radio service could flash news to half the world in that time via radio. One of the correspondents upon hearing this statement left the room, seemingly with some obscure but malign intent. So the officer immediately established communication with Commander Reed and various stations of the network, as well as with a few men of war in

various parts of the Atlantic Ocean and the Gulf of Mexico. The correspondent soon returned with a message from the Assistant Secretary of the Navy to Commander Reed, asking him how he was and sending best wishes.

This message was immediately dispatched to Reed, and at the same time quoted to various stations in the naval radio system. Reed replied in about two minutes as follows:

"Thanks for your good wishes. NC-4 is 20 miles s. w. of Sable Island, making 85 miles per hour."

This reply was also dispatched by radio to the stations of the network. Acknowledgments were quickly received from Paris, London, Rome, Norway, Panama Canal, San Francisco and vessels on the Atlantic. The message was also intercepted by a United States naval vessel in Turkish waters. A few seconds later the message had been received in Honolulu, Guam and the Philippines. The entire operation, from the time the Assistant Secretary's message started on its way until the delivery of Reed's reply to the various parts of the world, took only four minutes and twenty-eight seconds.

Distance meant nothing. In that little room could be pictured within a few seconds the planes in the air, vessels on the sea and under the sea, the snows of the North and the palms of the South Sea Islands. A contrast made possible by the most modern of inventions, but justifying the rather rash boast of flashing news to half the world in five minutes.

The navy was on the job in radio early, watching every move. In 1902 "The New York Herald" arranged with Mr. Marconi for the installation of radio apparatus on certain private vessels, so that newspaper reporters could telegraph to their papers the results of the international boat races off Sandy Hook. The navy sent a representative to witness this experi-

mental communication. This representative immediately saw the military value of radio communications and recommended that the navy investigate this matter as rapidly as possible. This was done, and many United States naval vessels were soon fitted out with the new invention. The apparatus was crude and was useful for communications at short distances only.

In 1907 or 1908 the navy conducted what was then considered long-distance radio communication tests with the U. S. S. Salem and Birmingham. These ships put out to sea with high-power radio spark sets and endeavored to communicate back to the United States each day as they cruised across the ocean. The maximum distance obtained was about 1,000 miles at night. The sets themselves were impracticable for naval use, but the experiments resulted in the establishment of one of the most important technical formulas of radio engineering, the so-called "Austin-Cohen Formula." These gentlemen at that time were employed by the navy as physicists.

Later, in 1913, the U. S. S. Delaware, equipped with a spark transmitter and a receiver having a crystal detector, established communication while off the Azores with the newly constructed 100 k. w. spark station at Arlington. There was great difficulty in receiving messages on board ship. This date is mentioned because it represents the active start of the present

phase of remarkable development in the radio science; and it is interesting to note that this 100 kilowatt set, the first of its kind in the world, is now a historical object in a museum.

### Telephone Tests

Shortly after this date the navy in conjunction with some of the leading American manufacturers conducted a series of trans-Atlantic radio telephone experiments. The apparatus was impracticable for every-day use, but it served as an excellent demonstration of the possibility of radio and resulted in further endeavor and experiments on the part of the navy. This is believed to be the first time that the voice of the United States was heard in Europe by means of radio telephone.

Beginning in 1914 the development of radio in the navy was so rapid that it is difficult to select any single outstanding item of interest. However, at the entrance of the United States in the World War the navy had several high-powered inter-oceanic stations, several long-range coastal radio stations, and almost every vessel in the navy was equipped with radio. But this was still insufficient to meet the requirements of modern naval warfare, even though the navy's radio equipment at the beginning of the war was far in advance of commercial apparatus then in use.

(Continued on page six)



# Elementary Information for Radio Novice

## Answering the Question, "What Is Radio?"

By JAMES W. H. WEIR

Technical Editor, "The National Stockman and Farmer"

This is the second of a series of lectures for the radio layman which is being broadcast through KDKA, the Westinghouse Electric and Manufacturing Company's station at East Pittsburgh, Pa.

THE old-fashioned idea of radio, together with the layman's imaginary belief, that of ragged blue sparks jumping from an aerial, may be likened to the old Irish woman's idea of the submarine. Her son was in the navy. "Poor Tim," she often sighed, "to be cooped away down in one of them boxes with nothing to breathe through but the periscope."

Radio is neither black art nor magic. It is not mysterious, and in this world of ours there are many things more difficult to understand and far less interesting to study.

Let us begin with the word "radio" itself. Radio comes from "radiate," a word meaning to spread out in all directions. To know radio it is necessary to be at least somewhat familiar with electricity. It is not my purpose to explain the meaning of electricity, and my introduction of this science into the story at this time is merely to impress on your mind that radio is a form of electricity in motion, and that it spreads out from its source of creation in all directions.

Most of us are familiar with ordinary domestic electricity—the kind employed in lighting our homes and running machinery. We know it is something that is carried from place to place along wires which provide a pathway for it. In radio the electricity used is somewhat different. It does not travel along wires, but rather radiates out in all directions in the form of waves. It is this very fact that makes it possible for us to sense the effects of radio in an unlimited number of places simultaneously.

Science has introduced to the world during years gone by two other forms of

wave motion very similar to radio in their characteristics. They are known to us as light and sound. Sound, for instance, is a form of wave motion that spreads out in all directions from its point of origin. Like radio, its effects can be sensed by a number of people in different places simultaneously. In the case of sound, however, the distance over which the effect is sensed is limited to those within hearing distance. Again take light. It also possesses similar characteristics to those mentioned above, and in addition science has proved that the speed of the light wave is identical with that of the radio wave. In other words, both light and radio waves travel at the terrific speed of 186,000 miles in a second. In the case of light our eyes are the receivers with which we interpret the effects of the wave action. In radio we employ very delicate instruments known as receiving sets.

In radio, the electrical waves responsible for the results we know to be established facts are created by means of special apparatus in the transmitting station. When the layman has firmly fixed the foregoing facts in his mind he is well on the road to a thorough understanding of the radio science.

### Two Forms of Radio

Radio communication is known in two forms, first the dot and dash system, and secondly, the popular broadcast. In this series of articles little will be said relative to the telegraphic side of radio, as it is more important that my readers devote their time to the study of radio as it is used in the broadcasting of speech and music.

For the most part we all are familiar with that domestic utility known as the telephone. How many of us, though, could describe briefly the method of its operation? Not many I assure you. Here is a brief outline of what takes place. The

spoken voice is directed into a small black box termed a transmitter. Inside of this box there is concealed a thin metallic plate known as a diaphragm. Very similar in construction is the black box used by the person listening to the conversation at the other end of the wire. The voice now projected into the transmitter produces vibration in the air, which in the form of waves beat against the metallic diaphragm in the transmitter. Immediately this diaphragm begins to vibrate and an electrical transformation takes place. The sound waves are transformed into electrical impulses. These impulses travel along the wire to the distant receiver, where other similar transformations take place and the impulses are changed back into sound waves which beat upon the diaphragm of our ear and are interpreted as words.

### Similar to Telephone

In radio it is precisely the same, save for the fact that the electrical impulses are not traveling along wires, but rather through space. The sound waves created in the studio are directed into the microphone and carried through a similar electrical transformation, becoming electrical impulses or waves, which are intercepted by the receiving aerial, changed back and reproduced to us in the form of sounds. This is the fundamental action of radio and telephone communication systems.

When listening to the radio set we must bear in mind that the atmosphere which we breathe is continuously charged more or less with electricity. Its presence interrupts radio reception at times and such interruption is often termed "static interference." It is unfortunate that this little word "static" has become so popular, for to-day every little ailment of the receiving set or its operation is diagnosed as "static." That this is untrue I will prove in a later chapter. Oftentimes the layman erroneously believes that additional

amplification will enable him to receive broadcast signals above the attendant noises. This is not true, because amplification will incidentally increase the disturbances in proportion. During electrical and thunder storms true static charges are very severe. The layman is cautioned for safety's sake to refrain from listening in during such storms. The danger does not lie in a direct lightning hit but rather in the surge of electricity, often of great strength.

### Possibilities of Radio

We have now laid the groundwork of radio, the science, and before concluding this chapter it will be of interest to cite a few of the possibilities of radio. The radio receiving set during the last few years has become not only a factor in American business life but also the means of entertainment for a nation. Undoubtedly the farmer is most benefited by the widespread use of radio. His isolation has now become a thing of the past. Radio brings to his very fireside things which up to a few years ago he waited to come through the mails. The weather and market reports are of great value to him—he enjoys the entertaining features—the lectures—the news and the sporting events. The storekeeper increases his prospects for business by posting bulletins on the results of sporting events, thereby increasing the interest of his patrons. Religion casting its voice through the mystic microphone sends the word of God to thousands of shut-ins. Newspapers have added its service to their quest for and distribution of news. Secret communication is not yet a realized fact, yet who knows what the future has in store? A few years ago the public would have scoffed at the idea of broadcasting music through the air without the use of wires, and yet to-day it is a possibility realized. Not only the voice and music but actual photographs have been transmitted through space. What next?

## Some Musical Instruments Make Excellent Radio Reproducers

The Sound Board of an Ordinary Second-Hand Piano if Actuated by a Powerful Loud Speaking Unit Will Give Perfect Reproduction

By H. G. Silbersdorf

THE public has heard much during the last few weeks regarding the recent experiments of John Hays Hammond Jr., in which it was found that it was possible to make most any piano give forth sounds duplicating those of the church organ.

With the resonant qualities of the piano in mind, and the possibility of applying these valuable properties in the construction of a mammoth loud speaking device, a new use was found for this most popular instrument.

David Grimes, chief engineer of David Grimes, Inc., built up such a speaker. The results were astounding. Absolute true reproduction of all sounds that enter the microphone at the broadcasting studio was obtained. Low notes and exceptionally high notes were reproduced, some of these notes having a frequency so high that they are rarely heard in the average radio loud speaker.

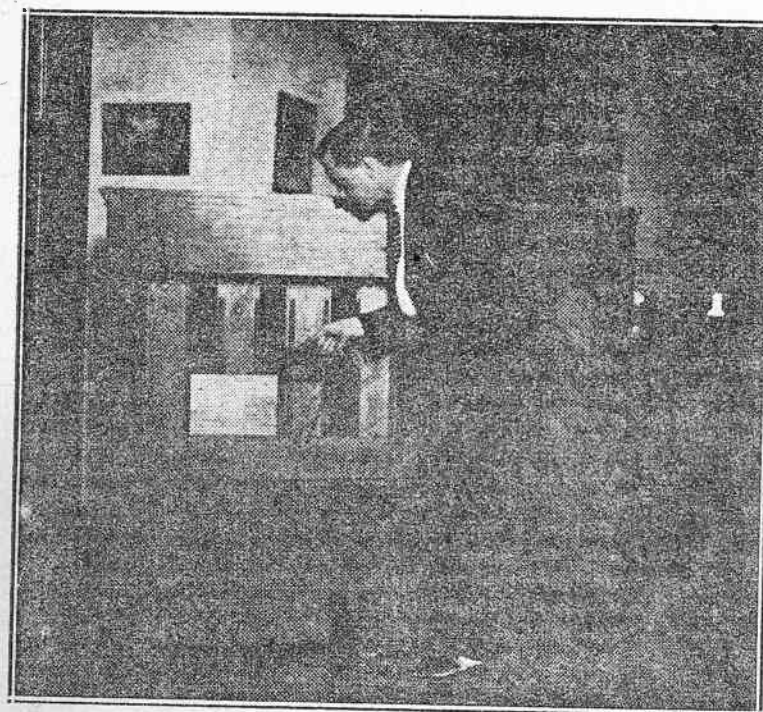
A demonstration of this speaker was given recently to a number of newspaper radio editors, most all of whom had visions of similar operations being performed by radio enthusiasts all over the country and

well. In the case of the violin high notes are produced with remarkable fidelity, the violin selections sounding most natural.

When using the remodeled guitar quite the opposite effect was obtained, although the signals all were somewhat louder and more mellow in tone.

Three Elements Necessary for Quality Returning to the more serious side, the piano board gave best results, as it acts like a large diaphragm and successfully accommodates both large and small vibrations equally well.

There are three elements which must be taken into consideration.



David Grimes in recent experiments proves that most of our present-day loud speakers fall short when compared to a piano sounding board set into vibration by a powerful unit. Treble and bass notes, seldom heard on other types of speakers, are clearly reproduced with this contrivance.

the prospects of a lively season for the second-hand piano dealer.

There was a time when mother's pet rolling pin was unsafe on the kitchen cabinet and finally was sacrificed on the altar of radio development and provided a form for more than one tuning coil. Now, little William looks with wistful eyes at mother's baby grand piano which.

When using this type of speaker it is highly important that the receiving set be capable of covering all high and low notes with good quality amplification. Therefore, it is a simple matter to see the transformers on the audio side work in an important role. Many of the transformers in use to-day have decided peaks throughout their curves, resulting in many of the important notes being lost entirely.

After selecting the set which meets this requirement, it is necessary to add additional stages of power amplification. Care must be taken that no distortion is had at this point. From the output terminals of this amplifier connections are made to the loud speaking unit. This unit is similar to those used on present day cone speakers, the cone itself, of course, being removed.

The drive pin or push rod of the unit is fastened to some point of the sounding board on the piano. This point varies in most instruments and will have to be determined by experiment.

### Square Piano Best

The recent demonstration took place at the home of Mr. Grimes at Grasmere, S. I. Here he used a standard inverse duplex four-tube (199) receiver. To this was added a power amplifier and then a speaker unit. An upright piano was used.

With the above equipment a number of interesting experiments may be carried on by the experimenter, using various objects as the diaphragm.

The resonance chamber of a violin or a guitar works remarkably reproduction.

First, the broadcasting itself must be perfect. If this equipment is not so designed that it will actually transmit the very high and very low notes, we cannot hope to reproduce them regardless of how good our following equipment may be. Unfortunately there are but few of our stations which are capable of sending out this perfect form of transmission. Second, we have the receiver and amplifier. This unit is called upon not only to detect the signal, but to increase it to such proportions, and with sufficient power be-



Experimenting with a violin and a radio reproducing unit

hind it to start vibrations in our diaphragm. This must necessarily be great in the new system, due to the weight, size and stiffness of the sounding board. Third, we have the matter of the unit and diaphragm.

While this point is last mentioned, it is of prime importance. Some diaphragms will vibrate well only on the lower notes, cutting off all but a few of the higher ones. Other speakers, and those which are in the great majority to-day, will respond only to the higher or medium high sounds.

There is little doubt but that the cone type speaker is a great step toward the ultimate goal of perfect

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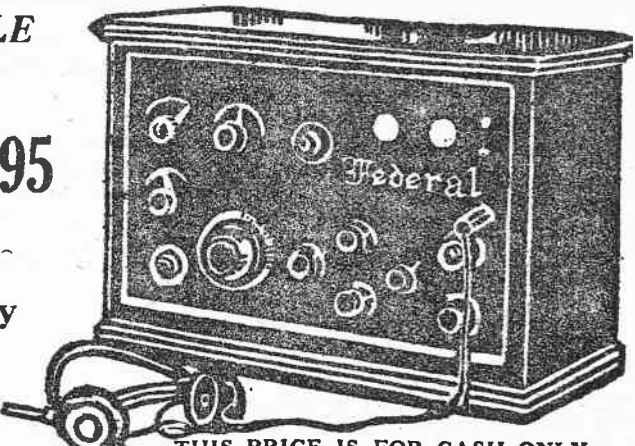
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## Old King Kerry—A Radio Election Story

(Continued from page one)

Without further ado Jimmie departed from the inner precincts of Bailey Club. Joe went to work at once on the speech, writing a first draft and eliminating all the three-syllable words from his second.

It would be necessary to retain just a few big words to avert suspicion. The fertile brain again fulfilled its mission. Joe would start the speech with one fine word, a mouth-filling phrase, and, after overcoming the initial obstacle, Jimmie would read through the remainder in simple English with facility and ease, as though it were his own.

Asbury Hadden, for his part, went into consultation with his campaign manager. It was necessary to meet the maneuver of the King-Kerry combination in having the Nicholas Jazz Band come to town. Against the protests of his manager Hadden decided to install a loud speaker in the high school auditorium.

Folks would come to hear the Nicholas Jazz Band and the speech of Jimmie Kerry. After the OIC program was over they would hear Asbury Hadden close his campaign in an outburst of eloquence. His manager thought it foolish letting the audience listen in on a band hired by the opposition, but he was voted down.

Saturday night arrived all in a rush. Mythington was in a state of breathless suspense. The younger set arranged dances for the night, anticipating the music of the Nicholas Jazz Band. The substantial citizens of the town decided to make a gala occasion of it by attending the high school auditorium for that strange verbal duel—James Kery speaking over the radio and Asbury Hadden speaking from the platform.

Hadden directed the radio shop to install its receiving set with a maximum of efficiency. He would brook no charge of failing to give Kerry the best possible hearing in this critical moment of the campaign.

Joe King felt the battle of his life was ahead of him. He rewrote Jim Kerry's

speech eight times. With every rewriting he pruned the difficult words. Finally the only troublesome sentence remaining was the opening one. It read: "Metaphorically speaking, the lamb has twisted the lion's tail in this campaign; but, ladies and gentlemen, retribution will be just and swift." Then Jimmie was to say: "It appears, my friends, that Asbury Hadden thinks I use big words. Well, to suit him, I'll talk in language that a child can understand. Mr. Hadden himself ought to get my meaning."

After that would come Joe King's best political stuff, in Jim Kerry's natural lingo.

Joe accompanied his candidate to the broadcasting studio, anxious to hear how the speech would sound. There had been no need to type it, for Jim would be heard, not seen, by his audience. Kerry took his seat near the microphone and, although listeners in could not know it, Joe King sat beside him.

The high school auditorium was filled to the last row. Asbury Hadden sat alone on the platform—not entirely alone, for the loud speaker occupied a central position

on the stage. The Nicholas Jazz Band played "It Ain't Goin' to Rain No More, No More." Wild applause followed. The band played two other popular songs, meeting equal applause, and a stillness followed.

### Kerry Goes On the Air

"The next voice you will hear," said the announcer, "will be that of James Kerry, candidate for Mayor."

A hush fell over the audience. Asbury Hadden gripped both arms of his chair, although pretending to be at ease. The receiving set thus far had worked with remarkable efficiency, so much so that when the great Mr. Nicholas coughed before the number started his cough echoed clearly through the hall.

In the studio Jim Kerry was growing nervous. His eyes were on the high school auditorium, even if he could not see it. At a given signal he prepared to read the manuscript King had written. The very first word stumped him. Joe's handwriting never was too plain. What was that word? Was that an "m" or a "w"? Was that a "ph" or a "gh"? Jimmie leaned over and whispered:

"Say, Joe, I can't read your writin'. What's that word?"

Joe knew the speech by heart.

"Metaphorically," he replied.

Jim cleared his throat and began the speech.

"Metaphorically speaking," he said, "the lamb has twisted the lion's tail in this campaign; but, ladies and gentlemen, retribution will be just and swift."

In the high school auditorium a startled audience came to life. Every word that Jim Kerry had whispered to Joe King came across the radio as clearly as though it had been trumpeted through a thousand horns. Every man and woman in the audience had heard Jimmie say, "I can't read your writin'." They had listened to Joe reply, "Metaphorically." They had heard Kerry launch into his speech, totally unaware of the prank that possibly the radio operator at the broadcasting station had played on him.

Jimmy Kerry went on with his speech to the bitter end. He had no means of knowing the uproar in the high school auditorium. The first person to catch on to the trend of things was a woman in the fifth row. She giggled. A man beside her laughed. People began to nudge one another. A moment later the laughter was open, spontaneous and hearty. Every remark of Kerry's as he innocently continued provided fresh opportunity for amusement.

When it was over there remained nothing for Asbury Hadden to say. The "Daily Dawn" issued an extra, with a red streamer across the front page, "Say, Joe, I can't read your writin'." The report of the OIC broadcasting followed at length.

Radio has elected many men to office. It has defeated many others. In the Mythington campaign it elected Asbury Hadden by an overwhelming majority, defeated James Kerry by a landslide and sent Joe King, boss of Bailey Club, to a political oblivion from which he never emerged.

ordinary receiving tube, supplied with heavy duty B batteries intended for reception purposes. The total power required by the transmitter was only 13 watts, a fraction of the power used by ordinary electric light bulb. Electric flatirons, for instance, usually use about 250 watts.

Engineers, in discussing this record, ascribe the efficiency of transmitter to the steady, unwavering signals which it emits. The usual amateur transmitter draws its power from alternating current mains, causing a hum, which detracts from the steadiness of signals. By using batteries this difficulty is eliminated.

### New Low Power Record Established

Clair Foster, operating a small home-made radio transmitting station at Port Alberni, B. C., established a new world's record when he communicated across the Pacific and over 1,000 miles of Australia, while more than a quarter of the distance was in daylight.

It is a well known fact that daylight transmission is very much more difficult than night and that sending over the sun-set or sunrise line offers still greater obstacles to the travel of radio waves.

The most remarkable feature of Foster's record, however, is the extremely small power used by his transmitter. Instead of a transmitting vacuum tube, he used an

Timmons B-Liminator  
"On test, the B-Liminator provided ample plate current for a five-tube set and its maximum output was not used."—Brooklyn Eagle.

Among the other newspapers and radio publications which have tested and endorsed B-Liminator are New York World, Garden (N. J.) Post Telegram, Indianapolis Star, Boston Traveler, Fort Worth Star Telegram, Newark (N. J.) Call, Radio Broadcast, Popular Mechanics Magazine, Radio in the Home and Electrical Goods.

## Amplion Pedigree

Thirty-eight years ago—

In 1887 Mr. Alfred Graham invented and demonstrated the first practical loud speaker, of which the world had ever heard (Illustrated above).

In 1893 Graham Loud Speakers placed upon the market. Illustration shows the "1893 model."

In 1896 Graham Loud Speaking Naval Telephones developed and adopted by British Admiralty.

In 1898 Graham Waterproof Loud Speakers patented. Placed on many warships and mercantile vessels, throughout world.

In 1902 Complete Graham Loud Speaker installations, on central battery plan, erected on warships as sole means of communication.

In 1906 The most extensive loud speaking naval installation to date was made by Graham. Included a Graham exchange system fitted to H. M. S. Dreadnought.

Onwards Graham Loud Speakers applied to all sorts and conditions of service at home and abroad, sailors and afloat.

By 1919 No less than 12,000 Graham loud speaking installations in operation on ships alone.

In 1920 Graham radio loud speakers were in common use in "AMP-LION" Loud Speakers produced for radio by Alfred Graham & Co., A.M.P.I. Trade-mark registered.

In 1923 Amplions introduced into United States, Canada and other countries. Quickly attained largest throughout-the-world sale of any loud speakers.

In 1924 To supply demand The Amplion Corporation of America was formed to market and manufacture Amplions here.

In 1925 More Amplion companies formed and agents appointed throughout world to keep pace with international demand.

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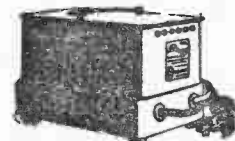
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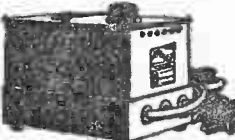
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However, this feature adds another tuning control. Although a loop antenna may be of almost any conceivable shape its most common form is the spiral type. This consists of wire wound about a square and is nothing more than an overgrown inductance coil. A simple loop for radio broadcasting reception may be made by winding about fifteen turns of wire about a form three feet square. The turns should be spaced about a quarter of an inch apart and insulated from the frame by well dried wood or composition. Flexible wire is the easiest to wind and is, therefore, usually used, although it is not essential. The wire may be either insulated or bare providing the turns are spaced.

The condenser type of antenna is seldom employed for radio reception. It is nothing more than an open circuit type having a high capacity. This capacity is obtained by having two conductors placed five or more feet apart. It usually has a very large flat-top area and is used with a counterpoise similar in construction to the aerial.

The Beverage wire antenna is a modification of the single wire aerial and was named after its inventor, H. H. Beverage. It consists of a single wire, usually supported at a low altitude and equal in wave length to the wave length received. One end is grounded through a resistance and at the other is connected to the ground in the usual manner through an inductance. This system is extremely directional in the direction toward which it points. It is, therefore, not practical for radio broadcast reception.



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"Radio has performed a miracle in relaxing the life of the home," says John J. Pulley, president of the Emigrant Savings Bank, in his booklet, "Five Steps to Fortune."

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"So do not be surprised when I say that the third step to fortune consists in laying aside enough in the savings bank month by month (over and above our basic reserve or living insurance) to enable us when the right time comes to have enough money to purchase an automobile or perhaps a radio or some other means to relaxation which in the old days would have been called a luxury, but which to-day has become very nearly a necessity."

**ADDITIONAL RADIO NEWS AND ADVERTISEMENTS**

will be found on the RADIO BROADCAST PAGES

# Up-to-the-Minute News of Radio in Pictures

Miss Elizabeth A. Berger, director and operator of station WLTS, Lane Technical High School, Chicago, Ill.

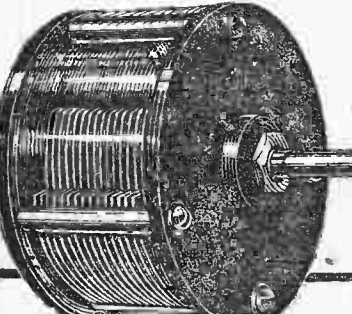
Salvation Army Headquarters Quartette which sings from station WGBS

Starlings alight on the Aerial of Marconi House, London.

Clifford Labor got World's Series results through receiver rigged on his ash truck.

Left A. Atwater Kent (seated) and Graham McNamee, of WEA, discuss a Musical program.

Corp. E. I. Pratt demonstrating the latest type U.S.A. Signal Corps radio transmitter and receiver.



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The Radio Hub of New York



# Navy's Radio Sends Half-Way Around World

With the additional funds and facilities made available for war the navy, in conjunction with commercial electrical manufacturers, made large and progressive strides in the development of radio. Radio telephony was made practicable. The broadcast radio transmitters of to-day are based on these war developments.

During the war the navy took over the commercial radio stations and modernized their apparatus. For example, a high-power radio station on the Atlantic sea coast was then under construction, and there was being installed apparatus of British design, which the navy considered of doubtful practicability. So the navy installed apparatus of American design, and this apparatus is still in operation at that station.

## Service During the War

Long before the war was over the navy had in operation the largest radio set in the world. An interesting phase was the organization for handling radio traffic between the United States and Europe. The navy system not only handled the messages for the United States naval forces on the high seas, but also those between the War Department and the American Expeditionary Forces in France. The transmitting keys of all the Atlantic coast high-powered radio stations—namely, Marion, Mass.; Sayville, N. Y.; New Brunswick, N. J.; Tuckerton, N. J., and Annapolis, Md.—were controlled from a single room in the Navy Department Building in Washington.

From that room the Secretary of the Navy could communicate instantaneously with France, Italy, England and all our outlying possessions, as well as with men of war at sea.

The navy soon ascertained that this system would be insufficient to handle the

(Continued from page three)

rapidly increasing traffic load. So naval radio operators were sent to France to help man the French stations, and this immediately increased the speed of handling the messages. Early in 1918 the construction by the navy of an additional high-power radio station in France was commenced. This station, La Fayette, was of 1,200 kilowatt capacity, and remains the highest power radio station in the world to-day, although there is one larger station in this country now under construction.

It is interesting to note that in the interval between 1912 and 1919, a period of only seven years, the 100 kilowatts station at Arlington had become obsolete and the newest stations were all in the order of 1,200 kilowatts, such was the progress in radio.

The navy has not rested in its endeavors since the war. There has been developed under navy specifications a modern radio transmitter, which has proved to be most practical for efficient long-range communication on merchant ships.

The navy's radio compass system has been improved, and by this compass we assist vessels in making their ports in fogs, thus enabling them to complete more quickly their voyages. This service rendered by the navy makes possible the saving of thousands of dollars to organizations engaged in foreign and coastal trade.

As for the future, the navy is engaged in some remarkable developments, some of which will have commercial application. There is being established the first low-power, long-distance radio network in the world. At least the navy will be the first to have this new type of system on a practical traffic-handling basis. This is the result of research, in which the navy

has taken a leading and most active part during the last few years. While it might not spell the doom of high-powered radio stations, it certainly will result in large savings in operating costs.

Early in the century the navy realized the importance of radio in modern naval warfare; but the commercial demand was not large enough at that time to warrant investments of suitable amounts of money on the part of the manufacturers. The money-making possibilities of radio in competition with cables and telegraph did not seem to be very alluring.

The field of ship and coastal radio was a comparatively small undertaking for large business concerns. In other words, in the pre-war days the commercial demand for radio was so small as to make rapid technical development an impracticability.

In 1911 and 1912 radio in this country was controlled by British and German interests, the European countries being interested in radio as an adjunct to their huge foreign trade, and also because they wished to bind more closely their colonies with their home government. The United States had no such incentive, her merchant marine was small and our colonies were relatively unimportant, as compared to the continental United States. Because of this state of affairs the navy, except in a few minor instances, had to purchase its radio equipment in Europe. In 1912 the navy had on board its ships radio apparatus made in Germany.

After the war the navy had to return the private stations it had taken over for war use; however, the former German-controlled stations were retained by the navy permanently. Many of the other private stations were owned by a corporation controlled by British interests. The United

States was again faced with the possibility of having her trans-oceanic and coastal communications in foreign hands.

Fortunately, one of the leading American electrical manufacturers was negotiating the sale of some very important radio patents and apparatus to these foreign-controlled corporations. The patents and apparatus were American inventions and had been used by the navy during the war with great success. The navy approached this electric company and requested them, on the grounds of patriotism, to withhold the sale of this patent to any but American organizations. The company co-operated very willingly with the navy, but there were no American companies organized which had sufficient capital to handle the matter in a satisfactory manner. The navy could not purchase the patent because of the necessity for retrenching its expenditures. So it was suggested that this electrical company organize a radio company of its own and purchase the British interests in the foreign controlled company under discussion.

Most important to the navy, however, is that we do not have to depend on foreign countries for our apparatus, and it is interesting to note that the early desire of the navy to create a source of manufacture of radio equipment in this country helped speed the development of "radio broadcasting."

This is in entire accordance with the methods the navy has practiced in many other scientific and engineering fields. Thus, the navy is not only a protection to the country but it also renders important service in peace, the value of which few persons realize, but which are certainly a direct economic benefit not only to the business interests but also to the entire population of the United States.

## Foreign Fans Show Interest in Radio Expositions

(Continued from page two)

try on the same system as that already in use at Greenwich Observatory.

As regards the general display of receivers and components, there was nowhere anything of a revolutionary nature. General improvement in design and construction was very marked and cheaper prices prevailed, as compared with conditions a year ago. Many manufacturers had super-heterodynes on show, for this type of receiver has begun to be very popular in England during the last twelve months. Whereas a year ago there were no suitable component parts for super-heterodyne construction, there is now a varied collection.

Loud speakers of the horn type seem to be rapidly giving way to those of cone and other designs, as is the case in this country. The famous Amplion loud speaker is now available in this new form, the new models being displayed for the first time at the "Narmat" exhibition, and, apart from their excellence of performance, they are made up as very handsome pieces of furniture.

England also appears to have awakened to the need for battery eliminators, and many different types of these useful radio auxiliaries were in evidence, some of them combining in one instrument the functions of both A and B batteries.

The second Great German Radio Exhibition was held in Berlin from September 4 to 13 in the great hall specially built last year for radio exhibition purposes.

In some respects this exhibition was particularly epoch making, for, coincident with its opening, the German government rescinded many of the regulations which have up to now so greatly hampered the progress of radio in Germany. There is no limit to the wavelength range which may be covered by a radio receiver, either manufactured or home constructed, and regeneration may now be used in an unrestricted manner. Manufacturers are now left free to make use of any technical improvements whatsoever.

Amateurs also are given much greater freedom, so that we may look for greatly increased activity on the part of German amateurs during the next twelve months.

The effect of the abolition of these restrictions was immediately apparent in the exhibits at this year's radio exhibition. Receivers were to be seen everywhere which permit reception on any wave length, from the lowest to the highest. This may sound strange to the American reader, who has freedom to receive

on 20,000 meters if he wants to, but is not particularly interested in so doing, but in Germany there are countless amateurs who are so interested and have been prohibited from doing so for many years. Also their biggest broadcasting station,

Koenigs-wusterhausen, operates on 4,200 meters.

The number of exhibitors contributing to the success of the show was 280, and it was apparent that the radio industry in Germany is now on the road to stability,

## Radio Aids Isolated Men in Maine

By Walter J. Fenton

THE old feeling of romance which came from the utter loneliness is gone now," said Commander Eugene F. MacDonald Jr., in charge of radio communications with the MacMillan Arctic expedition, in a recent interview published in this section.

That's one way of looking at it, but witness the case of the two city chaps who recently traveled to the rock-bound coast of Maine for a week's sojourn. One of the two had not been to the wilderness for some years and, acting on past conditions, primed himself for the usual questions of these people in the lonely sections of the country. What is the latest song hit in New York? This was the first question he was usually asked when going into the mountains of Pennsylvania. Questions of the political situation followed and the reviews of current plays came in their own order.

In starting for the Maine coast this visitor was all prepared for the questions. To his surprise not one of the questions was asked, but his own ignorance was brought to the surface on visiting the home of an old sea captain.

"Well, how did you like the world series?" was the first question, and this from the feminine head of the household. The smartly who had prepared himself looked at his companion. Together they stared in bewilderment at their hostess. Why, the last game was only played yesterday, so how could these two city boys know the scores when they were motoring toward their destination.

"You don't mean to say you were not interested," continued the hostess. "I wouldn't have missed it for anything."

"Oh, did you get to the first game?" asked the visitor in an effort to cover his embarrassment.

"Why, I've been to every game," was the retort courteous.

"This radio set of mine brought in the game play by play. We could hear the

cheers of the crowds, and I really enjoyed it more than if I had been there, because each play was explained by one trained to catch what I might have missed."

Their visit ended, the two city chaps continued to the home of another old friend on the other side of the hill. This friend, too, was a former sea captain. He had guided vessels across the ocean when radio was practically unheard of. After the usual greeting the conversation drifted to current events. The city chaps went into a discussion of the recent submarine disaster as a possible means of interesting their host. From this the subjects drifted until they reached Sunday sermons. The nearest church to this former captain of the seas was five miles away. To get there on Sunday meant a big sacrifice, shared with his wife, his only other companion in this lonely house which looks out on the ragged rocks and bounding sea.

Now the big surprise came to the city chaps when they tried to quote some sermon erroneously. They were politely corrected by the aged couple, who announced that the sermon was delivered in Boston two weeks previous and that they both had listened attentively to the speaker's every word.

Romance may be robbed by radio, but the comfort and education provided these residents of the lonely settlements are indeed a compensation.

These retired sea captains, waiting for the call of the Almighty, spending their last days on the open coast of Maine, their porches headed toward the woodland and their bedroom windows opening on to the surf, are certainly deriving an unthought-of comfort from their radio sets, no matter how small.

And in Venezuela they have adopted a law prohibiting the use of radio sets in the day time. This, however, has been done so that the workmen after their daily luncheon will return to their tasks instead of devoting the afternoon to their radio sets.

though it has a long, long way to go yet.

Up to the present the universal type of tuning coil in use in Germany has been the fine wire honeycomb coil, but this year sees the commencement of the low-loss era, and straight line frequency condensers have also appeared in rudimentary form. The old fixed condensers with arbitrary values are giving way to more efficient instruments actually possessing the capacity marked upon them.

Head phones and loud speakers also showed a marked improvement over last year's models, and the general quality of instrument work has improved.

## Czechoslovakia Shop Window

This go-ahead little country, one of Europe's latest converts to the science of radio, added a radio section this year to its annual fair at Prague, held between September 6 and 13, and with commendable enterprise did its utmost to attract not only the foreign visitor but also the foreign exhibitor.

To this end considerable special reductions in fares were made on the Czechoslovak state railways, and were applicable not only to natives but also to foreign visitors, for whom passport and other formalities were specially facilitated. Visitors to the fair, which included a multitude of industries other than radio, were estimated at 400,000, of whom more than 6,000 were foreign buyers.

Special pavilions were erected to house the radio section of the fair and thirty-eight aeriels, supported by thirteen masts, were provided for the use of exhibitors. Batteries of large loud speakers mounted on towers filled the exhibition grounds with music. An area of 5,000 square meters was devoted to the radio section and a special pavilion divided up into cubicles was arranged for loud-speaker demonstrations.

Most of the radio apparatus on view was of foreign manufacture, but such Czechoslovakian instruments as were to be seen followed closely the methods of design and construction common to other countries new to the art. The products of nearly all the leading foreign manufacturers, including the Radio Corporation of America, were very much in evidence.

Very active business is reported as the result of Czechoslovakia's enterprising radio fair, both in the home and foreign markets, and about 25 per cent of the exhibitors applied for space to exhibit at the next spring fair, to be held from March 21 to 28, 1926.

## Practical Information on Radio Receiving Antenna Construction

The Aerial Is One of the Most Important Units of the Receiving Circuit; Glass or Porcelain Insulators Suggested; Enameled Wire Best

By Morton E. Stanley

ONE of the most neglected units of a radio receiving installation is the antenna system. The average radio fan does not stop to consider that the antenna system is the most essential unit. It is literally the connecting link between the transmitting station and of the circuit and if poorly constructed will not give satisfactory results. The receiving apparatus.

Radio writers seem to have neglected the device that receives the radio energy from the ether and supplies it to the receiving apparatus—the antenna system. The aerial is one of the most important parts of any radio set, whether it be transmitter or receiver.

An efficient antenna demands careful design in spite of the fact that almost any kind of a conductor elevated above the earth and fairly well insulated, such as a tin roof, bed-spring or small coil of wire, will work. The difference between a good or a poor antenna will not be noticeable on the reception of stations located within 100 miles of the receiving apparatus but is very apparent on the reception of those farther away. This fact makes many DX fans wonder why it is impossible to receive distant stations when the best radio receiver money can buy is used. In almost every case of this kind the explanation is that a poorly constructed antenna system is employed.

Not only is the aerial important but its companion, the ground, is of equal importance for good results. The ground connection is considered part of the antenna system and therefore should receive careful consideration. A good antenna without a good ground; or vice versa, is like the good horse without a rider. It will, therefore, be the purpose of this article to depict the different types of antenna systems that are suitable for receiving work and to tell their respective advantages and disadvantages.

### Three Types of Antennas

Antenna systems are of three distinct types. These types are commonly termed the closed circuit type or loop, the condenser type and the open circuit type. The latter is the most common for radio broadcast reception and may be subdivided into several classes. Each of the forementioned types of antenna has a special use to which it is best adapted—with the possible exception of the condenser type aerial. We will first concern ourselves with the most common and well known type.

By subdividing the open circuit type antenna into classes we have the vertical wire, the inverted L, the T and the umbrella. Incidentally some of these may be divided into separate classes. This latter distinction deals with the arrangement of the wires. For instance, the inverted L or T type may be either of cage or parallel wire construction. However, for ordinary receiving purposes the multi-wire antenna offers no better results than the ordinary single wire.

For practical broadcast reception the vertical wire and the umbrella type may be eliminated. They are usually difficult to erect and will offer no better results than the common inverted L or T type antenna.

Another point to consider when thinking of the multi-wire antenna is that it often causes a set to tune "broad"; that is, make it less selective. Inasmuch as there are several hundred broadcasting stations in the United States operating on wave lengths between 200 and 550 meters and less than ten kilocycles apart poor selectivity is always objectionable.

### The Proper Height

The proper height seems to be a problem that baffles the radio fan when he is considering the construction of a new antenna. As a matter of fact, there are no definite data available giving any constants on this point. It is the general consensus of opinion, however, that the higher the aerial the better the results. This has been proved in practice time and time again. One objection to an extremely high antenna is that it also tends to make the receiver tune broad. Therefore, if the radio fan is fortunate enough to be located a consider-

able distance from a broadcasting station he has the advantage of being able to erect a high aerial without introducing poor selectivity. However, do not gain the impression that it is solely the antenna that causes the set to tune broad. This is not true. A poorly constructed receiver will not be selective even if it is used with the best possible antenna. The point is that with the proper combination of the receiver and antenna the best sensitivity and selectivity will be had.

The fan who lives within a few miles from a transmitting station has a different problem to solve. He usually lives in a city and has many obstacles which prevent the construction of a good antenna. A long, low antenna will tend to introduce selectivity into any radio receiver. However, it will not be a good DX "getter." Therefore we must reach "happy medium" between these two factors. It is safe to say that an antenna having an effective height of between twenty-five and forty feet will be satisfactory for all-around radio broadcasting reception.

The effective height of an aerial is the average distance between it and the earth or some other ground. In the case of an aerial erected on an apartment house it would be rather difficult to figure out the effective height inasmuch as the frame of the building is usually metal and grounded. On the roofs of these buildings all metal fixtures are usually grounded for protection against lightning. In this latter case the only alternative is to approximate the effective height.

There is very little difference in the results obtained from an inverted L and T type antenna. The one which is the most convenient and easiest to construct should be the one selected. It often has been said that the T type antenna is less directional than the inverted L. However, this will not have much effect on the reception of broadcast signals. Where the directional characteristic of an antenna is noticed most is at the transmitting station. The only directional antennae for reception are the loop and Beverage types. These will be considered later.

The insulation and kind of wire used in an open circuit type antenna is important. A leaky antenna will never give satisfactory results. It is generally considered that either glazed porcelain or glass insulators are the most satisfactory under all conditions. A good insulator five inches in length at both ends of the antenna is all that is required. It might be of interest to know that glass towel rods, which may be purchased in the "five and ten," make excellent insulators capable of handling a hundred times as much voltage as normally exists in the receiving aerial.

Copper wire Best  
Copper wire is generally considered best for antenna construction, due to its low resistance. Either No. 14 or No. 12 wire will be found satisfactory. Bare wire is all right when it is new, but copper corrodes, increasing the resistance of the wire. This is because the currents in a radio receiving aerial flow on the surface of the wire and do not penetrate further than a thousandth of an inch. It is easy to see that if the wire is corroded the currents will have to pass through this thick coating which is a poor conductor as compared to the wire itself. Enameled wire will prevent this. Stranded wire should not be used unless it is enameled.

Next in importance is the loop antenna. This type has many advantages, but it cannot be employed with a receiver which does not have two or more stages of radio-frequency amplification. For this reason it is most commonly used with a super heterodyne. Its chief characteristic is that it is extremely directional. This is a great aid in tuning and adding to the selectivity of the receiver.

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Every tube tested in your presence.  
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## Elementary Information For the Radio Novice

**A Radio Receiver Cannot Be Expected to Pick Up the Signals of Broadcasting Stations More Than 100 Miles Away During Daylight**

This is the last of a series of twenty-four lectures for the radio layman, which have been broadcast through KDKA, the Westinghouse Electric and Manufacturing Company's station at East Pittsburgh, Pa.

By James W. H. Weir,

Technical Editor, "The National Stockman and Farmer"

WE ARE now on the last chapter of our radio course. More than seven hundred students in all parts of the country have followed these radio lessons to their completion and have expressed their appreciation in one form or another. If it is not asking too much I would like very much to have those of you who have followed this series of articles drop me a line just to let me know whether or not they have been beneficial to you.

And now for our closing story. In the ranks of the radio enthusiasts of America are thousands who are continually aggravated by the fact that they are unable to get distance during the daytime. In fact, there are many who are unable to get any stations at all during the day, due to the fact that they are living beyond the daylight range of the nearest transmitting station. It is said that the daylight range of a 500-watt transmitter is but 100 miles and of course such being the case there are comparatively few who will be able to get any but the high powered stations during the daylight period. In rare instances reception beyond this limit has been recorded, and it is safe to assume that such reception is "freakish" rather than the usual thing. Therefore if you are located outside the area over which the transmitter is capable of acting there is small chance of your being able to receive broadcasts during the day with the present radio receiving sets. Sometime in the future perhaps the conflicting obstacles may be removed, but at present the outlook is very remote. The truth of the matter really is that during the daytime the signals may be reaching you, but the receiving equipment used, although extremely sensitive, is not of a degree sufficient to enable you to pick up and render intelligible the weak electrical waves traveling over extreme distances during the day.

On the other hand, during the early evening and late night exceptionally long distances are recorded almost constantly and instead of hundreds many radio fans measure the reception distances in thousands of miles. There is one exception even to this and that is that in places where "static" predominates during several months of the year such distance reception is almost as impossible as during the day.

In the early evening the radio waves spread out farther from the transmitter and as night begins to fall the carrier wave is first heard faintly, gradually increasing in intensity, until finally it brings to you the voice and music from a point hundreds of miles away. At various times during the late night and early morning the signals are strong enough to operate

very interesting talk. This is a phenomenon that cannot be remedied in any way, and there is no earthly use in your trying to manipulate the receiver to bring the wave back, for it will not come until the condition that caused it to disappear is removed. Many theories have been advanced as to the cause of this, particularly of radio reception, but it seems as if we are as far away from the solution as ever. Some say it is caused by atmospheric conditions and others attribute it to the changes in cloud strata. There remains but one thing to do if this fading becomes pronounced and that is to tune in a station at an extremely different direction and forget for the time being the one that gives you trouble.

The size of the set seems to worry a lot of radio fans. Some think that if they have a cedar chest with a multitude of dials and a flock of tubes their chances are better than the average radio fan who operates from one to five tubes. Such is not the case. An efficient one-tube set will pick up the signal just as readily as a two or three tube audio-frequency receiver, but of course the volume is lacking. I say two or three tube audio-frequency set because there are some two or three tube sets that employ radio-frequency amplification before the detector, and this enables them to pick up fainter signals than a single one-tube set would permit. It makes no difference, however, how many stages of audio-frequency amplification you use, for if the signal is not capable of being picked up on the detector tube alone all the audio frequency in the world won't give you a bigger range. The one-tube set, of course, limits the operator to the use of headphones. Two sets may be used satisfactorily, but if more are required it is better to use a single stage of audio-frequency amplification. When a loud-speaker is desired two stages of amplification will be found plentiful.

There are many letters received that tell of the almost unheard of distance performance of the simple little crystal set. There is no doubt that the great majority of these records are "freak" receptions. It would be impossible for the average fan to take the simple crystal detector type of receiver and record signals originating anywhere from 500 to 1,000 miles away. One out of a hundred might get away with it, but the other ninety and nine would be greatly disappointed. The crystal detector undoubtedly will give clearer and perhaps more natural reception, yet it should be used only when in close proximity to a broadcasting station.

Nowadays the crystal is playing an important part in a number of reflex sets, due mainly to the fact that it affords good quality and clean tones. Without the aid of the vacuum tubes in the circuit, however, it would be impossible to obtain distances such as are recorded with sets that employ it as their means of detection.

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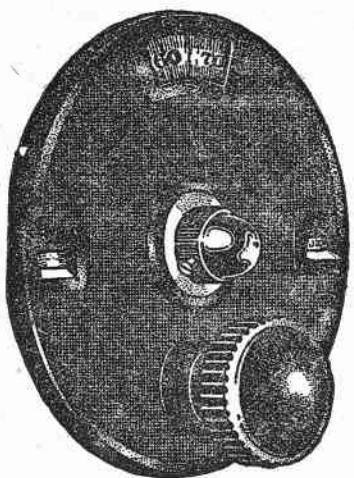
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# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

SECTION TEN

SUNDAY, MAY 16, 1926

12 PAGES

## A Compact Eight-Tube "Super-Het"

**This Receiver Employs Three Stages of Transformer Coupled Intermediate Frequency Amplification, One Transformer Coupled and One Impedance Coupled Stage of A. F.**

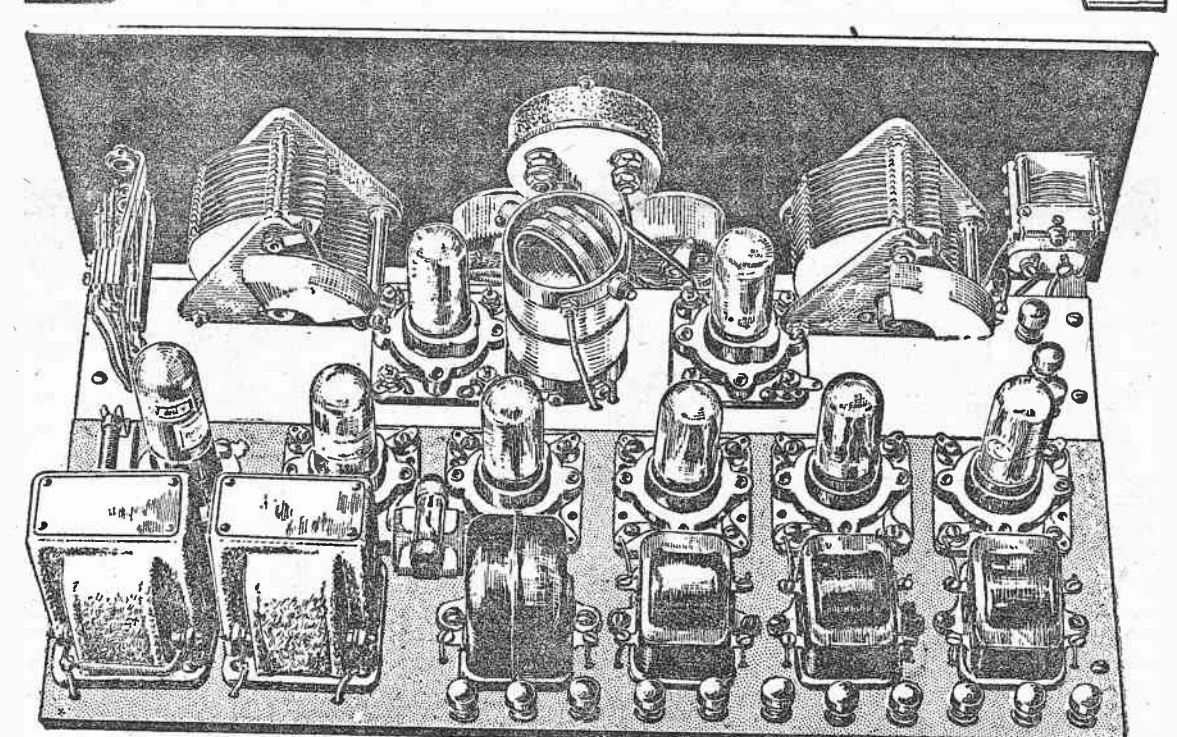
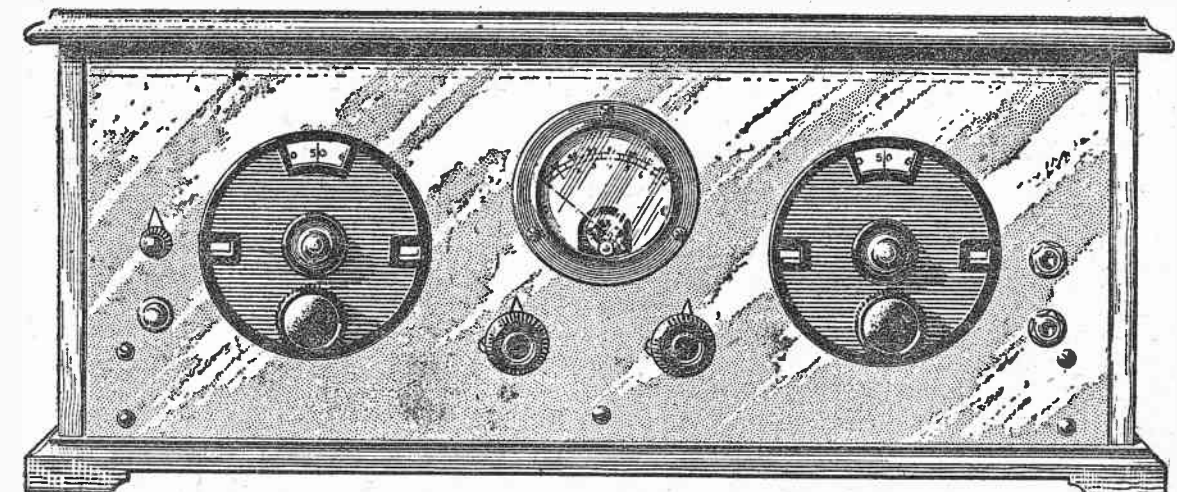
By J. E. ANDERSON

EVERY real radio fan builds a great many radio sets in his search for something just a little better. Usually he does not concentrate his efforts on turning out a work of art, but rather on the radio principles involved. His finished products do not compare very favorably as to appearance with the handsome pieces of furniture now sold for radio receivers, but for quality of reproduction, sensitivity and selectivity they often excel. Every fan who throws together these copper wire entanglements has a dream that some day he will gather all the best he has learned about receivers and build an orderly set which will be a "knock-out" both as to appearance and performance. The "some day" has arrived for Paul Hollingshead, a discriminating amateur of many years experience in the radio field. He has built an eight-tube super-heterodyne, for which he does not need to offer any apologies. It is one of the finest examples of amateur radio construction that this writer has ever seen. And it does all those things, you know, that a good receiver is supposed to do. It brings in the DX, it cuts out the local interference and it does deliver signals fit for a cone speaker.

The circuit follows closely to standard design, as will be seen from the diagram, except in a few places where minor innovations have been introduced. Although the diagram shows an antenna and a ground, together with a radio-frequency input transformer, L-1, L-2, the set is primarily intended for use with a loop pick-up system. The antenna and ground circuit are added when extreme distance is desired. To substitute the loop for the transformer L-1, L-2 the leads to coil L-2 are cut out at the points marked X and the loop terminals connected here. As will be seen, there are three leads to this coil, one running to a tap near the low potential end of the coil. When L-1, L-2 is used it should be an ordinary radio frequency transformer which will cover the broadcast range with the tuning condenser C-2, which should preferably be one of the .0005 mfd. capacity.

Regeneration is introduced into the modulator tube by feeding back energy from the plate through the midgeet condenser C-3 and through a portion of the loop or of the secondary coil L-2, or by the Hartley parallel feed method. The midgeet condenser gives a satisfactory control of the amount of regeneration, provided the proper number of turns be included in the plate circuit. In the case of L-2 the tap is placed at the fifteenth turn measured from the plate end of the coil.

The two windings, L-3 and L-4, associated with the oscillator, are wound on a piece of bakelite 2 inches in diameter with No. 30 double silk-covered wire, the tickler containing forty turns and the



These drawings show how the parts should be arranged on the panel and sub-base panel

secondary fifty-two turns. The pick-up coil, L-5, is wound on 1.5-inch bakelite tubing and it contains twenty-four turns of No. 24 double silk-covered wire. It is mounted inside the oscillator coil, L-4, in such a manner that it may be rotated through an angle of 360 degrees. There is no control for this variation brought out on the panel, because the pick-up may be adjusted once for all until the operation is satisfactory. The condenser, C-4, across the oscillator coil is of the same size as C-2. Condenser C-1 is of .0025 mfd. and is merely a by-pass across the C battery.

The first three intermediate frequency transformers, T-1, T-2 and T-3, are of the iron core type. T-4 is a tuned air-core transformer, responding to a frequency of 30,000 cycles per second. These four transformers taken together constitute a satisfactory filter in the intermediate frequency level.

The first detector, or rather the modulator, operates on the principle of negatively biased grid. The second detector operates on the principle of blocking condenser and grid leak. The condenser C-5 is a .00025 mfd. mica instrument and the grid leak, R-1, is a variable, liquid-filled affair.

The by-pass condenser, C-6, is the same size as C-1, namely, .0025 mfd. This, however, could well be a smaller condenser, say a .001 mfd. The larger this condenser is the more will the high frequencies in the signal be suppressed. Hence, it is important not to use a condenser here larger than is absolutely necessary. If the circuit seems to give as loud signals for all carrier frequencies with no condenser as with it, then by all means omit it. The condenser across the secondary of transformer T-4—namely, C-0, is an integral part of the transformer and should not be included in the list of parts. It is given on the diagram just to show that it is actually there. If some other filter transformer be used, one in which this condenser is not incorporated, it will be necessary to include one and to adjust it carefully so that the filter transformer will be in tune with the same frequency as the one for which the iron core transformers are most responsive.

Transformer T-5, which was actually used in this receiver, is a Raula-Lyric, and it is used as a straight audio transformer. The second transformer, T-6, is of the same make, but it is not used in the same way. The latter is used as an auto-transformer with the windings

inverted. That is, the two windings are first connected in series aiding and then the secondary winding is connected in the plate circuit and is used as primary, and the two windings in series aiding are connected in the grid circuit, and this enlarged winding is used as the secondary. To be specific, B and F are connected together and the junction connected to the plate of the tube. Then G is connected to the positive of the plate battery and P is connected to the grid of the second tube. This method of connecting puts a very high impedance in the load of the tube and therefore straightens out the dynamic characteristic of the tube and at the same time it makes the primary voltage high. The step-up, however, is slight, but it is better than if the secondary alone were as a choke coil.

The blocking condenser, C-7, has a capacity of 1 mfd. The grid leak, R-2, has a resistance of 250,000 ohms. The by-pass condenser, C-8, across the B battery, is of the same size as the blocking condenser, C-7.

J-1 is a jack for listening in on the first stage of audio. The volume at this point is sufficient for loud-speaker operation on all local and a good many distant stations, but the tube is a C-299, and this, of course, is not able to handle all that is required for a cone type of speaker without overloading. The last tube is a UX-120, which can handle enough, provided a sufficiently high-plate voltage is used. J-2 is an automatic filament control jack for tapping in on the output of the last tube.

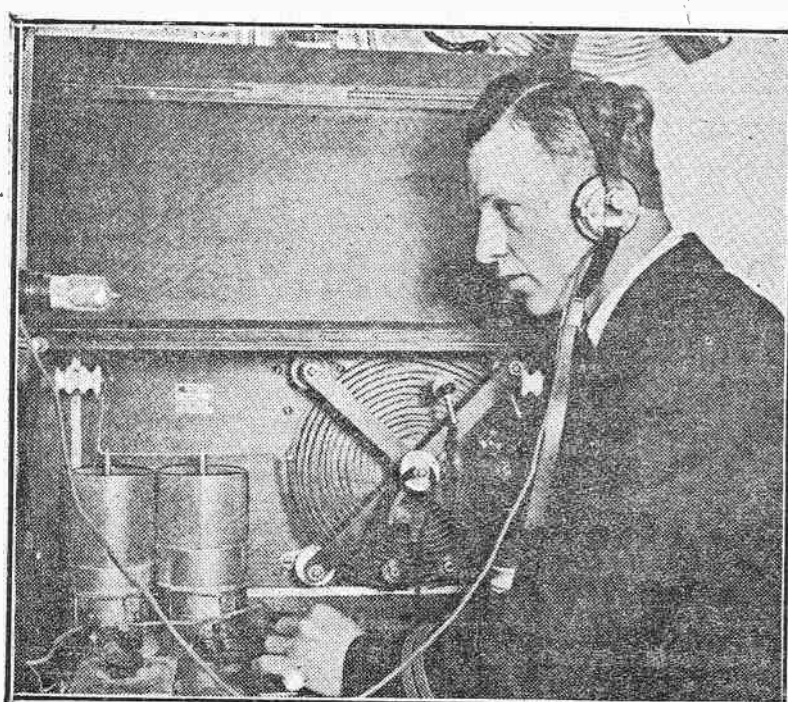
R-4 is a master rheostat handling the current for all the tubes. A voltmeter V, connected across the filament line above the rheostat, is a convenient aid in adjusting the filament terminal voltage to the proper value. In series with the master rheostat and with the filaments of the first two intermediate frequency tubes is a second rheostat, R-3. This is mainly used to control the volume of the output of the receiver. Rheostat R-3 may be used for this purpose without producing distortion because the tubes handle intermediate frequency currents, and the signal level in both of these tubes is very low. The master rheostat, however, should never be used for this purpose, for any attempt to reduce volume by reducing the current as a whole will result in serious distortion, particularly in the two audio frequency tubes.

All the tubes in the receiver, with the exception of the last, are C-299 and the last is a UX-120.

The plate voltage on the last tube is 135 volts normally, on the next to the last it is ninety volts and on the remaining tubes it is forty-five volts. Provision has been made so that tubes having dif-

(Continued on page nine)

## The Rotor Ship Has Half K. W. Radio Set



Anton Flettner's rotor ship, the Baden-Baden, arrived in New York Harbor after having completed the first trans-Atlantic trip credited to a vessel of this type. The radio equipment used during the voyage, which consists of a one-half kilowatt transmitter, is shown above. Peter Braun, radio operator, is adjusting the controls.

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Additional Radio News Will Be Found in Another Section of Today's Herald Tribune







## Many New Designs For Sets Found in Short Wave Contest

The first public announcement from the Board of Judges, now engaged in considering the merits of the various short wave receivers entered for the \$500 prize contest being held here as a part of the Radio Broadcast-Everyday short wave experiments, indicates that many novel designs have been submitted by amateur contestants. While most experiments submitted designs differing only in minor details from conventional regenerative receivers, a number of radically new designs, involving principles never heretofore used in home built broadcast or short wave receivers, are being subjected to rigid tests in order to determine their merits.

One receiver which shows considerable promise uses a bridge method of detection, which divides the energy ordinarily radiated by the antenna system in such a manner that it does not affect that circuit. It must be remembered that in the reception of continuous wave signals, the detector circuit must be in an oscillating condition in order to heterodyne the distant signal and, as a consequence, ordinary methods of neutralization used in broadcast reception, are of no avail. One of the most important conditions of the contest is that receivers be of the non-radiating type—a condition which is not met by any of the short wave receivers now in general use.

Another novel departure is embodied in a number of receivers submitted, employing double detection, permitting the maintenance of the most favorable grid and plate potential of efficient operation, without, at the same time, causing radiation through the antenna system.

Data is now being collected, through extended measuring tests and by practical operation, in order to determine the performance of the various qualifying receivers under conditions actually encountered in short wave reception. Careful measurements are being made of the energy radiated by the receiver in an oscillating condition, and there is every likelihood that several designs will be published which overcome radiation on short waves. While amateurs are not yet troubled by the radiating receiver problem, it is important that non-radiating receiver designs for short wave reception be developed. Indeed this is one of the primal purposes of the contest. With the large influx of broadcast enthusiasts into the new short wave field, apprehension is felt that short wave broadcasting channels will be made useless, sooner or later, because of the appearance of squealing receivers in that territory, unless non-radiating short wave receivers are developed. Any squeals within range of broadcasting stations obtaining their programs through a short wave link are, of course, retransmitted when the program is rebroadcast on long waves. The use of non-radiating receivers, which have been developed through the contest, is therefore a contribution of considerable interest both to the short wave and broadcasting art. It is recalled that the practical development of regenerative receivers was accomplished by amateur rather than professional designers, and consequently their remarkable work with short wave design is meriting widespread interest and attention among radio engineers, short wave enthusiasts and broadcast listeners.

Included in the board of judges are Professor Louis A. Hazeltine, inventor of the neutrodyne system of reception; Boyd Phelps, radio writer and well known amateur; Arthur H. Lynch, former editor of "Radio Broadcast"; G. C. Furness, manager of radio division National Carbon Company; Dr. Lawrence Dunn, district superintendent of the American Radio Relay League; Edgar H. Felix, radio writer; Dr. A. Hoyt Taylor, in charge of the Naval Research Laboratories at Anacostia, and Professor John H. Morecroft, of Columbia University. It is expected that the prize winners will be announced within thirty days.

**Match Dials to Condensers**  
Dials of various kinds intended for attachment to the shafts of condensers, movable coils and rheostats are made in both clockwise and counter-clockwise models. Carefully examine your own instruments, determine the direction in which they must be turned to effect an increase in adjustment and purchase your dials accordingly.

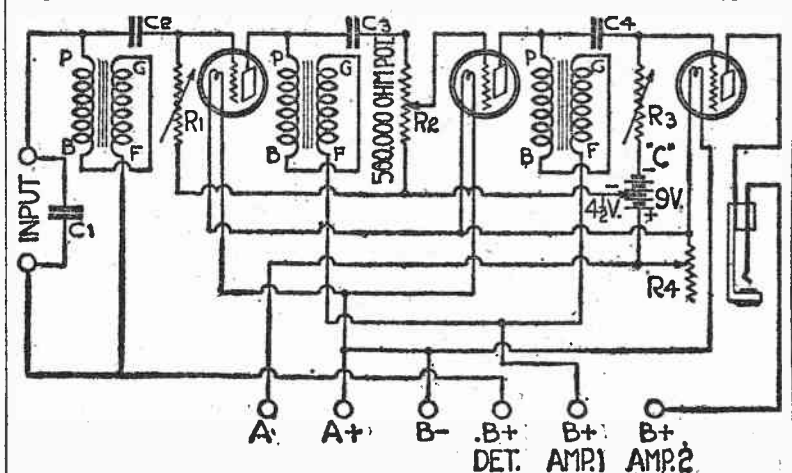
## How to Build an Impedance Amplifier From Old Apparatus

### The Reproduction From the Average Set May Be Improved by Making Slight Changes in the Circuit and Adding a Few Parts

By L. S. Hillegas

It is generally recognized that while the present-day transformer-coupled audio amplifiers deliver ample volume and are electrically efficient for a given frequency, many fail to pass various deep notes of bass instruments regularly featured in broadcast programs. Most notes below 100 cycles are amplified imperfectly if they come through at all.

Because of their superiority in this respect resistance and impedance



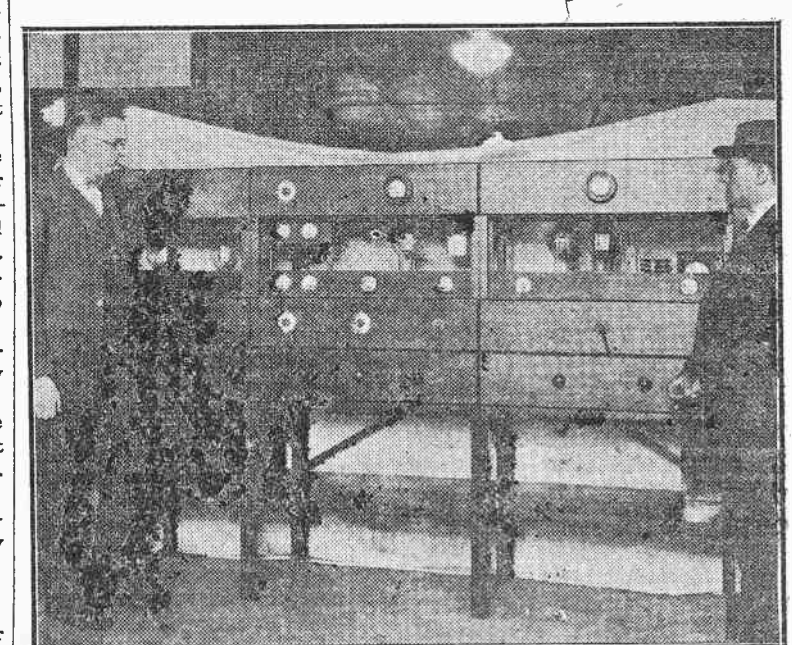
coupled amplifiers are proving popular among set builders, notwithstanding the necessity of using an extra tube to boost volume and a higher plate voltage. The demand is for quality and full rounded tones.

A scheme to readily convert a standard transformer amplifier to choke coupling, utilizing old parts, is suggested by engineers of the Central Radio Laboratories, Milwaukee. From the accompanying diagram it will be seen that the usual two transformers and an additional one have their primaries and secondaries connected in series forming three chokes. It is entirely possible to use the secondaries alone in case three transformers with their primaries burned out are available. Tapping the coil as is done with commercial auto transformers is not essential for good results, and because of the difficulty it is not recommended that an attempt be made to cut into the windings.

The by-pass condenser C1 has a capacity of .001 mfd.; C2 and C3 are not critical in capacity. They may be from 0.1 to 1 mfd., but C4 must be kept small—say from .001 to .00025 mfd.—as a larger one, although it makes for more volume, will tend to block. The three grid resistances are each 500,000 ohms.

To control volume the center grid resistance should be variable. A non-inductive 500,000-ohm Centralab modulator is suggested. Resistance control is preferable because the surges of current caused when jack circuits are opened and closed are a source of danger to the windings of the chokes. These currents frequently

## Crystal Controlled Radio Relay Station



Above is shown the new high-power crystal-controlled radio transmitter, which has recently been installed in the Westinghouse Electric and Manufacturing Company's works, at Newark, N. J., and which will be used to maintain telegraph communication with East Pittsburgh on forty-seven meters. The crystal-controlled feature makes a variation from the assigned wave-length impossible and thereby greatly reduces heterodyne interference.

## Few Tools Needed For Construction Of Radio Outfits

One of the things that makes radio such an alluring hobby is the fact that it calls for neither a complicated array of mechanical tools nor an extensive knowledge of mechanical processes. With a few simple hand tools, obtainable in any hardware store for small sums, a man can assemble and wire any kind of a radio receiver, from little one-bulb affairs to ten-tube giants.

If the new radio fan equips himself at the start with the necessary tools he will find the construction of complex sets a good deal easier than it appears. The following list is a representative one, and if he obtains the items contained in it he will be prepared for any kind of a circuit:

Hand drill, with chuck to accommodate drills up to 1/4 inch, and set of steel twist drills; convenient packages of common radio sizes are available. Approximate cost, \$4.50.  
Electric soldering iron, roll of solder, can of soldering paste. Cost, \$2.  
Portable bench vise, three-inch jaws; the kind that can be clamped to the kitchen table or the edge of a window. Cost, \$1.50.

Hacksaw, with package of blades. \$1.  
Pliers, one pair round nose, one pair flat nose with side cutters, and one pair wire side cutters. Highly important tools; buy good ones. Cost, \$2.75.

Screwdrivers, one very small, two medium. Cost, \$2.  
Ball-pen hammer, all metal. The five-and-ten sells a dandy for a dime.  
Six-inch carpenter's square. Cost, 50 cents.

Three files; one round, one flat, one three-cornered. Cost, 50 cents.  
Strong jackknife. Cost, 50 cents.  
Small pair scissors. Cost, 10 cents.  
Steel center punch. Cost, 10 cents.  
Long, stiff-haired brush. Cost, 10 cents.

The whole list totals only \$16.65 if you buy everything at once.  
The purpose of most of the tools is quite evident, but a few things might need explanation. A hammer, for instance, may seem superfluous since nails are never used in radio sets, but it is very necessary in denting panels with the aid of the center punch to provide starting places for the drill. The square is essential for the accurate drawing of lines at exactly right angles to the edge of a panel; do not depend on a mere straight edge.

The knife is used in the skinning of insulation and the cleaning of end of wire in preparation for soldering. The scissors are very useful in the trimming of loose and frayed insulation and for the slicing of insulating tape. The brush is indispensable for the removal of dust, dirt, filings, loose curls of drilled material and lost nuts and washers from beneath inaccessible edges and the set in general.—R. H.

## Helen Keller to Introduce Mrs. Peabody to Audience

Following the program of dinner music broadcast from the Rose Room of the Hotel Waldorf-Astoria on Tuesday evening WEA's listeners will hear a short program in honor of International Good Will Day. During this program, which will begin at 6:45, the radio audience will hear a talk by Helen Keller and Mrs. W. Peabody.

Mrs. Peabody is a prominent leader among women of America and is the editor of "Every Land," a magazine of world friendship published especially for girls and boys. Her radio message is particularly designed to appeal to children and she will make her radio statements in story form. Probably the feature of the program will be the introduction by Mrs. Peabody of Miss Helen A. Keller, who will also speak for a few moments.

Undoubtedly there are thousands of the radio audience who will welcome the opportunity of hearing the voice of Helen A. Keller, for she is generally regarded as one of America's wonderful women. She has been deaf and blind practically her entire life, an illness when she was nineteen months of age causing this condition. She has been an outstanding leader in work for the blind for many years and is the author of several books, the best known probably being "The Story of My Life," "The World I Live In" and "Out of the Darkness." She is a member of many commissions having charge of institutions and work among those afflicted with blindness.

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Have You Seen  
This Magazine's  
Radio Exchange?

# More Than 500 Attend Convention of the Radio Manufacturers' Association

## Seven Co-operating Organizations Also Hold Annual Meetings in Atlantic City

By EVERETT M. WALKER

THE Radio Manufacturers' Association had a delegation of more than 500 members and guests at the Hotel Ambassador during its second annual convention at Atlantic City May 10 to 14.

The convention was officially opened by Herbert H. Frost, now past president of the organization, at 10 o'clock Monday morning. Mr. Frost briefly touched on the activities of the organization during the preceding year. He stated that the industry had reached the lowest point on the curve, and it followed that any industry at this point must take one of two roads—disintegration or stabilization. Mr. Frost was presented with a key to the city by a representative of the Mayor.

in securing the highest possible price for their marketable products.

The National Radio Trade Association held a meeting Monday afternoon at which were discussed various ways and means for determining credit. The meeting involved a number of discussions and a number of credit associations presented their method of doing business.

Monday evening in the Japanese room of the Ambassador the Radio Week Committee held its first meeting during the convention. Strenuous opposition to the international radio week, voiced by delegates from the Pacific Coast, succeeded in sidetracking the efforts of the exponents of the international tests to choose a date for 1927 broadcasting events.

experts believe that the next international tests will be successful.

"The basis for that belief is the establishment of so-called super-power stations in leading centers of broadcasting on the Continent and in the British Isles.

"Another assurance is the certainty of the cordial co-operation of an official European body which has the desire and the power to function properly in arranging the tests in all aspects, in the light of arranging proper programs, as well as attending to the many technical details."

## Hold Second Meeting

Unable to reach an agreement as to whether or not another radio week should be held next winter, the radio week committee held a second gathering Tuesday evening. It was decided, after a long delay, that another series of international

a message read before the convention that the government stands ready to do what properly may be done to encourage the development of radio.

The text of President Coolidge's message, which was addressed to Major Herbert H. Frost, past president of the association, is as follows:  
"My Dear Major Frost:

"Please give my greetings and best wishes to those present at the joint convention of the radio industry in Atlantic City.

"This is a most important event. The invention and development of radio have been one of the most wonderful incidents of the advance of civilization. Its possibilities for entertainment and education are already known in part. But we are just beginning to realize its full meaning in the commercial world.



Group of delegates at the convention of the Radio Manufacturers' Association, Atlantic City, N. J., May 10

Following the opening remarks officers of the various organizations, including the National Association of Broadcasters, the Radio Magazine Publishers' Association, the Radio Week Committee, the Radio Writers' Association, the National Radio Farm Council, the National Radio Trade Association and the Federated Radio Trades Association, all of which were holding joint sessions with the Radio Manufacturers' Association, gave brief reports of their activities during the last year.

Paul B. Klugh, executive chairman of the National Association of Broadcasters, urged better programs for the radio listener, and stated that a number of prominent manufacturers had contributed a great deal to the improvement of current programs. It was brought out in his talk that manufacturers must contribute to radio programs in order to keep the industry progressive; that manufacturers cannot expect to gather all the cream from the cow without feeding it.

## Magazines Influence Buyers

R. W. De Mott, president of the Radio Magazine Publishers' Association, told of the tremendous influence radio magazines have on radio buyers, and stated that the combined circulation of radio magazines is 2,052,000.

Dr. E. A. White, director National Committee on Relation of Electricity to Agriculture, addressed the convention on the subject "Magnitude of the Farm Radio Market."

"Within the space of a few short years radio has won a place for itself on the American farm," stated Dr. White. "The reports as to the number of farm families enjoying this service vary, but in any case it is great enough to demand serious attention from radio equipment manufacturers. Yet when we take the most optimistic estimate it appears that there are 5,717,032 farms without radio. This is ten times the number already equipped."

Dr. White told how extremely important radio is to farmers. It enables them to know market conditions and aids them

The fight against international tests was a carry-over from the battle against the 1926 tests, which took place at the fourth annual radio conference, held in Washington last fall.

## Oppose Radio Week Tests

The radio broadcasters west of the Mississippi have always opposed international radio week tests. Their contention is that it is impossible for Western fans to hear European stations, due to their remoteness from the east coast, the time difference and the various barriers of mountains and deserts which lie between them and Europe. In view of these facts they objected to giving up an hour of broadcasting each evening for a week for the benefit of Eastern stations and listeners.

Ernest Ingold, president of the Pacific Radio Trade Association, shouldered the burden of the West in its fight against Eastern advocates of international tests. Powell Crosley Jr., chairman of the committee, suggested that if tests were to be held next winter they take place during December instead of January, the month selected for the tests in previous years.

Radio should appoint an "ambassador" to Europe, was the advice that Eric H. Palmer, well known writer, expressed in an address to the Radio Week Committee. The function of the "ambassador," declared Mr. Palmer, is to guarantee the success of the preparations for the next international broadcast tests by working in advance of the dates set for the trans-oceanic experiments, to the end that the program will be of the highest interest and appeal and that all the principal European stations will participate.

Last minute preparations, lack of effort abroad, principally because volunteer representatives of the American committee were not supplied with funds to carry on their activities and many other reasons were given by Mr. Palmer to explain the failure of the tests in January, 1926.

"Everything but smallpox seemed to intervene," he stated. "Atmospheric conditions were frightful most of the week, and the chances are very much against repetition of that barrier in the future."

In part, Mr. Palmer said: "European

tests would be held this winter for a period of three days. It had not yet been decided, however, during what time of the year the tests will take place, but it is expected this information will be forthcoming in the near future.

Tuesday morning the Radio Manufacturers' Association called to order its second general session in the Venetian Room of the hotel at 10 o'clock.

L. H. D. Wells, who addressed the convention on the subject of "The Economics of Distribution," stated that the sensational character of the radio industry, price cutting, dishonest advertising and "gyp" dealers, has done much to retard swift progress. The speaker advocated better programs, more stations connected together in chain and fewer stations in the larger metropolitan districts.

A humorous and practical talk on radio retailing was delivered by J. W. Griffin, of New York City. Mr. Griffin told how the radio dealer operates and described in full the relation of the dealer to the consumer.

Resolutions extolling the feat of Commander Richard E. Byrd in his flight over the North Pole, were adopted during the Tuesday morning general session of the Manufacturers' Association. The resolution was submitted by Eric H. Palmer, who called attention to the close link existing between radio and explorations and expeditions of every description into new territory. The resolution follows:

## Palmer's Resolution

"Whereas, This conference of representatives of the radio industry is held coincident in time and interest with an exploit that does highest honor to the American people and particularly to the United States Navy, and whereas, radio has become so vastly important a contributing factor to the success of expeditions of research and exploration and gives additional protection to the daring and courageous men involved in these hazardous explorations and more investigations, and also makes known to the world, almost instantly, just what has been accomplished.

"Therefore, Be it resolved that the convention tender its heartiest congratulations to Lieutenant Commander Richard E. Byrd on the inspiring success of his polar flight and express the hope and conviction that radio may extend its usefulness to the science in the days to come, to the general benefit of mankind."

President Coolidge told the delegates in

"This government stands ready to do what may be done to encourage the development of radio. To you who have the privilege of being connected with this formative period of a great art as well as a great industry I extend my congratulations. Yours very truly,

"CALVIN COOLIDGE."

Paul B. Klugh, executive chairman of the National Association of Broadcasters, told the members of the press Wednesday morning that 81 per cent of the radio programs in the United States are controlled by the National Society of Composers, Authors and Publishers, and that his association hopes to make an agreement with the latter society in the near future so that radio listeners will have full benefit of all the available musical entertainment.

## New Officers Elected

Election of officers of the Radio Manufacturers' Association took place Wednesday morning. The new officers are as follows: A. T. Haugh, of Buffalo, president; Carl D. Boyd, of Chicago, first vice-president; H. H. Eby, of Philadelphia, second vice-president; Leonard Parker, of Chicago, third vice-president; L. G. Baldwin, of Cleveland, secretary; P. C. Lenz, of Chicago, treasurer. R. W. Ruark is executive secretary of the association.

The new board of directors is as follows: Directors at large, Carl Boyd, Powell Crosley Jr., Vernon Collamore and E. F. McDonald; directors of the Eastern district, H. H. Eby, C. C. Colby, E. M. Square, H. B. Redmond, Godfrey Gort, S. B. Trainor and H. H. Frost; directors of the Western district, Leonard Parker, Townner K. Webster, J. A. Bennan, W. W. Dowell, Harry Bradley, J. V. Hawley, Harry Simpson and D. McGregor.

## Hold Annual Dinner

On Wednesday evening, May 12, the second annual dinner of the Radio Manufacturers' Association was held at the hotel, with more than 600 representatives of the industry present. Herbert H. Houston, publisher and member of the American committee of the International Chamber of Commerce, stated that the radio industry was threatened with ruin unless steps were taken to defeat the Dill radio bill governing radio control. Paul B. Klugh was toastmaster.

The balance of the week was consumed with technical discussions relative to radio developments.



# Another Receiver Designed for Use With Improved Amplifier-Battery Eliminator

This Set Employs Three Dry Cell Tubes in a Neutralized Radio Frequency Circuit

By WILLIAM M. HENDERSON

ON THE first page of the May 2, 1926, issue of the New York Herald Tribune Radio Magazine there appeared an article entitled "An Improved Power Amplifier and Battery Eliminator" by Fulton H. Crawford. The following week a second article by the same author described the construction of a two-tube receiver designed especially for use with the amplifier. These two units when used together made up a four-tube receiver, employing one stage of neutralized tuned radio-frequency amplification, a regenerative detector, one stage of audio-frequency amplification and one stage of power amplification, which could be operated direct from the 110-volt 60-cycle house supply without any sacrifice of efficiency. Also, because of the improved design of the amplifier practically distortionless amplification, with any desired amount of volume, could be obtained.

The results described above were obtained by utilizing the battery eliminator, included as part of the amplifier, to supply the plate current for the receiver (this can be done in the case of any set using not more than two r. f. tubes and a detector) and by using 3-volt A. C. tubes in the receiver.

It is the writer's belief that there are many persons desirous of securing the clear reproduction which is obtainable from the power amplifier who do not wish to have a receiver which requires the use of either storage batteries or special tubes. The receiver to be described in this article, therefore, has been designed to answer this requirement. It employs three UV-199 tubes and may be operated at maximum efficiency very economically. When used with the amplifier-battery eliminator three No. 6 dry cells are the only batteries required. These may be purchased for about one dollar and will last for several months. It can therefore be seen that it would be difficult to construct a receiver which would furnish the same quality of entertainment at less upkeep expense.

It should also be explained that any one not wishing to buy an A. C. tube and transformer for use in the first stage of the power amplifier may substitute a UX-199 and practically the same results will be obtained. When a UX-199 is used in the amplifier its filament may be heated with the batteries connected with the receiver.

## Results With Dry Cell Tubes

There may be some doubt in the minds of those readers who are not just looking for quality reproduction, but who also want distance reception, as to the merits of small dry-cell tubes. Let it therefore be said that the small tubes will give just as good amplification at radio frequencies as the larger storage battery type if the circuit and components are chosen with due consideration, as is the case in this set.

This receiver, for it is a complete set when used with head phone, is mounted

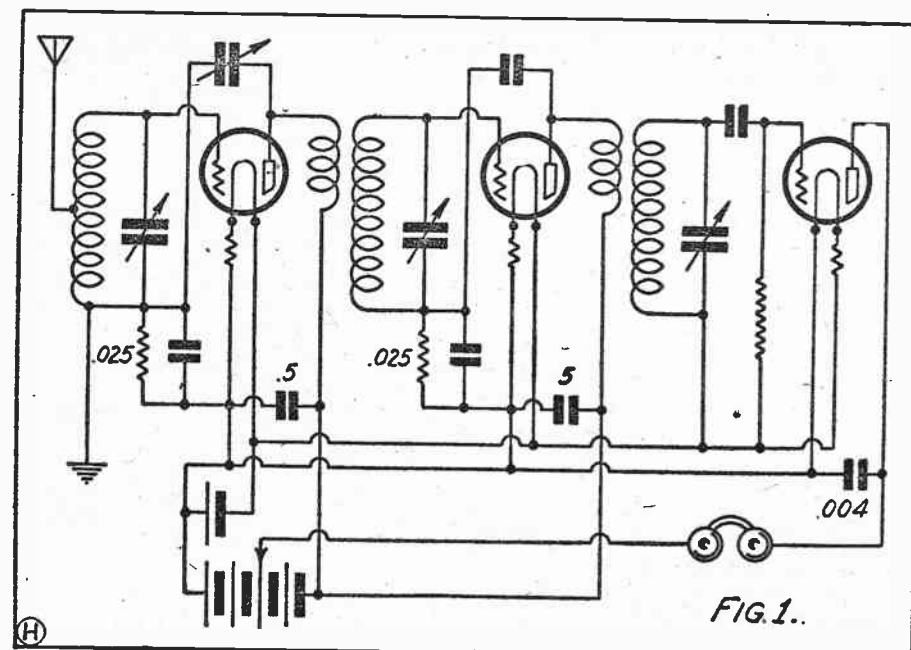
in a seven by eighteen inch cabinet. It will be noticed from the drawings that there are only three dials on the panel which are the three wave length controls. This departure from the usual use of rheostats should not be frowned upon for there is no real necessity of using variable rheostats in series with any amplifier tube that is correctly biased or balanced. In the detector circuit the variable rheostat is not necessary when the grid leak is connected from the grid to the filament rather than in shunt with the grid condenser. The way in which adjustable rheostats are eliminated in this receiver is by the use of an automatic filament control, amperite, in series with the filament of each tube.

## List of Parts

The following is the list of parts actually selected by the writer and used in the construction of the receiver described:

- 1 Radiator panel 18x8x1/2 inches.
- 1 Radiator sub-base panel 18x17x1/2 inches.
- 1 General instrument 23-plate SLP condensers.
- 3 Type No. 6, V 199 Amperite filament controls.
- 3 BMS Vernijustor dials.
- 3 General instrument radio-frequency transformers.
- 3 Radiator type UX-199 sockets.
- 3 Lynch metalized grid resistors, value to be determined by experiment.
- 2 Variocouplers.
- 2 —.5 mfd. Tobe by-pass condensers.
- 2 Grid leak mountings.
- 2 —.0005 mfd. fixed condensers.
- 2 —.004 mfd. condensers.
- 1 Binding post strip.

On the panel there are mounted three twenty-three plate straight line frequency Condensers of this construction were selected because, in the writer's opinion, they are very much more satisfactory mechanically. The only other apparatus located on the panel is the three vernier dials employed to tune the condensers. In mounting the condensers on the panel care should be taken to see that the shafts are at least six and a half inches apart. This



A three-tube, two-stage tuned radio-frequency receiver designed for use with an external audio-frequency amplifier

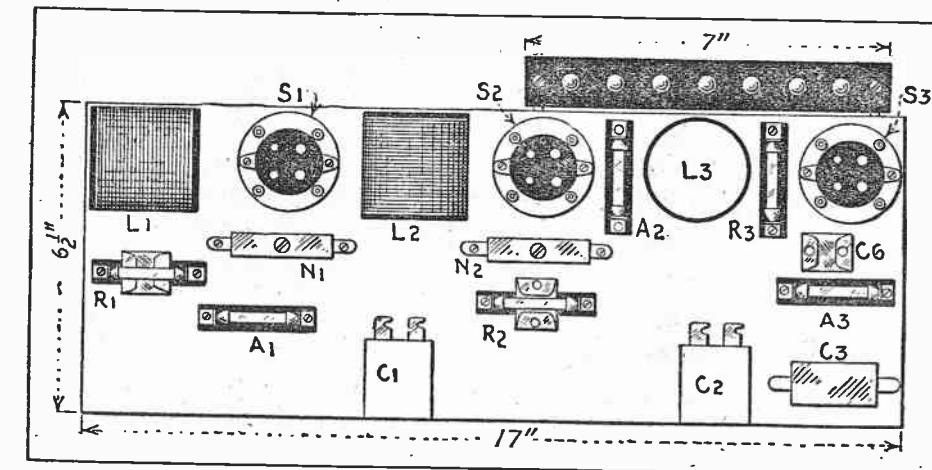
makes it necessary to mount one condenser in the center of the panel and the other two, two and one-half inches from the left and right hand edges respectively.

The layout of the apparatus on the baseboard of this receiver may be seen from the accompanying diagram. On the rear edge of the baseboard directly in back of each of the variable condensers are mounted the three radio-frequency transformers. Centered between these transformers are the vacuum tube sockets, which should be of the small UX199 type. On the front edge of the baseboard panel

between the tuning condensers the two .5-mfd. condensers are located. The grid resistors, the small .0005-mfd. variable condensers, the automatic filament controls and the balancing condensers are mounted close to the tube which they control, as shown in the drawing.

## The R. F. Transformers

The radio-frequency transformers selected for use in this set have been de-



The above drawing shows how the parts may be arranged on the baseboard

signed especially for use with 199 tubes, and as the other parts of the circuit are intended for use with these transformers, it is wise to either use the one selected or to construct transformers of a similar type.

The wiring of the receiver would be greatly facilitated if the apparatus mounted on the baseboard is connected before the front panel is attached to the baseboard. The connections between the coils and condensers, however, cannot be

when the receiver is balanced it is best to stop the tube preceding the detector from oscillating first.

Due to the fact that the 199 type of tube sometimes varies in characteristics, a failure to prevent oscillation will be cured by raising or lowering the value of the grid resistor.

For those who desire to make their own radio-frequency transformers the following data will be of value. Procure three

two and one-half inch lengths of Radiator ribbed tubing. This type of coil form gives a semi-air core coil.

On the form wind ten turns of fine wire spaced with a silk thread. This wire may be any size from 30 to 38, and either enamel, cotton or silk covered.

Place a layer of heavy paper over the primary coil and then over the paper, and in the same direction as the primary wind sixty turns of No. 26 double cotton covered copper wire. The coil terminals are connected in the circuit the same as described.

When the three tubes are operating connect the set to the power amplifier. Knowing from previous experience that the quality from this amplifier, which is well nigh perfect, any slight imperfection in the reproduction can be directly traced to the grid leak in the detector tube.

Changing the resistance value of this leak will clear up the distortion and result in a set that is a pleasure to hear. Additional volume can be obtained by boosting the voltage on the R F tube up to ninety. Under these conditions, however, a "C" battery should be inserted in the circuit. A separate battery should be used for each tube and the battery should be connected directly in the circuit, not outside the cabinet.

It is generally conceded to be good practice for a trouble shooting paragraph to be added to any article on set construction. Fortunately this set is heir to so few troubles that any small details can be covered as a "beware of the dog" sign.

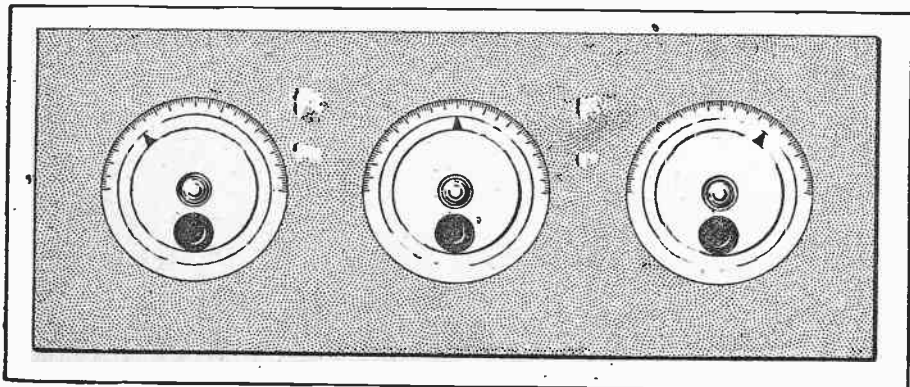
In the first place, do not think that the set tunes broadly because the antenna dial does not cut out powerful local stations within three or four degrees on the dial. The antenna is purposely connected conductively to the secondary circuit so that good summer reception of distant stations can be obtained. This connection naturally broadens out the tuning of the first radio frequency amplifier.

Second, any difficulty in balancing may be directly traced to the wrong value of the resistors used, each tube may require a different value. Also the value of the detector leak may be found critical.

If the set is noisy in any way, and the constructor is sure that all the connections are tight and no wires are held by rosin instead of solder, the trouble can be traced to the poor resistance. Resistors of the metalized type are usually most satisfactory for noiseless operation.

It will be best to shift the tubes around to find which functions best as detector and which as amplifiers. Such a change may improve results twenty-five or thirty per cent.

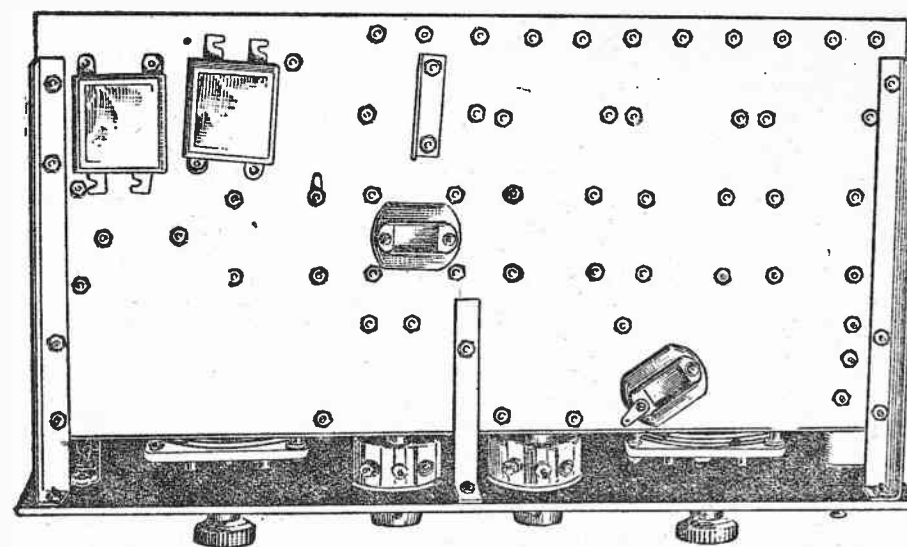
Use a small aerial in order to prevent overloading the detector tube when local stations are being received. Overloading this tube results in distortion and this condition would defeat the purpose of the power amplifier.



A suggested panel layout

# A Compact Eight-Tube "Super-Het"

(Continued from page one)



Practically all of the wiring in this receiver is concealed beneath the baseboard. The brass screws which hold the instruments in place are utilized to bring the wires through the sub-base panel

leads to the loop or tuning coil, which are marked X on the circuit diagram.

At this point it may be well to state that it would be better if the metal strip were not used. It serves no particular purpose and it does detract from the efficiency of the oscillator coil. As will be seen, the oscillator coil rests on the metal strip with its axis at right angles to the plane of the metal. That is, the metal sheet is at right angles to the magnetic field. This is bound to cause eddy currents of no small magnitude in the metal

sheet. A hard rubber or a phenolic strip would be much better.

In line with the tubes will be seen at the extreme left the grid leak for the last tube, then the power tube, the first audio, the detector and the three intermediate frequency amplifiers. Then in the row of transformers is seen the auto-transformer, the audio-transformer, the detector grid leak, the intermediate frequency tuned filter and the three iron core intermediate frequency transformers. In the foreground is the row of binding

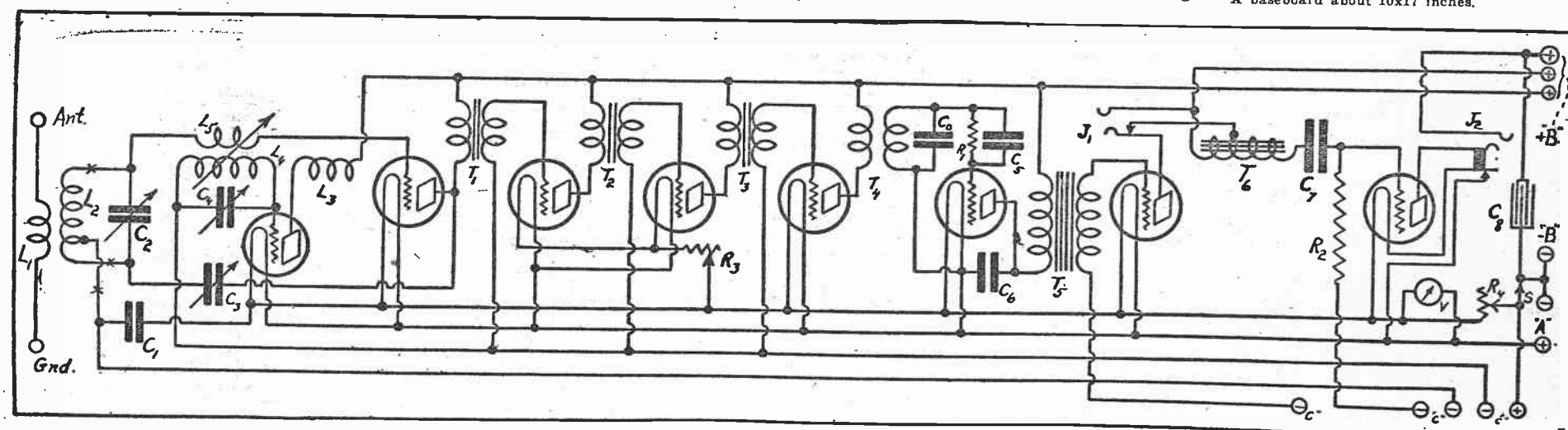
posts, marked to correspond with the terminals they represent.

The third drawing shows the bottom view of the baseboard. This shows the locations of the two microfarad condensers to the two .0025 mfd. condensers and the greater part of the wiring.

The filament power is supplied by a battery of twelve No. 6 dry cells connected in series parallel so as to give 4.5 volts. The total filament current is normally .54 ampere. Since there are four banks of No. 6 dry cells in parallel, each cell delivers only .135 ampere, a value which is low enough to insure long and efficient life of the battery.

The following is a list of the parts used in the construction. Of course, other makes may be substituted if desired, provided these parts are equally good as those used and are otherwise suitable.

- A loop or input transformer, L-1, L-2.
- An oscillating coil as described.
- Three General Radio I. F. iron core transformers.
- One General Radio tuned filter transformer, 30,000 cycles.
- Two Rauland-Lyric transformers.
- Two General Radio tuning condensers, .0005 mfd. each.
- Two Micro vernier dials.
- One Ambassador midrange condenser.
- Two Sanguamo fixed condensers, .0025 mfd. each.
- One Dubilier fixed condenser, .0025 mfd.
- One General Radio 20 ohm rheostat, R-3.
- One General Radio 6 ohm rheostat, R-4.
- One Turn-it grid leak.
- One Daven grid leak with mounting.
- One double circuit jack.
- One single circuit filament control jack.
- One filament switch, C-35.
- One Weston voltmeter, 0-7.5 and 0-150.
- Seven Benjamin sockets for UV-199.
- One General Radio socket for UX-120.
- Fourteen Eby binding posts.
- One 25.5 grid battery.
- Twelve No. 6 dry cells.
- Three 45 volt plate batteries, preferably large.
- One Western Electric cone type speaker.
- One 7x18 hard rubber panel.
- A baseboard about 10x17 inches.



The wiring diagram of the eight-tube super-heterodyne receiver described in this article

# Police to Stop Crime With Radio

(Continued from page five)

on, that would be the signal for the sergeant to tune in and get the word from headquarters.

There is no greater testimony to the value of using radio in criminal cases than that which was offered April 18 last by Gustave Fischer, twenty years old, one of the "cake eater bandits," who pleaded guilty to murder in the second degree and was sentenced to from twenty years to life imprisonment.

Fischer wrote a letter to his former employer, declaring he had pleaded guilty in order to save his companions from the electric chair. He stoutly maintained that he was innocent of participation in the murder of Angelo Maharis, a Jamaica restaurant keeper, but said he acted as he did to save the lives of his friends.

## Fischer's Letter Broadcast

Now this letter of Fischer's, intended obviously to win leniency for him, was promptly put on the radio program. Fischer's former employer was Donald Flamm, proprietor of a printing shop at 250 West Fifty-fourth Street. Mr. Flamm, a believer in the honesty of Fischer, said: "I will always hold a job for Gustave." Station WMCA gave Mr. Flamm permission to broadcast the "cake eater's" letter, and, as may be readily imagined, in a human interest story of that kind, a huge audience listened in.

Had there been any opportunity of winning leniency for Fischer through public opinion, that broadcasting of his letter would have done it. Whether from a morbid interest or otherwise, the public wants its crime news, not in concentrated, homeopathic doses, but enlarged upon, with full details both of the crime and of the persons involved.

It is beside the point to argue that this is or is not a sociological defect. The public wants it, and manages to get what

it wants. In order to obtain like cooperation from the public on the enforcement side of the law, the Police Department plans to enlist the services of every possible accessory. Notable among these now is radio.

Returning to the "cake eating" bandits, it should be remarked that Fischer's employer invalidated the entire force of the argument in behalf of Fischer, by a concluding remark. After insisting that Fischer was innocent, and after reading the letter in which Fischer said he had done nothing wrong, Mr. Flamm said, according to published reports:

"Gustave was drunk at the time of the murder committed by another—Herbert Koerber. He was drunk and didn't know what was going on. He was only a pawn in the hands of his companions, none of whom was an intimate friend."

A prosecuting attorney might argue that if Fischer was drunk at the time of the murder and did not know what was going on, he was hardly competent to testify as to his part in the crime. It would seem strange, also, that he should be willing to accept a term of life imprisonment to save bandits who were only acquaintances, none of them being an intimate friend.

## The Three "Graces" of Radio

(Continued from page two)

tuning over the entire broadcast band. Use audio amplifiers that will allow as near an approach as possible to straight line amplification, i. e., amplification without distortion.

Unless you can afford to buy the best do away with jacks. Secure a high quality loud speaker whose nominal impedance matches more or less accurately the output impedance of the last audio tube.

time friend. His conduct, if the facts were true, would be quite remarkable. Such nobility should be rewarded in some other place than in Sing Sing.

Having to cope with radio employed by or in behalf of bandits, the Police Department must of necessity employ radio in behalf of law and order.

On the side of efficiency, the astounding confessions published in full in all New York newspapers recently, by a member of the Richard Reese Whittemore gang, shows that crime is well organized and conducted on a national scale. The lengths to which the members of this band will go are attested by the fact that Whittemore has been tried for murder in Buffalo, is awaiting trial for murder in Baltimore, and if he escapes the Maryland law will be tried on a variety of charges in New York City.

The ease with which Whittemore and other bandits get around from city to city, with seeming impunity, calls for action along new lines by the police. While no Eastern city ranks in amount or daring of crime with Chicago, nevertheless few of them can afford to jeer at the display of lawlessness now prevalent in Chicago.

The murder of an assistant state's attorney, shot down in an automobile by bullets from a machine gun, sounds primitive in brutality if advanced in scientific development. The automobile and machine gun are twentieth century novelties. The cold-blooded killing dates back quite a bit. But before New York points an accusing finger at Chicago, it should be remembered that the Chicago bootlegging band responsible for McSwiggan's murder, not having at hand competent marksmen, had imported gunners from New York, and it is believed the actual murderer was a New York bandit.

More of this will be developed during the investigation into McSwiggan's death now being conducted by a blue-blooded grand jury of Chicago bank presidents and financiers. It would not be at all surprising if their verdict contained a recommendation for the Chicago Police Department to re-establish itself on an efficient basis. One of the probable consequences would be the adoption of a municipal broadcasting station, with a receiving set in all police booths and traffic towers.

Should that recommendation be made, undoubtedly the Chicago officials will be visiting New York to observe the workings of radio here. A natural development, too, will be that the two cities eventually will interchange police alarms with municipalities in between.

The next step after that will be a national police radio, connecting San Francisco and Los Angeles with New York. The central clearing house for such national police news, finally, would constitute the point of communication for the foreign centers of the International Police Bureau. The next few weeks should tell whether radio is to become an indispensable adjunct in the solution of important crime mysteries.



# Additional Radio Programs for the Week

(Continued from preceding page)

630k-WHN-NEW YORK-321m

12:30-1 p. m.—Low's Orchestra.

1:10 p. m.—Low's Orchestra.

5:10 p. m.—Dot McLean, Low Ford.

5:30 p. m.—News and sports.

7:30 p. m.—Isabelle Henderson, soprano.

7:45 p. m.—Health talk, Dr. Percival.

8 p. m.—Will Oakland's Chateau.

8:30 p. m.—"The Town of Upernivik."

8:45 p. m.—John's Club.

9 p. m.—Harold Von der Hilde, pianist.

9:10 p. m.—Poems by N. T. G.

9:20 p. m.—Dick Hughes, ukulele.

9:30 p. m.—Low's Orchestra.

10 p. m.—Bob Schaefer, tenor.

10:15 p. m.—Charles Soper, contralto.

10:30 p. m.—Leroy Smith's Orchestra.

11:30 p. m.—Everglades Orchestra.

12 midnight—Sophie Tucker's play-

ground.

670k-WNYC-NEW YORK-326m

5:55 p. m.—"Keepling Pit," Joe Ruddy.

6:05 p. m.—Herman Neuman, pianist.

6:15 p. m.—Tennyson, Lotus Eaters and

Venezia.

6:35 p. m.—Jeanette Eberhard, soprano.

6:45 p. m.—Market high spots.

7 p. m.—Vinton Higbee, tenor.

7:15 p. m.—"Department of Public Wel-

fare."

7:30 p. m.—Police alarms.

7:45 p. m.—Resumé of meeting of the

Board of Estimate.

8:05 p. m.—Frank Lauria, violinist.

8:20 p. m.—Bar Association address on

"The Course of a Criminal Case."

8:45 p. m.—Godney's Student Orchestra.

9:10 p. m.—Lecture service.

10:10 p. m.—Police alarm; weather.

10:30 p. m.—Police alarm; weather.

11:00k-WFBB-NEW YORK-273m

2 p. m.—Orchestra.

2:30 p. m.—Studio program.

3:30 p. m.—Lois Kenkel.

3:45 p. m.—Bob Cavanaugh, Charles Her-

terman, baritone.

4:15 p. m.—Radio views, Mrs. Owen Kildare.

4:30 p. m.—Augustus East, bass.

4:45 p. m.—Eddie Woods.

4:55 p. m.—Marion Davis, soprano; Ber-

nie Pollock, songs; Theo Alban, tenor.

5:30 p. m.—Dorothy Clark, contralto.

6:30 p. m.—Automobile routes.

6:45 p. m.—Majestic String Ensemble.

7 p. m.—Yorkville Radio Entertainers.

7:30 p. m.—Castilian Royal Orchestra.

11:45 p. m.—Sleepy Hall Orchestra.

880k-WMCA-NEW YORK-341m

10:15 a. m.—Employment opportunities.

10:30-11:30 a. m.—Market report.

12 noon—Food Bureau program.

12:30-1 p. m.—Olcott Vail's Ensemble.

1:30 p. m.—Market report (hourly to

3:30).

4 p. m.—Charles Furell, songs.

4:30 p. m.—Happy Girl, Violet Kaye.

6:05 p. m.—Ida Allen's Tea Parties.

6:45, 6:50 p. m.—Employment oppor-

tunities.

6:50 p. m.—Olcott Vail's String Ensemble.

7 p. m.—Horray Haus Entertainers.

7:30 p. m.—Klein's Serenaders.

8 p. m.—Reiner's Romers.

8:15 p. m.—Nathan Strauss Serenaders.

8:30 p. m.—Columbia Park Entertainers.

8:45 p. m.—McAlpin News Editor.

9:30 p. m.—California Ramblers.

9:45 p. m.—Ernie Golden's Orchestra.

12 midnight—Broadway Night.

12:00k-WOKE-NEW YORK-235m

8:15 p. m.—Frank Galas, composer.

8:30 p. m.—American Legion program.

8:45 p. m.—Involved Post program.

8:55 p. m.—Nick Seraphine's Serenaders.

10 p. m.—Vanity Orchestra.

1410-WMGS-NEW YORK-215m

8 p. m.—Jimmy Clark's Entertainers.

8:30 p. m.—Hotzy Tooty Boys.

8:45 p. m.—Sport talk.

7:15 p. m.—Castle Royal Boys.

8:15 p. m.—Augustine Jacquilland, so-

prano.

8:30 p. m.—Willard Robinson, "Voice of

the South."

9:15 p. m.—Augustine Jacquilland, soprano.

9:30 p. m.—Irene Arrington, pianist.

9:45 p. m.—Rita Katz, soprano.

9:55 p. m.—Irene Arrington, pianist.

10:15 p. m.—Clara Smith, tenor.

10:30 p. m.—S. S. Levitane's Orchestra.

1040k-WLWL-NEW YORK-288m

8:30 p. m.—McHenry's Entertainers.

9 p. m.—Question Box.

9:15 p. m.—Florine Instrumental Trio.

9:30 p. m.—Samuel Gilligan, tenor.

9:45 p. m.—"Books," Walter V. Gavran.

10:15 p. m.—John Zell, cellist.

10:30 p. m.—Florine Instrumental Trio.

11:30 p. m.—Edna D'Andrea, soprano; Mo-

zelle Bennett, violinist; Frances

Hines, pianist.

11:45 p. m.—Clifford Davis, soprano; Or-

chestra.

9:30 p. m.—U. S. Marine Band.

10:30 p. m.—Whitall Anglo Persians.

11:30 p. m.—George Little, piano.

12 noon—Market and weather reports.

12:30 p. m.—George Little, piano.

650k-WAHC-RICHMOND HILL-316m

12 noon—Grebe Matinee Trio.

1390k-WRST-RAY SHORE-216m

8:40 p. m.—Grand organ.

11:40k-WAAM-NEWARK-263m

11 a. m.—Sport talk program.

6 p. m.—Ernie Golden's Orchestra.

7 p. m.—Sport talk, Major Tate.

7:00k-WOKE-NEWARK-235m

6:45-7:15-7:45 a. m.—Gym class.

7:15-7:45 a. m.—Gym class.

7:45-8:15 a. m.—Gym class.

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7:15-7:45 p. m.—G



# The Herald Tribune Daily Broadcasting Programs for Week Ending May 22

## TO-DAY

610K-WEAF-NEW YORK-492m  
4 p. m.-Interdenominational Church  
and Address, Rev. Dr. E. E. Eseniel  
Verway, music by choir.  
5 p. m.-Symphony Orchestra.  
6:30-8:30 p. m.-Federation Mixed Quartet.  
6:30 p. m.-Russian Cathedral choir.  
7 p. m.-Crescent Orchestra.  
7:15 p. m.-Eugene Mueser, pianist,  
and "The Capitol Theater" Orchestra.  
7:30 p. m.-A Water Kent half hour; Allen  
McQuaha, tenor and orchestra.  
8 p. m.-Theater of the Sea, readings  
from his stories, "Pierre and His Peo-  
ple."  
10 p. m.-To be announced.

660K-WJZ-NEW YORK-455m  
4 p. m.-Children.  
11 a. m.-West End Presbyterian Church.  
11:30 p. m.-Sunday Ray.  
12 p. m.-Mansel Campinsky, violinist.  
1:35 p. m.-St. George's vesper service.  
2 p. m.-Park Avenue Baptist Church  
Carillon.  
4:20 p. m.-Pennsylvania Concert Orches-  
tra.  
5 p. m.-Bakelite hour; variety program.  
6 p. m.-Commonwealth Concert Orchestra.  
7 p. m.-Godfrey Ludlow, violinist.

690K-WVEF-NEW YORK-515m  
2:30 p. m.-Russian Orthodox Church.  
4 p. m.-Arrowhead Orchestra.  
5 p. m.-Little Blue Orchestra, around the Cor-  
nell Gardens; James Helfenstein, choir-  
master; Franklin Coates, organist; choral  
and instrumental ensembles of boys and  
men.  
6 p. m.-Music-drama, "Mozart," sym-  
phony orchestra and harpsichord ac-  
companiment; Broadway players.  
7:30 p. m.-WINY-NEW YORK-510m  
11:30 p. m.-Calvary morning services.  
12:30 p. m.-Loew's organ recital.  
1:30 p. m.-Queen's Choir, Christian En-  
deavor.  
2 p. m.-Radio Bible Class.  
3:40-4:40 p. m.-News and sports.  
5:30-6 p. m.-Rosedale Dance Orchestra.  
6:30-7 p. m.-"The Capitol Theater" Or-  
chestra.  
10:45-11:15 p. m.-Janssen's services.  
12 p. m.-"Mop-top" Tucker's "Hot  
Streak."

700K-WNYO-NEW YORK-525m  
10:30-11:00 p. m.-Constitution reading; Jo-  
seph's Council, No. 443, Knights of Co-  
lumbus. Speakers: Rev. Dr. E. E. Eseniel,  
Rev. Alexander Roca, Charles A. Har-  
nett, Rev. Eugene J. Callahan.

750K-WJLA-BALTIMORE-240m  
2:30 p. m.-Sections from the Bible and  
psalms.

760K-WYAC-NEW YORK-492m  
4 p. m.-Interdenominational Church  
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nett, Rev. Eugene J. Callahan.

750K-WJLA-BALTIMORE-240m  
2:30 p. m.-Sections from the Bible and  
psalms.

760K-WYAC-NEW YORK-492m  
4 p. m.-Interdenominational Church  
and Address, Rev. Dr. E. E. Eseniel  
Verway, music by choir.  
5 p. m.-Symphony Orchestra.  
6:30-8:30 p. m.-Federation Mixed Quartet.  
6:30 p. m.-Russian Cathedral choir.  
7 p. m.-Crescent Orchestra.  
7:15 p. m.-Eugene Mueser, pianist,  
and "The Capitol Theater" Orchestra.  
7:30 p. m.-A Water Kent half hour; Allen  
McQuaha, tenor and orchestra.  
8 p. m.-Theater of the Sea, readings  
from his stories, "Pierre and His Peo-  
ple."  
10 p. m.-To be announced.

660K-WJZ-NEW YORK-455m  
4 p. m.-Children.  
11 a. m.-West End Presbyterian Church.  
11:30 p. m.-Sunday Ray.  
12 p. m.-Mansel Campinsky, violinist.  
1:35 p. m.-St. George's vesper service.  
2 p. m.-Park Avenue Baptist Church  
Carillon.  
4:20 p. m.-Pennsylvania Concert Orches-  
tra.  
5 p. m.-Bakelite hour; variety program.  
6 p. m.-Commonwealth Concert Orchestra.  
7 p. m.-Godfrey Ludlow, violinist.

690K-WVEF-NEW YORK-515m  
2:30 p. m.-Russian Orthodox Church.  
4 p. m.-Arrowhead Orchestra.  
5 p. m.-Little Blue Orchestra, around the Cor-  
nell Gardens; James Helfenstein, choir-  
master; Franklin Coates, organist; choral  
and instrumental ensembles of boys and  
men.  
6 p. m.-Music-drama, "Mozart," sym-  
phony orchestra and harpsichord ac-  
companiment; Broadway players.  
7:30 p. m.-WINY-NEW YORK-510m  
11:30 p. m.-Calvary morning services.  
12:30 p. m.-Loew's organ recital.  
1:30 p. m.-Queen's Choir, Christian En-  
deavor.  
2 p. m.-Radio Bible Class.  
3:40-4:40 p. m.-News and sports.  
5:30-6 p. m.-Rosedale Dance Orchestra.  
6:30-7 p. m.-"The Capitol Theater" Or-  
chestra.  
10:45-11:15 p. m.-Janssen's services.  
12 p. m.-"Mop-top" Tucker's "Hot  
Streak."

700K-WNYO-NEW YORK-525m  
10:30-11:00 p. m.-Constitution reading; Jo-  
seph's Council, No. 443, Knights of Co-  
lumbus. Speakers: Rev. Dr. E. E. Eseniel,  
Rev. Alexander Roca, Charles A. Har-  
nett, Rev. Eugene J. Callahan.

750K-WJLA-BALTIMORE-240m  
2:30 p. m.-Sections from the Bible and  
psalms.

760K-WYAC-NEW YORK-492m  
4 p. m.-Interdenominational Church  
and Address, Rev. Dr. E. E. Eseniel  
Verway, music by choir.  
5 p. m.-Symphony Orchestra.  
6:30-8:30 p. m.-Federation Mixed Quartet.  
6:30 p. m.-Russian Cathedral choir.  
7 p. m.-Crescent Orchestra.  
7:15 p. m.-Eugene Mueser, pianist,  
and "The Capitol Theater" Orchestra.  
7:30 p. m.-A Water Kent half hour; Allen  
McQuaha, tenor and orchestra.  
8 p. m.-Theater of the Sea, readings  
from his stories, "Pierre and His Peo-  
ple."  
10 p. m.-To be announced.

660K-WJZ-NEW YORK-455m  
4 p. m.-Children.  
11 a. m.-West End Presbyterian Church.  
11:30 p. m.-Sunday Ray.  
12 p. m.-Mansel Campinsky, violinist.  
1:35 p. m.-St. George's vesper service.  
2 p. m.-Park Avenue Baptist Church  
Carillon.  
4:20 p. m.-Pennsylvania Concert Orches-  
tra.  
5 p. m.-Bakelite hour; variety program.  
6 p. m.-Commonwealth Concert Orchestra.  
7 p. m.-Godfrey Ludlow, violinist.

690K-WVEF-NEW YORK-515m  
2:30 p. m.-Russian Orthodox Church.  
4 p. m.-Arrowhead Orchestra.  
5 p. m.-Little Blue Orchestra, around the Cor-  
nell Gardens; James Helfenstein, choir-  
master; Franklin Coates, organist; choral  
and instrumental ensembles of boys and  
men.  
6 p. m.-Music-drama, "Mozart," sym-  
phony orchestra and harpsichord ac-  
companiment; Broadway players.  
7:30 p. m.-WINY-NEW YORK-510m  
11:30 p. m.-Calvary morning services.  
12:30 p. m.-Loew's organ recital.  
1:30 p. m.-Queen's Choir, Christian En-  
deavor.  
2 p. m.-Radio Bible Class.  
3:40-4:40 p. m.-News and sports.  
5:30-6 p

## SUNDAY

1430K-BWNY-NEW YORK-210m  
2:30 p. m. -Consuelo Rivero, pianist.  
3:00 p. m. -Paula Taylor, soprano.  
3:30 p. m. -Milton Wyckham, tenor.  
4:00 p. m. -Paula Taylor, soprano.  
4:30 p. m. -Mrs. Cecelia Rivero.  
4:55 p. m. -Orchestra.  
5:00 p. m. -Harmone Adley, songs.  
5:15 p. m. -Jack Davis, barytone, songs.  
5:30 p. m. -Harmone Adley, songs.  
6:00 p. m. -Harmony String Boys.  
6:30 p. m. -Milton Wyckham, tenor.  
6:55 p. m. -Orchestra.

1160K-WJNY-NEW YORK-258m  
2:45 p. m. -Body of Fire.  
3:00 p. m. -"Rance"of Vinyl Ensemble.  
3:30 p. m. -Oderno Quartet.  
3:45 p. m. -Philadelphia's Hour of Religion.  
4:00 p. m. -Treble Quartet.  
4:15 p. m. -Orchestra.

1480K-WJCA-NEW YORK-341m  
11 a. m. -Pirata Choral Christ services.  
11:30 a. m. -Dorothy Martin, soprano.  
12:05 p. m. -Halpert and Fryxell, Buck-A-Nears.  
1:30 p. m. -Roemers Homers.  
2:00 p. m. -Ernie Golden's Orchestra.  
2:30 p. m. -Clifford Brown, Ensemble.  
3:00 p. m. -California Ramblers.  
3:30 p. m. -Fernando Diaz de Caceres, Maria Guerrero and his Orchestra.

1100K-WFBI-NEW YORK-273m  
10 p. m. -Iluminato Meandering violin.  
10:30 p. m. -Frankie and his Orchestra.  
11:00 p. m. -World Masonic news.  
11:30 p. m. -Entertainment.  
11:55 p. m. -Talk.  
12:00 p. m. -Addide Woods.  
12:30 p. m. -Studio program.  
11:30 p. m. -Castilian Royal Orchestra.  
12:00 p. m. -Sicilian Trio's.  
12:30 p. m. -Orchestra.

1040K-WLWJ-NEW YORK-238m  
10 p. m. -Paulist Choristers; sermon by the Rev. Albert A. J. O'Connell.  
11:00 a. m. -Services from Chelsea M. E. Church.  
11:45 p. m. -Services from Chelsea M. E. Church.

1100K-WBBR-STATEN ISLAND-273m  
10 a. m. -Watchtower Trio.  
10:30 a. m. -Sunday School lesson.  
10:45 a. m. -L. Brown soprano.  
10:55 a. m. -Watchtower Trio; singers.  
11:00 a. m. -Bible lecture.  
11:30 a. m. -Choral Singers; trio.  
11:45 a. m. -Bible lecture.  
12:00 p. m. -L. Brown, soprano.  
12:30 p. m. -Bible lecture "Even the Rain."

960K-WFNY-NEW YORK-455m  
1 p. m. -Meyer Davis's Orchestra.  
1:30 p. m. -News service.  
1:45 p. m. -News.  
2:00 p. m. -"Your daily menu."  
2:15 p. m. -Flower Market.  
2:30 p. m. -"Shopping Service."  
2:45 p. m. -Commodore tea concert.  
3:00 p. m. -Flower Market.  
3:15 p. m. -Market quotations.  
3:30 p. m. -Flower Market.  
3:45 p. m. -Market quotations.  
4:00 p. m. -Flower Market.  
4:15 p. m. -Madison dinner concert.  
4:30 p. m. -John H. Kennedy.  
4:45 p. m. -Fisher's Orchestra.  
5:00 p. m. -Reading Radio Revelers.  
5:15 p. m. -Flower Market.  
5:30 p. m. -Harry Leonard's Orchestra.

610K-WFAP-NEW YORK-492m  
7:45 a. m. -"The Morning Tollers."  
7:45 a. m. -Prayer services.  
8:00 a. m. -"The Morning Tollers."  
8:15 p. m. -"History of Cotton," Robert Cummings.  
11:30 a. m. -Mary Lewis, soprano.  
11:45 a. m. -"Embrodered Aprons," Ethel Brown.  
11:55 a. m. -"Poetry" Bertha Baker.  
12:00 p. m. -noon tea.  
12:15 p. m. -Israel Franklin, soprano.  
1:15 p. m. -Celia S. Negin, pianist.  
1:30 p. m. -"The American Music Stone."  
1:45 p. m. -"Modern European Fiction," Brewster.  
1:50 p. m. -Program in connection with the closing of the Academy of Music Program: Overture, "Norman symphony" orchestra; talk by George B. Cortelyou; songs by Miss F. F. Brown, soprano; "The Theater Three-quarters of a Century Ago," by the "Theater Three-quarters of a Century Ago" club.  
1:55 p. m. -"Theater Three-quarters of a Century Ago," by the Choral Society of the Consolidated Gas Company; orchestra; songs by Miss F. F. Brown, soprano.  
5:30 p. m. -Irving Cohn, saxophone; Dick Linn, piano.  
6:00 p. m. -Dinner music.  
6:15 p. m. -Dinner music.  
6:30 p. m. -Columbia University lecture.  
7:20 p. m. -Anne Bacon, pianist.  
7:30 p. m. -"The Grand Old Lady."  
8:00 p. m. -Anne Bacon, pianist.  
8:15 p. m. -"The Grand Old Lady."  
8:25 p. m. -"Cartoons and Buffoons," Clara Rogers.  
8:45 p. m. -Dorothy Rumsage, contralto.  
9:00 p. m. -A. & P. Gypsies.  
9:15 p. m. -"The Grand Old Lady."  
11:12 p. m. -Ben Berens, piano.  
11:30 p. m. -"The Grand Old Lady."  
10 a. m. -Timely talks with Terese.  
10:10 a. m. -Jack Cohen, pianist.  
10:20 p. m. -"The Grand Old Lady."  
10:30 p. m. -Timely talks with Terese.

950K-WFNY-NEW YORK-455m  
10:30 a. m. -Polish album, waltzes & casts.  
10:45 a. m. -Polish album, waltzes & casts.  
11:00 a. m. -Polish album, waltzes & casts.  
11:15 p. m. -Lucie Wilkin, pianist.  
11:30 p. m. -Polish album, waltzes & casts.  
11:45 p. m. -Stell Jamison, tenor.  
11:55 p. m. -Mary Price, "Air Queen."  
12:00 p. m. -Sibyl Marvin Hue, speaker.  
12:15 p. m. -Polish album, waltzes & casts.  
12:30 p. m. -James Hyndman, "The P. of Dutch."  
1:15 p. m. -Sylvan String Trio.  
1:30 p. m. -Liteners' variety program.  
1:45 p. m. -Women's variety program.

1290K-WOKO-NEW YORK-233m  
10 p. m. -Ann Diamond, pianist.  
10:30 p. m. -"The Evening Song," duets.  
11:00 p. m. -Sunshine Song.  
11:30 p. m. -"The Evening Song," duets.  
11:45 p. m. -Rita Costello, soprano.  
12:00 p. m. -"The Evening Song," duets.  
12:15 p. m. -Vanya Costello, soprano.  
12:30 p. m. -Rita Costello, soprano.

1040K-WLWJ-NEW YORK-238m  
8:30 p. m. -"The Evening Song," duets.  
8:45 p. m. -Question Box.  
9:00 p. m. -"The Evening Song," duets.  
9:15 p. m. -"The Evening Song," duets.  
9:30 p. m. -Study Circle.  
10:15 p. m. -Howard Melick, bass.  
10:30 p. m. -"The Evening Song," duets.  
10:45 p. m. -Alma Stok, contralto.  
11:00 p. m. -"The Evening Song," duets.  
11:15 p. m. -Syrian music.  
11:30 p. m. -Bible instruction.  
11:45 p. m. -"The Evening Song," duets.  
12:00 p. m. -"The Evening Song," duets.  
12:15 p. m. -"The Evening Song," duets.  
12:30 p. m. -"The Evening Song," duets.  
12:45 p. m. -"The Evening Song," duets.  
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6:00 p. m. -"The Evening Song," duets.  
6:15 p. m. -"The Evening Song," duets.  
6:30 p. m. -"The Evening Song," du

9:00 p. m.—Wachetower Historical Trio.  
9:20 p. m.—Bible questions and answers.  
9:30 p. m.—WSP—**WACHETOWER**—216m  
8 p. m.—Radiolans dance music  
11 a. m.—**WVAM—NEWARK**—265m  
11:30 a. m.—Church services.  
11:30k—**WGCP—NEWARK**—252m  
12:15 p. m.—Elyzer Mayer, soprano.  
12:30 p. m.—Church services, orchestra.  
1:30 p. m.—Jimmy Farrell Trio.  
1:30 p. m.—Marla Stuart, soprano.  
2:00 p. m.—Larinello, soprano.  
2:15 p. m.—Martha Anderson, contralto.  
2:30 p. m.—Betty Anderson, soprano; Lillian Weldanz, organist.  
2:45 p. m.—Frank Von Near Artist's Trio.  
3:00 p. m.—Emmy, soprano; Oscar Voigt, baritone; Gustav Bischoff, pianist.  
3:15 p. m.—Parade.  
3:45 p. m.—Sinfingalino Violin Quartet.  
4:00 p. m.—Elsie Fairall, contralto.  
4:15 p. m.—Clarence Seaman's Quartet.  
5:00 p. m.—Jimmy Shearer, songs.  
5:15 p. m.—Mina I. B. pianist.  
6:00 p. m.—Joseph Hall, baritone.  
6:30 p. m.—Mother Goss, Girl.  
6:45 p. m.—Artine and Goss, soprano.  
7:00 p. m.—Alice Davis harpist.  
7:15 p. m.—Parade, vocal.  
8:00 p. m.—**WODA—PATERSON**—224m  
10:35 a. m.—First Baptist Church Service.  
7:00 p. m.—Market Street M. E. Church Service.  
9:00 a. m.—Church services.  
9:00k—**WOD—PHILADELPHIA**—508m  
9:30 a. m.—Musical service, Spring Sunday School.  
9:45 p. m.—Sacred organ recital.  
10:00 p. m.—E. W. Church services.  
7:00k—**WLIT—PHILADELPHIA**—395m  
6:30 p. m.—Organ recital.  
6:45 p. m.—Concordia Orchestra.  
8:00 p. m.—Friends of Chamber Music Society.  
9:00 a. m.—Church services.  
10:45 a. m.—Morning service.  
7:00k—**WFI—PHILADELPHIA**—395m  
7:30 a. m.—Church services.  
8:30 p. m.—Chapel service church choir.  
9:00 a. m.—CAU—**WYOMING**—290m  
11 a. m.—Church services.  
11:30 p. m.—Radio church service, the Rev. Rockwell.  
6:45 p. m.—Clarence Seaman's Orchestra.  
7:00 p. m.—Bible questions and answers.  
8:30 p. m.—Bonwit Teller Ensemble.  
9:00 p. m.—Hour of music.  
9:15 p. m.—Church services, Synopacted Artists.  
10:00k—**WHAB—ALLEGANY CITY**—275m  
6:30 p. m.—Organ recital.  
8:15 p. m.—Community vocal and instrumental recital.  
9:00 p. m.—News flashes and scores.  
9:15 p. m.—Ambassador Concert Orchestra.  
9:30 p. m.—Church services.  
9:45 a. m.—Fashion talk; piano.  
9:55 a. m.—Graham Smalling, soprano.  
1:30 p. m.—Harry Schlossberg, violinist.  
1:45 p. m.—Special musical.  
2:30 p. m.—Interview with Mae West.  
2:45 p. m.—The Special.  
3:30 p. m.—Lillian Eichler, "Well Bred English."  
3:45 p. m.—Pietro Gentile, baritone.  
6 p. m.—Uncle Geebee.  
6:30 p. m.—Louis Gershenson's Orchestra.  
7 p. m.—Irene West, "Good Taste."  
7:10 p. m.—Louis Gershenson's Orchestra.  
7:30 p. m.—Edna, soprano.  
7:45 p. m.—Blanche Weinberg, pianist.  
8:20 p. m.—Bern Dagmar, baritone.  
8:30 p. m.—Edna, soprano.  
8:50 p. m.—Jimmy Clarke's Entertainers.  
9:00 p. m.—Edna, soprano.  
9:15 p. m.—Haines good news party.  
9:30 p. m.—News and sports.  
9:45 p. m.—Joe Smith, songs.  
4:20 p. m.—The Rev. Barnard Shioff, pastor.  
4:30 p. m.—Ruth Marr, pianist.  
4:40 p. m.—Belle Brooks's Friends.  
5:00 p. m.—Edna, soprano.  
5:10 p. m.—Polly's beauty talk.  
5:15 p. m.—Edna, soprano; musical sale.  
6:30 p. m.—VHVN Movie Club.  
7:00 p. m.—Messe's Orchestra.  
7:15 p. m.—Edna, soprano; orchestra.  
8:25 p. m.—"Storage Batteries," H. B. Genshick.  
9:00 p. m.—George's Surprise.  
9:10 p. m.—Levitch's Trio, "Peter the Great"  
9:30 p. m.—Pallades Orchestra.  
9:45 p. m.—Leonard's Orchestra.  
10 p. m.—Dance orchestra.  
11:30 p. m.—Alabam Orchestra.  
12:00 a. m.—Midnight.  
1160k—**WERNY—NEW YORK**—238m  
11 a. m.—Kuth Come, fashions.  
11:15 a. m.—Kuth Come, fashions.  
11:30 a. m.—Irene Aray, soprano.  
11:45 a. m.—WGBS—**WYOMING**—290m  
12 noon—Musical Courier Says.  
12:15 p. m.—Harvey Schoeman, songs.  
12:30 p. m.—WGBS—**WYOMING**—290m  
12:45 p. m.—Jack Paul, pianist.  
1:00 p. m.—Radio theater.  
1:15 p. m.—Sports: commerce.  
7:10 p. m.—Radio Theater Indigo.  
7:15 p. m.—Jack Paul, pianist.  
7:30 p. m.—Orlando's Concert Orchestra.  
7:45 p. m.—Radio Theater.  
8:15 p. m.—Amater's debut hour.  
9 p. m.—"The Hypno-Boscopus," Hugo Genshick.  
9:15 p. m.—Musical Travelogue.  
9:30 p. m.—Radio Theater Indigo.  
9:45 p. m.—Judith Roth, soprano.  
10 p. m.—Al Jack's Orchestra.  
10:15 p. m.—Radio Theater Indigo.  
10:30 p. m.—"The Cenci."  
6:30 p. m.—"Jacques Jacobs' Ensemble"  
6:40 p. m.—"Pagenagen Quartet."  
6:50 p. m.—"Currys, H. K. Katenberg."  
7:00 p. m.—Virginia Richards, soprano.  
8:45 p. m.—Klein's Serenading S.  
9:45 p. m.—The Lyric Club.  
10 p. m.—Lieutenant Taylor, "Parade."  
10:15 p. m.—The Lyric Club.  
10:30 p. m.—Saturday Review of Literature.  
10:45 p. m.—Leon Wood, organist.  
10:50 p. m.—"Cherry Pie" program.  
11:00 p. m.—"Cherry Pie" program.  
11:10k—**WVAM—NEWARK**—265m  
11 a. m.—Happy Hour program.  
11:15 p. m.—Francis, soprano.  
7:30 p. m.—Sport talk by Major Tate.  
7:45 p. m.—Francis, soprano.  
7:50 p. m.—Newark Chamber of Commerce.  
8 p. m.—Major Novelty Trio.  
8:15 p. m.—Major Novelty Trio.  
8:30 p. m.—Ray Nichols' Orchestra.  
9:30 p. m.—Versatility Boys.  
9:45 p. m.—Major Novelty Trio.  
11:00k—**WGCP—NEWARK**—252m  
6 p. m.—Studio program.  
6:30 p. m.—Hans Shatter, Rec Pierce, T. and barytone.  
8:45 p. m.—Gene Sneden, songs.  
9:45 p. m.—Studio program.  
9:55 p. m.—Gene Sneden, soprano; B. Carlson, violinist.  
10:15 p. m.—Hugo Wabel, pianist.  
10:30 p. m.—Hans Shatter, sopr.  
Brook Carlson, violinist.  
10:45 p. m.—Hans Shatter, pianist.  
11 p. m.—Hawatha Country Orchestra.  
11:00k—**WMAF—PLAINFIELD, N.J.**—250m  
10 p. m.—10:30  
Plainfield High School auditorium.  
10:30k—**WGBS—WYOMING**—244m  
8 p. m.—Bob Hildenbrand's Trio.  
8:45 p. m.—Emma Sunshine, reader.  
9:00 p. m.—Radio Theater Indigo.  
9:15 p. m.—Paul Hoffman, tenor.  
9:30 p. m.—Radio Theater Indigo.  
9:30 p. m.—Harold Manning, saxophon.  
9:45 p. m.—Mabel Kennedy, Sally Flinn.  
10 p. m.—Paul Hannover, violinist.  
10:15 p. m.—Radio Theater Indigo.  
11:00k—**WYST—BAYTHORE**—216m  
7:45 p. m.—Jack Watson's Theater.  
7:45-10 p. m.—Musical program.  
11:00k—**WVAM—NEWARK**—265m  
12 noon—WODA chamber music.  
12:15 p. m.—Studio program.  
12:30 p. m.—WODA talk music.

6 p. m.—Stanley Todd's Orchestra.  
 6:30 p. m.—Blue Moon Serenade.  
 7 p. m.—Dance music.  
 7:30 p. m.—Wynona George Clayton.  
 8:00 p. m.—Wynona Male Quartet.  
 8:30 p. m.—Clare Webber, soprano.  
 9 p. m.—Marg. Daly, soprano.  
 10 p. m.—Clare Webber, soprano.  
 10:30 p. m.—Madeline Clay, soprano.  
 11 p. m.—Clare Webber, contralto.  
 10:50 p. m.—Male Quartet.  
 11:00 p. m.—Grand Opera.  
**1060K—WFLA—PHILADELPHIA—350m**  
 12 (noon)—Luncheon music.  
 1 p. m.—Grand opera.  
 1:30 p. m.—Dinner music.  
 2 p. m.—Grand opera.  
 3 p. m.—Address, Rev. Forest Dager.  
 4 p. m.—Music by gypsies.  
 5 p. m.—Band.  
 11 p. m.—Adelpha Dance Orchestra.  
**1060K—WFLA—PHILADELPHIA—350m**  
 12 (noon)—Grand opera.  
 1 p. m.—Religious service; orchestra.  
 2 p. m.—Concert.  
 2:30 p. m.—Heart talk.  
 3 p. m.—Artistic School.  
 4 p. m.—Peirce School.  
 5:15 p. m.—Sequitentinel program.  
 6 p. m.—Dance music.  
 7 p. m.—Short Agro Waves.  
 8 p. m.—Dance music.  
 9 p. m.—Dance band; company artists.  
 9 p. m.—Stanley Theater hour.  
 10 p. m.—Arabic Dance Orchestra.  
 10:30 p. m.—Vaudeville.  
 10:45 p. m.—El Fatio Dance Orchestra.  
**1060K—WFLA—PHILADELPHIA—350m**  
 7 p. m.—Setting-up exercises.  
 7 p. m.—Luncheon music.  
 8 p. m.—Artie recital.  
 9 p. m.—Market Hints to Housewives.  
 9:30 p. m.—Home.  
 10:05 p. m.—Dinner music.  
 10:30 p. m.—Department of Agriculture.  
 7 p. m.—Roll call and birthday list.  
**1060K—WFLA—PHILADELPHIA—350m**  
 10:30 p. m.—Club.  
 11 p. m.—Tee-room ensemble.  
 11:30 p. m.—Club.  
 11:30 p. m.—Studio program by artists.  
 11:30 p. m.—Concert.  
 7 p. m.—Dance orchestra.  
**1060K—WCAU—PHILADELPHIA—378m**  
 7 p. m.—Recital.  
 8 p. m.—Carolyn Thomas, soprano.  
 8:30 p. m.—Dance music.  
 9:45 p. m.—Kathryn Fichtner, contralto.  
 10 p. m.—The Morris Minstrels.  
 10:30 p. m.—Jackson and Billie songs.  
 11 p. m.—Madrigal Mixed Quartette.  
**1060K—WCAU—PHILADELPHIA—378m**  
 2 p. m.—Seaside Trio.  
 7:30 p. m.—Industrial Talk, R. Orville Ketchum.  
 8 p. m.—Seaside Trio.  
 8:30 p. m.—Follies and Dance Orchestras.  
**Daylight Savings**  
 M-meters  
 8:30 p. m.—Organ recital.  
 9 p. m.—German, baritone; Sadie Yellie, soprano.  
 9:30 p. m.—Empire Singing Orchestra.  
 10:30 p. m.—Robert Morris, Alice Quigg.  
**1120K—WTAG—WORCESTER—263m**  
 10:30 a. m.—Musical selections; talk.  
 11:00 a. m.—Dance music.  
 7 p. m.—Astronomy talk.  
 8:15 p. m.—Twilight Song.  
 8:30 p. m.—"Peculiarities in the Garden."  
 8:45 p. m.—WTAG Entertainers.  
 9:15 p. m.—Dance music.  
 10:11 p. m.—Grand Opera.  
**140K—WCAU—WASHINGTON—469m**  
 10:30 a. m.—Musical program by artists.  
 11:00 a. m.—"Washington Post" hour.  
 11:30 a. m.—Studio.  
 9 p. m.—A. and F. Gypsies.  
 10 p. m.—Grand opera.  
**140K—WCAU—WASHINGTON—469m**  
 12 noon—"Fifty Fanny Flashers," under the auspices of the Department of Agriculture.  
 12:20 p. m.—Organ recital from the studio of the Homer L. Kitt Piano Company.  
 1 p. m.—Raleigh Hotel.  
 1:30 p. m.—Loring directing.  
 5 p. m.—"Housekeeper's" Half-hour.  
 Dorothy Townsend.  
 5:45 p. m.—"Things Talked About."  
 6:15 p. m.—Dance music.  
**1220K—WBAL—BALTIMORE—246m**  
 7:30 p. m.—Musical program by artists.  
 8 p. m.—WBAL Sandman Circle.  
 8:30 p. m.—Musical program by artists.  
 10 p. m.—Talk by Bennett.  
 10:10 p. m.—Musical program.  
**1060K—WBAL—BALTIMORE—246m**  
 5:00K—WDKA—PITTSBURGH—306m  
 7:30 p. m.—Dinner.  
 7:30 p. m.—Children's period.  
 9 p. m.—Stockman-farmer news.  
 9:15 p. m.—U. S. Dept. of Agriculture dress.  
 9:30 p. m.—Read light opera hour.  
**650K—WCAU—PITTSBURGH—461m**  
 7:30 p. m.—Dinner.  
 7:30 p. m.—Sunshine Girl.  
 8 p. m.—Studio concert.  
 8:30 p. m.—Dinner.  
 11:05 p. m.—Dance orchestra.

## Daylight Saving Time

**K-kilocycle**

8301c—WHN

9:00 p. m.—Maureen Clay, soprano.  
 10:40 p. m.—Marilyn Wiley, contralto.  
 10:50 p. m.—Male Quartet.  
**760K—WOL—PHILADELPHIA—368m**  
 11 a. m.—Grand orchestra.  
 12 (noon)—Lunchroom music.  
 1:30 p. m.—Grand orchestra; trumpet.  
 2:30 p. m.—Dinner music.  
 3 p. m.—Organ recital.  
 3:30 p. m.—Addie Mae Davis, Fretter Dager.  
 4 p. m.—Music by gypsies.  
 5:30 p. m.—The Dixieland Band.  
 11 p. m.—Adelphia Dance Orchestra.  
**760K—WLIT—PHILADELPHIA—368m**  
 12 noon—Organ recital—Stanley Theater.  
 2:30 p. m.—Concert orchestra.  
 3:30 p. m.—Recital.  
 4:35 p. m.—Artist recital.  
 5 p. m.—Pelfee School.  
 6:30 p. m.—Fifty Farm Plashes.  
 7:30 p. m.—Dream Daddy.  
 8:30 p. m.—The Dixieland Band.  
 9:30 p. m.—Star Piano Company artists.  
 9 p. m.—Stanley Theater hour.  
 10:30 p. m.—Arcaidee Dance Orchestra.  
 10:50 p. m.—Vaudeville.  
 11:30 p. m.—Blondie Dance Orchestra.  
**880K—WFJF—PHILADELPHIA—368m**  
 7 a. m.—Listening-up exercises.  
 8 a. m.—Settling-up.  
 9 a. m.—Artist recital.  
 9:45 a. m.—Market Hints to Housewives.  
 10:30 a. m.—Talk show.  
 1:05 p. m.—Dinner music.  
 1:30 p. m.—Department of Agriculture,  
 2:30 p. m.—Holl call and birthday list.  
**760K—WFJF—PHILADELPHIA—368m**  
 10:30 a. m.—Civic Club association.  
 1 p. m.—Tea room ensemble.  
 1:40 p. m.—Tea room ensemble.  
 2:30 p. m.—Studio program by artist.  
 3 p. m.—Concert orchestra.  
 3:30 p. m.—Dance orchestra.  
**1080K—WCAU—PHILADELPHIA—278m**  
 12 noon—Recital by N. Snellenburg.  
 1:30 p. m.—Carolyn Taylor, soprano.  
 2:30 p. m.—The Hood Boys.  
 3:45 p. m.—Kathryn Fichtenthorn, contralto.  
 4:30 p. m.—The Dixieland Band.  
 5:30 p. m.—Jackson and Bills, songs.  
 6:30 p. m.—Madrigals Mixed Quartet.  
**1000K—WHAR—ATLANTIC CITY—277m**  
 12 p. m.—Seaside Trio.  
 2:30 p. m.—In-Home Talk, R. Orville Ketchum.  
 3 p. m.—Eddie Brer.  
 11 p. m.—Eddie Brerere Dance Orches-

9 p. m.—Gehrmann, barytone; Sadie Yellie, soprano.  
 10:30 p. m.—Empire Singing Orchestra.  
 10:30 p. m.—Robert Morris, Alice Quertman.  
**1120K—WTAG—WORCESTER—268m**  
 10:30 a. m.—Musical selections; talk.  
 12:30-2 p. m.—Lunchroom music.  
 2:30-3 p. m.—Acoustic guitar.  
 7:15 p. m.—“Twilight Scopes.”  
 8:15 p. m.—“Tree of Life” Gardsen.  
 8:30 p. m.—WTAG Entertainers.  
 9:10 p. m.—Robin Hood hour of music.  
 10:30 p. m.—Rocky Horror Picture Show.  
**640K—WCAP—WASHINGTON—468m**  
 6:45 a. m.—Tower health exercises.  
 7:30 a. m.—Washington Connection.  
 8 p. m.—Studio program.  
 10:30 a. m.—A. and P. Gypsies.  
 10:30 p. m.—Grand piano “Glocoenda.”  
**640K—WRA—WASHINGTON—468m**  
 11:05 a. m.—Artists’ Circle signs.  
 12 noon—“Fifty Farm Plashes,” under the auspices of the Department of Agriculture.  
 12:30 p. m.—Organ recital from the studio of the Homers L. Stoddard Company.  
 1:30 p. m.—Ralph Hotel Orchestra; Dorothy Townsend.  
 2 p. m.—“Housekeepers’ Half-hour,” Laing directing.  
 2:45 p. m.—“Things Talked About,” Laing directing.  
**1220K—WBAL—BALTIMORE—246m**  
 8:30 p. m.—Dinner program.  
 8:30 p. m.—WBAL bandman Circle.  
 9 p. m.—Musical program by artists.  
 9:30 p. m.—Talk show.  
 10:10 p. m.—Musical program.  
 11 p. m.—WBAL Ensemble.  
**1220K—WDKA—PITTSBURGH—402m**  
 8:30 p. m.—Dinner concert.  
 9:30 p. m.—Chorus.  
 9:35 p. m.—Stockman-farmer news.  
 9:55 p. m.—University of Pittsburgh.  
 9 p. m.—Ruud light opera hour.  
**650K—WCAR—PITTSBURGH—461m**  
 8:30 p. m.—Dinner concert.  
 9 p. m.—Sunshine Girl.  
 9:30 p. m.—Chorus.  
 10 p. m.—Grand opera.  
 11:05 p. m.—Dance orchestra.

## TUESDAY

**TUESDAY**

Con-	10:00k-WPG-ATLANTIC City-390m	6:56k-WJZ-NEW YORK-455m
tion-	6:45 p.m.-Afternoon Tea Music.	1 p.m.-Pennsylvania Luncheon Orchest
stra-	7:45 p.m.-Organ Recital.	1 p.m.-Weather; news service.
re-	8:30 p.m.-Arthur	6:30, 6:30, 7:30 p.m.-Weather serv
ce-	6:15 p.m.-Dinner music.	4:45, 7:30 p.m.-Baseball reports.
re-	8:30 p.m.-Alice Sacher, pianiste.	10 p.m.-Your Choice.
re-	8:30 p.m.-"Safety Dialogue" Helen and Wallace.	4:15 p.m.-"A Beautiful Skin."
re-	9 p.m.-Ambassador Concert Orchestra.	4:25 p.m.-Oliver Foster, "How to Gr
lon-	10 p.m.-Vincent	7 p.m.-Dahlia.
	11 p.m.-Eddie McKnight's Dance. Or	4:35 p.m.-Commodore tea music.
		7:30 p.m.-Financial summary.
	790K-WGY-SCHENECTADY-380m	8:30 p.m.-Financial summary.
	2:30 p.m.-Music. Good report.	9:50 p.m.-Fargo report.
778-	2:30 p.m.-Music. Good Economics talk.	10 p.m.-Frank Love on "Whippets."
	6 p.m.-Stock reports; news.	10:30 p.m.-"The Delish Pear Hour, "G
	7:30 p.m.-Music.	8:30 p.m.-"The Delish Pear Hour, "G
ram	7:30 p.m.-WGZ Orchestra.	10 p.m.-"The Grand Tour, "Scandin
	8 p.m.-WGZ Orchestra speakers	10:45 p.m.-George Olsen's Orchestra.
	9 p.m.-WGZ Orchestra.	610K-WEAR-NEW YORK-492m
	940K-WGR-BUFFALO-519m	7:45 p.m.-Prayer services.
	8 p.m.-Address, W. M. Hocking.	10:30 p.m.-Prayer services.
	11:30 p.m.-"The Grand Tour, "Insur	11:10 a.m.-Board of Education lectur
ance,	8 p.m.-Auto Camping de Luxe.	11:23 a.m.-Norman Secor, pianist.
	8:30 p.m.-"The Kiwanis Twin.	11:30 p.m.-Meredith.
	9 p.m.-Harriet Shire, soprano.	11:45 a.m.-Norman Secor, pianist.
	10:30 p.m.-Beatrice Twiss.	12:15 p.m.-Market report; news.
	10 p.m.-Mixed Quartet.	1 p.m.-Luncheon in honor of Fran
	11 a.m.-Music.	Wilson.
	1130K-WMAK-BUFFALO-866m	10 p.m.-Sadrian String Trio.
	7:30-8:30 p.m.-Musicals by Madame	4:30 p.m.-Women's program; "Fest
	4:30-Song recital.	6 p.m.-Dinner music.
	6 p.m.-Musical program.	10 p.m.-"Message to Children" by
	1080K-WHAM-ROCHESTER-278k	Henry Peabody.
	6:30 p.m.-Eastman Theater organ.	9 p.m.-Max Kafkas, tenor.
	6 p.m.-Eastman Theater organ.	9 p.m.-College of Education, "F
	8:30 p.m.-Eastman Theater Orchestra.	course.
1616m	9:30 p.m.-"The Grand Prize Eureka."	7:30 p.m.-Salon concert.
	9 p.m.-Troy High School Musical	8 p.m.-"The Grand Prize Eureka."
	10 p.m.-Address, Edward R. Cary.	9 p.m.-"The Grand Prize Eureka."
	10:30 p.m.-"Changes in New York Game	10 p.m.-Moment musical.
	11 p.m.-Royal Entertainers Orchestra.	10:30 p.m.-"The Grand Prize Eureka"
Amos	1:05 p.m.-Studio program.	11:12 p.m.-"The Buffaloonians"
con-	1:30 p.m.-WGBZ-TV-300m	10:30 p.m.-"The Buffaloonians"
	9 p.m.-"A. & P. Gypies."	10 a.m.-Timely talks with Terese.
	10:30 p.m.-Grand Opera House.	10 a.m.-Anna Robertson, soprano.
	630K-WTAP-ROCHESTER-476m	10:30 p.m.-"The Buffaloonians"
	11 a.m.-Travelers Orchestra.	10:35 p.m.-"The Buffaloonians"
Paula	11:30 p.m.-Eastman Theater entertainer.	1:35 p.m.-"The Buffaloonians"
ing-	5:50 p.m.-Hub Trio.	1:35 p.m.-"The Buffaloonians"
	7:30 p.m.-Eastman Theater Orchestra.	1:35 p.m.-"The Buffaloonians"
	7:45 p.m.-Vacation talk.	1:35 p.m.-"The Buffaloonians"
	9 p.m.-Minnie Fley Clement, soprano.	1:35 p.m.-"The Buffaloonians"
	9:30 p.m.-Grand Opera House.	1:35 p.m.-"The Buffaloonians"
	10 p.m.-Grand Opera House.	1:35 p.m.-"The Buffaloonians"
	10:30 p.m.-Grand Opera House.	1:35 p.m.-"The Buffaloonians"
	1070K-WNAC-BOSTON-280m	1:35 p.m.-"The Buffaloonians"
	10:30 p.m.-Grand Opera House.	1:35 p.m.-"The Buffaloonians"
	11 p.m.-Luncheon concert.	1:35 p.m.-"The Buffaloonians"
	1 p.m.-Copley Plaza Trio.	1:35 p.m.-"The Buffaloonians"

# Saving Time

## K-lyciles

8:30k—WJNN—NEW YORK—301m  
 12:30-1 p. m.—Loew's organ recital.  
 2-3:10 p. m.—Loew's overture and vaudeville.  
 3:20 p. m.—Loew's Lexington Orchestra.  
 4 p. m.—News and sports.  
 4:30 p. m.—Phyllis Morris and talk.  
 5:25 p. m.—News and sports.  
 6:10 p. m.—Phyllis Morris and talk.  
 7 p. m.—Arthur Normandin's Quartet.  
 7:50 p. m.—Willie Keane.  
 8 p. m.—Treasureland Neighbors.  
 8:30 p. m.—Judith Roth, soprano.  
 9:00 p. m.—Frankie Laine, tenor.  
 9:30 p. m.—Oderino Mixed Quartet.  
 10 p. m.—J. West Side, composer.  
 9:30 p. m.—Loew's Orchestra.  
 10 p. m.—Universal Trio.  
 10:30 p. m.—Strand Orchestra.  
 11 p. m.—Dance orchestra.  
 11:30 p. m.—A. A. A. Orchestra.  
 12 midnight—Dance orchestra.

1160K—WRNY—NEW YORK—258m  
 11 a. m.—Military Time.  
 11:15 a. m.—Club Women's hour.  
 11:30 a. m.—West Side Unitarian Church organ recital.  
 6:45 p. m.—Law series.  
 7:15 p. m.—Commerce.  
 7:45 p. m.—Radio Theater Index.  
 8:15 p. m.—Catching for boys and girls.  
 8 p. m.—"Does the Insulation Matter?"  
 Baxter Rowe.  
 8:30 p. m.—Mrs. Anna Scott, soprano.  
 9 p. m.—New York Edison hour.  
 9:30 p. m.—The Glee Club.  
 10:15 p. m.—"Vocations Offered by Radio."  
 Leon Adelman.  
 10:30 p. m.—"The Hugo's Hour of Music."  
 11 p. m.—"Up and Down Broadway."

1160K—WJNN—NEW YORK—375m  
 7 p. m.—Dan Barnett's Orchestra.  
 7:30 p. m.—Luna's Marine Band.  
 8 p. m.—The Millinery Shop, Geo. Ger.  
 8:10 p. m.—A. Wayne, singing reporter.  
 8:30 p. m.—Luna's Knickerbocker Orchestra.

1160K—WJNN—NEW YORK—210m  
 7 p. m.—Knickerbocker Trio.  
 7 p. m.—"Joseph" himself.  
 8:10 p. m.—Rose—Ora Wald.  
 8:45 p. m.—Steve Andrews, uke.  
 9 p. m.—Rose—Ora Wald.  
 9:15 p. m.—Ruth Jackson, soprano.  
 9:30 p. m.—Dagmar, Dance Orchestra.  
 10 p. m.—Ruth Jackson, soprano.

6:15 p. m.—Bill Wathey, "Sports."  
 6:30 p. m.—News.  
 6:45 p. m.—Bretton Hall String Quartet.  
 1160K—WGCF—NEWARK—262m  
 7 p. m.—Anabelle's Harmony Girls.  
 8 p. m.—Anita Avey, soprano.  
 8:15 p. m.—Alice Rinsky, violinist; Lilla Spitzer, pianist.  
 1340K—WODA—PATERSON—224m  
 12 noon—Dance music; songs.  
 3 p. m.—Musical.  
 5:30 p. m.—News; sport talk.  
 6 p. m.—Musical.  
 8:30 p. m.—Ernie Furris's Syncopators.  
 9 p. m.—Dance music.  
 9:30 p. m.—Phyllis Morris, soprano.  
 9:45 p. m.—Paterson Melody Four.  
 10:30 p. m.—Musical.  
 11:30 p. m.—Clifford Lodge Floor.

1160K—WOO—PHILADELPHIA—568m  
 12 noon—Dance music.  
 1 p. m.—Grand Hotel, trumpets.  
 7:30 p. m.—Philadelphia Sequenticum.  
 760K—WILT—PHILADELPHIA—395m  
 11 a. m.—Organ.  
 12:25 p. m.—Religious service.  
 12:30 p. m.—Concert orchestra.  
 1 p. m.—Concert.  
 2:30 p. m.—"Household Hints."  
 4:35 p. m.—Robert H. Women of Pennsylvania; artist recital.  
 7:30 p. m.—Dream Daddy.  
 8:10 p. m.—Maya recital.

590K—WIP—PHILADELPHIA—568m  
 1 p. m.—Organ recital.  
 2 p. m.—Artist.  
 6:05 p. m.—Monte Cross, "Oldtimer."  
 6:30 p. m.—Concert.  
 6:50 p. m.—Department of Agriculture.  
 7:15 p. m.—Philadelphia solos.  
 8 p. m.—Dramatic reviews.  
 8:10 p. m.—The Celeste Trio.  
 8 p. m.—Glee Club.  
 10:05 p. m.—Emo's "movie" broadcast.  
 10:15 p. m.—Philadelphia College.  
 11 p. m.—Dance orchestra.

760K—WTF—PHILADELPHIA—395m  
 1 p. m.—Tea room ensemble.  
 2 p. m.—Concert.  
 3 p. m.—John De Beuris, clarinet; Ade Bates, contralto; instrumental trio.  
 7 p. m.—Dance orchestra.  
 8 p. m.—Society of Musical Exposition.  
 8:11 p. m.—Program name as WEA.  
 8:30 p. m.—Concert.  
 8:30 p. m.—The Paradians' Orchestra.  
 7:30 p. m.—Schnellenburg Instrumental Trio.  
 8:10 p. m.—Concert.  
 8:10 p. m.—The Three Brothers.  
 8:25 p. m.—Concert.  
 8:45 p. m.—Charles Higgins, Joe Barker songs.  
 9:15 p. m.—Kuehnle's Artists.  
 9:30 p. m.—Robert Fraser, singer.  
 10:15 p. m.—Dance orchestra.

## WEDNESDAY

8:15 p. m.—Verna Scott, soprano.  
8:30 p. m.—Edna Brown, alto.  
9:30 p. m.—Lara Samoiloff's Sextet.  
10:15 p. m.—"Devotions Offered by Radio."  
10:30 p. m.—John Hugo's Hago of Music.  
1100K—WEBB—NEW YORK—273m  
10 p. m.—Dan Barnett's Orchestra.  
10:15 p. m.—Railroad talk, Garrow Geer.  
8:30 p. m.—A. Wayne, singing reporter.  
8:45 p. m.—Luna's Knickerbocker Orchestra.  
7:430K—WBNY—NEW YORK—210m  
7 p. m.—Knickerbocker Trio.  
8:15 p. m.—Joe Smith, male, songs.  
8:15 p. m.—Oma Welsh.  
8:45 p. m.—Mickey Andrews, ukule.  
9:15 p. m.—Rose Jaffe, pianist.  
9:15 p. m.—Ruth Jackson, soprano.  
9:30 p. m.—Dorothy Dance Orchestra.  
10 p. m.—Ruth Jackson, soprano.  
10:30 p. m.—Dagmar Jackson—278m  
1100K—WEBB—NEW YORK—278m  
2 p. m.—Orchestra.  
3 p. m.—Studio program.  
4:30 p. m.—Lester James, soprano.  
3:45 p. m.—Carl Jiencke, composer.  
4:45 p. m.—Billie Holiday, vocal. Doris Osborne, Teresa Gluck, songs.  
4:45 p. m.—Carl Smith, Joe Davis, songs.  
5:30 p. m.—Sam Perry's Pals.  
6:15 p. m.—Randy Ramo.  
6:15 p. m.—Radio talk, Bill Schmitt.  
6:30 p. m.—Majestic String Ensemble.  
6:45 p. m.—Vocalists.  
880K—WYMA—NEW YORK—341m  
10:30 a. m.—Market report.  
11:30 a. m.—Market report. Cusumakers Club.  
1:30 a. m.—"Making a New Face."  
2:30 a. m.—Market report. Agriculture.  
2:30 p. m.—Olcott Vail's String Ensemble.  
1:30 p. m.—Market reports (hourly to 3:30).  
3:30 p. m.—Market report. Male, songs.  
3 p. m.—Ukelele Dick Hughes.  
4:30 p. m.—Charles Purcell, songs.  
4:45 p. m.—Emphatic Opportunities.  
5 p. m.—Olcott Vail's String Ensemble.  
5:15 p. m.—Sach's.  
5:45 p. m.—Elvina Bock children's stories.  
6 p. m.—Horbaa Haus Entertainers.  
6:15 p. m.—Page Institute program.  
6:30 p. m.—Page Institute program.  
8:30 p. m.—California Ramblers.  
9:30 p. m.—Columbia Entertainers.  
10:15 p. m.—Page Institute program.  
10:30 p. m.—Musical program.  
10:30 p. m.—Marie Mace Orchestra.  
12 p. m.—McAlpin news editor.  
12:30 p. m.—Musical program.  
1410K—WDRS—NEW YORK—231m  
10 p. m.—Paulus concert.  
6:20 p. m.—Mrs. A. B. Bates, "Vision."  
6:30 p. m.—The Urban, tenor.  
7 p. m.—Sport talk.  
7:15 p. m.—Len Saxon, tenor.  
7:30 p. m.—Alvin Karpis, sport.  
8 p. m.—S. S. President Roosevelt radio talk.  
8:15 p. m.—Earl V. Dannmark radio talk.  
8:30 p. m.—Carmel.  
9:30 p. m.—Eva De Rodriguez, contralto.  
9:45 p. m.—Joseph M. McCormick, pianist.  
10 p. m.—K. of C. Glee Club.  
10:30 p. m.—S. S. Leviathan Orchestra.  
10:45 p. m.—Musical program.  
10:58K—WJLA—NEW YORK—258m  
9 p. m.—Samuel Diamond, pianist.  
9:15 p. m.—"Speed Writing."  
9:30 p. m.—Premier Male Quartet.  
9:45 p. m.—Alce Compinsky, cellist; Manuel Compinsky, violinist.  
10:15 p. m.—Premier Male Quartet.  
10:30 p. m.—Radio talk, Rev. Jas. Whitt.  
10:45 p. m.—Edwin Caplin, tenor.  
10:55K—WAIG—RICHMOND HILL—316m  
Musical program.  
10:30 a. m.—Tea room ensemble.  
1:40 p. m.—John De Beurs, clarinet; Ade Adams, contralto; orchestra.  
2:30 p. m.—Concert orchestra.  
3:30 p. m.—Concert orchestra.  
4:15 p. m.—Sequentialist Exposition.  
8:11 p. m.—Program same as WEAF.  
8:30 p. m.—Eddie McKnight's Dance Orchestra.  
8:30 p. m.—The Parodians' Orchestra.  
8:40 p. m.—Felix.  
8:45 p. m.—"The Theater Digest."  
8:10 p. m.—"The Three Brothers."  
8:10 p. m.—Felix.  
8:45 p. m.—Charles Higgins, Joe Barker.  
9 p. m.—Kuehn's Artists.  
9:30 p. m.—Robert Frager, singer.  
9:45 p. m.—Eddie McKnight's Dance Orchestra.  
10:30 p. m.—Billy Hays's Orchestra.  
10:45 p. m.—Traynor's Music.  
1:30 p. m.—Ambassador luncheon music.  
6:45 p. m.—Organ recital.  
7:15 p. m.—Traynor's Music.  
7:45 p. m.—Footlight and fashion fashion show.  
8 p. m.—Plaza artists; Cecil Steiner, violinist.  
8:30 p. m.—Concert program.  
8:45 p. m.—Eddie McKnight's Dance Orchestra.  
10 p. m.—Vincent Lopez's Orchestra.  
10:30 p. m.—Karl Bonawitz, piano recital.  
10:45 p. m.—Eddie McKnight's Dance Orchestra.  
10:50 p. m.—Eddie McKnight's Dance Orchestra.  
1090K—WHAR—ATLANTIC CITY—278m  
2 p. m.—Seaside Trio.  
3:30 p. m.—Seaside Trio.  
4:30 p. m.—Seaside Trio.  
7:00K—WGW—SCHENECTADY—380m  
12:30 p. m.—Market reports.  
1:30 p. m.—Market reports.  
2:30 p. m.—Organ recital.  
3:30 p. m.—Market reports.  
6:30 p. m.—Dinner program.  
7:30 p. m.—Address, "Greek Science."  
8:15 p. m.—Orchestra, Elizabeth Carrigan, contralto.  
8:30 p. m.—Delta half hour of romance.  
9 p. m.—WGY Orchestra; talk.  
9:15 p. m.—Croner, Maynor, Scandinavia Capitol.  
9:30 p. m.—Beaver House musical program.  
940K—WGB—BUFFALO—319m  
11 p. m.—Horton.  
6:30 p. m.—Dinner music.  
8:11 p. m.—Jointly with WEAF.  
1100K—WYMA—ATLANTIC CITY—266m  
6:15 p. m.—Dinner music.  
7:15 p. m.—Dinner program.  
1080K—WHAM—ROCHESTER—278m  
10:30 p. m.—Eastman Theater organ.  
6 p. m.—Recital.  
7:50 p. m.—Weather forecast; markets.  
8:15 p. m.—Croner, Maynor, Scandinavia Capitol.  
9:30 p. m.—"Beaver Hour."  
1080K—WJAR—PROVIDENCE—300m  
1:30 p. m.—Concert Ensemble.  
7:30 p. m.—Musical program.  
8:15 p. m.—Musical program.  
8:30 p. m.—Gold Dust Twins.  
9 p. m.—Eversley hour.  
10:30 p. m.—Musical program.  
10:30 a. m.—Bible readings; musical number.  
1 p. m.—Luncheon concert.  
4 p. m.—Incidental music to the feature film.  
6 p. m.—The Similes.  
7:30 p. m.—The Similes.  
7:35 p. m.—"Homes Comfortable."  
8 p. m.—The Graydon Trio.  
8:15 p. m.—The Graydon Trio, chimes.  
8:30 p. m.—Organ recital.  
8:45 p. m.—The Graydon Trio, chimes.

11:42	WRC-WASHINGTON-468m	12:45	p. m.-Norman Secron, pianist.
12:00	WRC-WASHINGTON-468m	1:00	p. m.-Cecilia C. Fagnola, Trio.
12:00	"Fifty Four Flashers," under the	1:05	p. m.-Protestant Church.
12:00	auspices of the Department of Agricul-	1:10	p. m.-Sport rays.
12:20	p. m.-Organ recital from the studios	1:15	p. m.-Musical Special digest.
12:30	of the Metropolitan Pitt Piano Compa-	1:20	p. m.-Radio Theater index.
12:30	y. p. m.-Hotel Washington Orchestra,	1:30	p. m.-Warren Burns, harmonica.
12:30	Irving Bernstein directing.	1:45	p. m.-Kathryn Benhke, Lullaby
12:30	p. m.-Radio City International	8	p. m.-Samuel Polonsky, violinist.
12:30	Relations.	8:10	p. m.-Musical Special digest.
12:30	p. m.-"Gems of Romance," broad-	8:15	p. m.-Musical Special digest.
12:30	cast jointly with WJZ from New York.	8:20	p. m.-Musical Special digest.
12:30	p. m.-To be broadcast.	8:25	p. m.-Musical Special digest.
12:30	p. m.-"The Good and True," broadcast	8:30	p. m.-Musical Special digest.
12:30	with WJZ and WGY from New York.	8:35	p. m.-Musical Special digest.
12:30	p. m.-Radio City Orchestra.	8:40	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	8:45	p. m.-Musical Special digest.
12:30	Swanee.	8:50	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	8:55	p. m.-Musical Special digest.
12:30	Swanee.	9:00	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	9:05	p. m.-Musical Special digest.
12:30	Swanee.	9:10	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	9:15	p. m.-Musical Special digest.
12:30	Swanee.	9:20	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	9:25	p. m.-Musical Special digest.
12:30	Swanee.	9:30	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	9:35	p. m.-Musical Special digest.
12:30	Swanee.	9:40	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	9:45	p. m.-Musical Special digest.
12:30	Swanee.	9:50	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	9:55	p. m.-Musical Special digest.
12:30	Swanee.	10:00	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	10:05	p. m.-Musical Special digest.
12:30	Swanee.	10:10	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	10:15	p. m.-Musical Special digest.
12:30	Swanee.	10:20	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	10:25	p. m.-Musical Special digest.
12:30	Swanee.	10:30	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	10:35	p. m.-Musical Special digest.
12:30	Swanee.	10:40	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	10:45	p. m.-Musical Special digest.
12:30	Swanee.	10:50	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	10:55	p. m.-Musical Special digest.
12:30	Swanee.	11:00	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	11:05	p. m.-Musical Special digest.
12:30	Swanee.	11:10	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	11:15	p. m.-Musical Special digest.
12:30	Swanee.	11:20	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	11:25	p. m.-Musical Special digest.
12:30	Swanee.	11:30	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	11:35	p. m.-Musical Special digest.
12:30	Swanee.	11:40	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	11:45	p. m.-Musical Special digest.
12:30	Swanee.	11:50	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	11:55	p. m.-Musical Special digest.
12:30	Swanee.	12:00	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	12:05	p. m.-Musical Special digest.
12:30	Swanee.	12:10	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	12:15	p. m.-Musical Special digest.
12:30	Swanee.	12:20	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	12:25	p. m.-Musical Special digest.
12:30	Swanee.	12:30	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	12:35	p. m.-Musical Special digest.
12:30	Swanee.	12:40	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	12:45	p. m.-Musical Special digest.
12:30	Swanee.	12:50	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	12:55	p. m.-Musical Special digest.
12:30	Swanee.	13:00	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	13:05	p. m.-Musical Special digest.
12:30	Swanee.	13:10	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	13:15	p. m.-Musical Special digest.
12:30	Swanee.	13:20	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	13:25	p. m.-Musical Special digest.
12:30	Swanee.	13:30	p. m.-Musical Special digest.
12:30	p. m.-Meyer Davis's Swanee	13:35	p. m.-Musical Special digest.
12:30	Swanee.	13:40	p. m.-Musical Special digest.
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**THURSDAY**[illegible]

0 30 p.m.—Eastman Theater Orchestra.  
 0 30 p.m.—Concert by instrumental trio.  
 1 1300K—WNAK—BUFFALO—266m  
 1 30 p.m.—Burlington Opera House.  
 1 30 p.m.—WVBC—PROVIDENCE—360m  
 1 30 p.m.—WVBC—PROVIDENCE—360m  
 1 30 p.m.—Chamber Musicale.  
 1 30 p.m.—Two in One Man. The Shinoia Boys.  
 1 30 p.m.—Musical program.  
 1 30 p.m.—The Boston Oboe.  
 1 30 p.m.—WVBC—HARTFORD—476m  
 2 30 p.m.—The Boston Oboe.  
 2 30 p.m.—Columbia Elder, Contr. Trux.  
 2 30 p.m.—Mrs. Charles Foster, organist.  
 2 30 p.m.—The Boston Oboe.  
 2 30 p.m.—"Three Fingered Villain," Profes-  
 2 30 p.m.—Laura Gaudin, pianist.  
 2 30 p.m.—Barber Nelson, organist.  
 2 30 p.m.—WVBC—HARTFORD—476m  
 3 00 a.m.—Women's Club; talk; songs  
 3 00 p.m.—Luncheon concert.  
 3 00 p.m.—The Boston Oboe.  
 3 00 p.m.—Krazy Kat Kiddies Klub.  
 3 30 p.m.—Checker Inn dinner dance.  
 3 30 p.m.—The Boston Oboe.  
 3 30 p.m.—The Hearshide Harmonizers.  
 3 30 p.m.—WVBC—CONCORD—340m  
 3 30 p.m.—WVBC—BOSTON—340m  
 2 noon—Keith—BOSTON—340m  
 3 30 p.m.—Red Top Serenaders.  
 3 30 p.m.—Krazy Kat Kiddies Klub.  
 3 30 p.m.—Joe Rine's Orchestra.  
 3 30 p.m.—The Boston Oboe.  
 3 30 p.m.—Perseus and the Joe Toye.  
 3 30 p.m.—Pierrot suite as WPA.  
 3 30 p.m.—The Musical Miral Makers.  
 3 30 p.m.—The Boston Oboe.  
 3 30 p.m.—M. A. C. radio forum.  
 3 30 p.m.—"Hiram Jones's Bet."  
 3 30 p.m.—The Boston Oboe.  
 3 30 p.m.—Fourth annual industrial safety  
 0 0 p.m.—WVBC concert ensemble.  
 1 1200K—WVBC—BOSTON—265m  
 0 30 a.m.—Musical selection.  
 2 00 p.m.—Luncheon music talk.  
 2 30 p.m.—Musical selection.  
 2 30 p.m.—Story Teller.  
 2 30 p.m.—Musical selection.  
 2 30 p.m.—Shinoia Merry-makers.  
 3 30 p.m.—To be announced.  
 3 30 p.m.—Musical selection.  
 3 30 p.m.—Light one.  
 3 30 p.m.—The Boston Oboe.  
 3 30 p.m.—Tovar health exercises.  
 3 30 p.m.—The Boston Oboe.  
 3 30 p.m.—The Shinoia Merry-makers.  
 3 30 p.m.—Davis's Saxophone Oboe.  
 3 30 p.m.—"Riddigree." Gilbert and Sul-  
 3 30 p.m.—WVBC—WASHINGTON—469m

## Dance Orchestras for This Week

	TO-DAY		TUESDAY, MAY 18	
Time	Wave		8:30	WERJ 273 Luna's
7:45	Station length	Orchestra	9:00	WODA 224 Dance music
7:45	WCAU 278	Billy Hay's	9:30	WGJ 283 Orchestra
7:50	WFL 210	Rafael Hernandez	10:00	WPG 300 Vincent Lopez
10:45	WHN 361	Jannsen's	10:30	WGJN 266 Vincent Lopez
11:30	WFBN 273	Castilian Royal	10:30	WIP 608 El Pato
MONDAY, MAY 17			10:30	WCAU 277 Billy Hay's
8:30	WTC 476	E. Heimbarger's	10:30	WEAL 485 Vincent Lopez
9:00	WODA 224	Dance music	10:30	WBZ 333 Wayside
9:00	WGY 380	WGY Orchestra	10:30	WMSG 218 Vincent Lopez
9:30	WABC 300	WABC Orchestra	11:45	WM 72 435 George Olsen's
10:00	WPG 300	Vincent Lopez	11:00	WPG 300 Vincent Lopez
10:00	WRNY 396	WRNY Orchestra	11:00	WGBS 288 Connie's Inn
10:00	WFL 395	Arcadia	11:30	WFBN 273 Connie's Inn
10:00	WEEB 349	Ed Andrews's	WEDNESDAY, MAY 19	
10:00	WOKO 400	Vanity	7:30	WFBN 273 Dance music
10:12-30	WHN 361	Dance music	9:00	WERJ 273 Luna's
10:15	WGBS 288	Adrian	9:30	WMA 341 Woodmansten
10:30	WMA 341	Woodmansten	10:40	WNVC 526 St. George's
11:45	WJZ 455	H. Leonard's	10:40	WFL 210 Trill
11:00	WOO 600	WOO Orchestra	10:00	WGBB 244 Jolly Frolics
11:12	WFA 492	Ben Bernier's	10:30	WFL 210 Conn. and Dan
11:00	WMA 341	S. S. Leviathan	10:30	WOO 608 Dance music
11:00	WHAZ 280	Royal	10:30	WMSG 218 S. S. Leviathan
11:00	WGBC 252	Hixley	11:00	WOR 403 Connie's Inn
11:12	WFL 210	Bergers	11:30	WFBN 273
11:05	WCAE 461	Dance music		

11:30	WHN	381	Dance music	10:30	WCJ	455	Lorraine Grill
11:30	WBAF	492	Feltham Heath	10:30	WJAZ	278	Kaj Myers's
<b>THURSDAY, MAY 30</b>				10:30	WJEL	285	WEL
7:30	WDRS	563	Seaside	10:30	WCY	380	WGY Orchestra
8:00	WRNY	258	Ben Bernie's	10:30	WBS	333	Brunswick
8:00	WJAR	300	Hudson-Exess	10:30	WMA	243	Maionland
8:00	WVBC	303	London	10:45	WJAM	275	Oberdach
8:30	WNYC	526	Gedney's	10:45	WCAP	345	WCAP
9:00	WODA	526	Dance music	11:00	WJAR	306	Prov. Biltmore
10:00	WOKO	233	Vanity	11-1	WGR	310	Vincent Lopez
10:20	WIP	503	Nat Martin's	11:00	WMSG	213	S. Levathian
10:20	WODA	214	Dance music	11:30	WFBR	273	Connie's Inn
10:30	WPG	360	Hotel Traymore	11:30	WBAF	492	Feltham Heath
10:30	WMSG	310	S. Levathian	<b>SATURDAY, MAY 31</b>			
10:30	WVIN	301	L. Smith	7:30	WGRS	310	William Pike's
11:00	WJZ	455	Fredrick Rich's	8:15	WRNY	253	Ben Bernie's
11:10	WCAU	402	Vincent Lopez	9:00	WBEZ	333	Phil Lawrence's
11:12	WBAF	492	Vincent Lopez	9:00	WTRT	333	Phil Lawrence's
11:12	WCAU	402	Vincent Lopez	10:00	WRC	409	W. S. Tupman's
11:30	WJAR	300	Follies Bergere	10:00	WJZ	455	Dance music
11:30	WFBR	273	Dance music	10:00	WOKO	233	Vanity
<b>FRIDAY, MAY 31</b>				10:30	WJZ	455	Dance music
8:00	WRBT	216	Dance music	10:30	WGRS	310	Dance music
8:00	WVST	273	Luna Park	10:30	WJZ	455	Dance music
9:12	WJN	216	Dance music	10:30	WMA	243	Maionland
10:00	WLIT	395	Arcadia	10:30	WMSG	213	S. Levathian
10:00	WSTC	476	E. Heimbeger's	11:00	WJAM	275	E. Golden's
10:30	WJG	360	Hotel Traymore	11:00	WBAF	492	Feltham Heath
10:20	WAHG	316	Harry Ash's	11:05	WOR	405	Larry Stry's

30	m. —Advanced Spanish lessons.	6:30	p. m. —Concert orchestra.
31	m. —Police.	7	p. m. —Dance orchestra.
7:35	p. m. —"Ten of the Times."	7:30	p. m. —Vocal solo. —WELPHIA—278m
8	m. —Bachelors' reunion.	7:30	p. m. —Shellerberg recital.
8:05	m. —Franklin's baritone.	7:30	p. m. —Plano. —Phind.
8:30	m. —"Rupert Rocket," Professor.	8:30	p. m. —Miller piano period.
8:45	m. —Columbia.	8:30	p. m. —Gold.
8:50	m. —John Jiggs, flute.	9:30	p. m. —Helen Travis Hoel, soprano.
9:00	m. —Columbia. —W. W. C. A. A.	9:45	p. m. —Senator Hassenpfeiffer.
9:15	m. —Sylvia Solow, violin solo.	9:45	p. m. —Instrumental trio.
9:30	m. —St. George's Society Orchestra.	10	p. m. —Carl Goehrs, Lou Hirsche, songs.
9:40	m. —WBFB—NEW YORK—275m	10:45	p. m. —Frank Cook, songs.
9:50	m. —Stock reports and news.	10:45	p. m. —Artie Upa.
9:55	m. —Stock program.	7:00	WGY—SCHENECTADY—380m
10	p. m. —"Hour of Meditation."	10:45	p. m. —Stock reports; news; scores.
10:15	p. m. —Bobby and his composer.	11	p. m. —Children's story.
10:30	p. m. —Doris Freedman, sangs.	11:15	p. m. —Book knowledge.
10:45	p. m. —Meditations.	7:30	p. m. —Onondaga Hotel program.
10:55	p. m. —Joe Payner, soprano.	8:00	p. m. —Concert orchestra.
11	p. m. —Gramercy Theatre harmony.	9	p. m. —Eustere Glee Club.
11:15	p. m. —Black Birds.	9:30	p. m. —WGR—BUFFALO—319m
11:30	p. m. —Abbey Orchestra.	6:30	p. m. —Two piano recital.
11:45	p. m. —"Secrets of Chemistry." E. Weiss.	7	p. m. —Joint recital. —WEAF.
12	p. m. —Majestic String Ensemble.	8:30	p. m. —Vocal and piano recital.
12:15	p. m. —Castillon's Royal Orchestra.	9	p. m. —Judy.
7:45	p. m. —Orchestra.	10	p. m. —"The Hour of Kings."
11:30	p. m. —Connie's Orchestra.	11	p. m. —
12:15	p. m. —WBFB—NEW YORK—254m	10:00	WHAM—ROCHESTER—278m
11	a. m. —Arts and decoration.	7:30	p. m. —Eastman Theater Organ.
11:15	a. m. —	8	p. m. —
12 noon	—Bob Schafer, songs.		
12:15	p. m. —Pollock and Dorn, songs.		
12:30	p. m. —		

8 p. m.—Seville Orchestra; Luis Wey  
8:30 p. m.—"Gems from Ingersoll" Joseph  
8:30 p. m.—Ella Clement, folk songs.  
9 p. m.—"Footlight and Lamplight."  
9:30 p. m.—Alice Faye, "The Hominy  
Cello and Violin."  
9:30 p. m.—Circus.  
10:30 p. m.—"EMO," Harry Hershefeld,  
"The Great American Circus," Tommy  
Hussey, in "A Jewish Poker Game."  
10:45 p. m.—"Black Birds of Harmony."  
11 p. m.—"The Great American Circus."  
11 a. m.—Art appreciation.  
11:15 p. m.—"The Great American Circus."  
12 p. m.—Violin; Bern  
hardt Nord, bayreute.  
12:15 p. m.—Rose Rider, soprano.  
12:45 p. m.—"The Great American Circus."  
1:45 p. m.—Book review.  
2 p. m.—"The Great American Circus."  
7 p. m.—Frank Garbarini, accordion.  
7:30 p. m.—"The Great American Circus."  
7:30 p. m.—Camps and records.  
8 p. m.—Ben Bernie's Orchestra.  
8:30 p. m.—"The Great American Circus."  
9 p. m.—"Fotash," The Great Deader.  
9:15 p. m.—"The Great American Circus."  
9:45 p. m.—"Virginia's Colombiati's Hour."  
9:45 p. m.—Frances Sper, soprano.  
10 p. m.—"The Great American Circus."  
10:30 p. m.—"The Great American Circus."  
10:30 p. m.—Win Sauer's Entertainers  
(Continued on next page)



# AMATEUR KICKBACKS

The two radio shows which have taken place during the last week mark the advent of the new radio season for the year 1925-'26—a year that promises from all evidence to be one of the greatest yet to be witnessed by the transmitting amateur.

Although the radio shows tend to favor the radio broadcasting branch of the industry, the amateur has not been neglected. Amateur radio is one of the most interesting and fascinating branches of the radio art.

The amateur is one of the mainstays of the art, and it is he who is largely responsible for present-day radio broadcasting. Contrary to the belief of many radio fans, solely interested in the listening to radio broadcasting, the transmitting amateur was interested and active in the field long before broadcasting was initiated. As a matter of fact, the amateur was active long before the great World War. Although many members of this clan have become active and then lost interest, there still remains a large number of those who are charter members of the fraternity.

Last year the amateur learned how to make a low-power tube transmitter operate efficiently on short wave lengths; that is, below fifty meters. Toward the close of the best weather for distant communication the amateur was just beginning to learn the peculiarities and the difficulties of short-wave communication.

The amateur is, in most cases, hampered due to the lack of funds. For this reason he often has to construct his own apparatus, which, with the exception of those pieces which cannot be made in the amateur workshop, such as tubes, etc., makes the problem even more difficult. Therefore the amateur transmitter is usually a makeshift affair.

These are only a few of the difficulties he faces. Another of his greatest problems is the lack of space to erect an antenna best adapted for his particular purpose. Still, when one thinks of the remarkable records that were made by amateurs using such apparatus last winter and spring he has to stop and wonder how it was done.

One of the greatest accomplishments of amateur radio last year was the establishment of two-way communication between both coasts of the continent during broad daylight. Although this is not the greatest achievement accomplished by the "ham," it is one that will stand out in the history of radio. It literally opened the eyes of the commercial companies, and since then several of them have erected huge short-wave stations for trans-Atlantic communication.

Now that the amateur knows the "tricks" of short-wave communication, this winter ought to be a "bummer" for radio. By this we do not mean that he knows all the tricks of high-frequency transmission, for there is still a great deal to be learned—experimentation has only just begun. But this year will afford an excellent opportunity for him to carry out the work which was started a year ago. If every amateur will co-operate with his fellow amateur and exchange ideas and tell what he has accomplished there will, without a doubt, be an innumerable number of pages added to amateur history.

2CTN seems to be an ardent supporter of the use of high waves for amateur communication. This station may be heard quite regularly on 185 meters.

After being silent for several months 2AWV is back on the air again. He is equipped to use either CW, ICW or phone. The operator at AWV is one of the oldtimers.

We have listened on the 80, 40 and 20 meter wave bands now assigned to amateur radio for the purpose of trying to determine which has the greatest number of stations operating. Had it been a year ago the 80-meter band would have won with an overwhelming majority, but this year there are more amateurs operating on forty meters. We wonder whether the 20-meter band will be the popular one next year. There are a few stations using this latter band, but most of them belong to the experimental class and, so far as we know, little traffic is being handled.

Although every amateur may pick out a band that seems best adapted for his particular purpose, it seems to us that it is a good plan to construct a transmitter capable of being operated on as many as possible.

## Pigtails Increase Efficiency, but Require Stops

By Michael Samitca

Friction, spring or pressure contacts between the movable and stationary parts of tuning instruments are a frequent source of noise and trouble. The connection may seem excellent when the new condenser or variometer is inspected in the shop, but after a period of use we begin to notice scratching and rasping noises upon turning the dials, which are due to loose or corroded contacts resulting from the inevitable wear and tear, oxidation, etc. There are enough unavoidable noises about any radio without permitting such as these to continue, especially since they represent a decided lowering of efficiency through high resistance and the possible loss of DX.

Substituting short lengths of flexible wire, commonly called pigtails, for these movable contacts is to be highly recommended as well worth the trouble. To be flexible the wire must be stranded, the finer the strands the more so. Braided wire is especially satisfactory. The wire may or may not be insulated; it

need not be unless two leads are to be brought out very close to each other, which is generally poor practice.

The two ends must be soldered, of course. It is essential that the solder penetrate the strands thoroughly to make a good joint. The usual precautions of absolute cleanliness, a hot and well-tinned iron and a minimum of some good non-corrosive flux apply here.

This gives us a perfect electrical contact, but some mechanical considerations are also necessary.

It is obvious that the pigtails are liable to be twisted off their anchorages if the rotor be moved too far. To prevent this we should limit the motion of the dial to not more than one complete revolution; a half revolution, or 180 degrees, is just as satisfactory and often simpler to obtain.

This can be done in several ways. While it is possible to rely on one's memory and simply form the habit of never going beyond the numbered portion of the dial, it is not the safest way, especially in the average family.

Positive stops are better and may take the following forms:

1. A projection on the shaft which strikes one or two stop-pins mounted on the instrument. This is the usual commercial practice, but it is rather difficult to install on many instru-

ments without adequate tools and considerable skill, as the projection usually takes the form of a small pin driven into a hole in the metal shaft.

2. A projection on the shaft striking stop-pins fastened to the back of the panel. This is sometimes simpler for certain types of instruments. The projection could be a small strip of bakelite with a hole in one end, forced over the shaft and cemented to it.

3. A small pin driven into the edge of the dial and limited by stop-pins on the front of the panel. This is very simple, if you don't crack the dial, but rather crude looking.

4. A dial with a semi-circular groove cut into its back, the ends of which strike a hidden stop-pin in the track of the groove.

5. Special forms of dials, such as some of the geared vernier dials, which have other desirable features.

Most of these require some adjustment to secure the desired range of motion. Conditions vary so much that it is impossible to state that any one scheme is best. There are many other possibilities which should suggest themselves after a little reflection, especially if one carefully studies the interior of several high grade manufactured sets, from which the most helpful ideas can be obtained.

**Concert by Saxophonist Whose Identity Is Not Revealed**  
A peer of saxophonists will be featured in the "Pooley Period" on Wednesday at 8:30 p. m. and broadcast by WEAF, WOO and WCAE. He is a feature recording artist, a well known orchestra leader and has appeared in concert recitals throughout the country. His numbers will be "Saxophone" and "Waltz Hilda," with a popular selection as an encore.

## Don Clark, Radio Announcer, Inaugurates 'Song Factory'

Don Clark, one of the youngest of radio announcers on the staff of WGBS, will inaugurate a new feature at that station at 10:20 a. m. Thursday, to be known as "The Song Factory." Clark will sing some of his own compositions, accompanying himself.

# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

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SECTION SIX

SUNDAY, SEPTEMBER 20, 1925

16 PAGES

## Bob's Class Buys a Radio Receiving Set

The School's Entertainment, Staged to Raise Money for a Receiver, Was Broken Up by a Boy's Prank, but Was a Financial Success

By H. L. VAN DEUSEN



"Stop that noise at once!" cried Miss Osgood, but no one could hear her on account of the girl's hollering, and spine-shivering sounds seemed to come from the loud speaker.

Sept. 11—Yaller Selgood won't do any more squealing on me in school, I bet, even if he is president of the school radio club—Extract from Bob's diary.

WELL, I gotter stay in after school for an hour each day for a month, and all on account of me popping Yaller Selgood on the noodle with a spitball, but I wouldn't mind it so much if me and Billy Rich weren't so busy inventing a new kind of a radio set, and I hated like the dickens losing a hole hour after school when I could put that much time on it.

It was the first day that school opened after the summer vacation, and it was just my luck to get in dutch right off the reel, but you can bet that no feller can squeal on me to the teacher and get away with it without me getting hunk with him!

Our teacher, Miss Osgood, ain't a bad scout, if she is a teacher, and just before I peppered Yaller with the spitball she had put the proposition up to us about getting a radio set for the school room and organizing a radio club.

said he had a real talent for lectro-ucution. It was then I popped him on the nut.

It was a good, juicy spitball, and it spattered in his eye. You'd died laffing. He just stood there blinking his eyes as fast as he could.

"What's the trouble, Ralph?" asked Miss Osgood.

"Bob plastered me with a spitball," said he.

Then the teacher called me up front and asked me if I had, and of course I wouldn't lie about it, and that's why I gotter stay after school for a month.

After that I lost a lot of interest in our school radio entertainment, but Billy he was down on the program for a peace and Fatty Leonard, who weighs about a ton, was to sing "Oh, for the Wings of a Dove." What he needed was the wings of an airplane. Yaller was down for a peace, too.

Honest, Yaller has more gall than a whole flock of hens, and thinks he is cut out for a life on the stage. He was down on the program to recite a peace called "Blow, Bugles, Blow!" and to see him strut up on the stage to practice it, would give a clothing store dummy a pain in the neck.

First off I wasn't going to the entertainment at all, but I stopped in Lahl's store for some candy and another feller came in and bought some red pepper for his family, and that gave me an idea.

I had to try a lot of stores before I could get what I wanted, but I got it and told Billy I had changed my mind and would be on hand for the entertainment that night.

Well, the school hall was packed, and I guess there was no doubt about us having enough money for the radio outfit. Billy done real good in his peace, and then they lowered the light as Yaller strutted out on the stage. It was his own idea. He said it would make his lectroucution more dramatic.

It did, but not the way he expected. As he opened his mouth and spouted, good and loud, "Blow, Bugles, Blow!" I put some sneeze powder on my hand and blew it right at him. Yaller was supposed to repeat the line twice, but he got the full benefit of the powder in his mouth and nose, and it near strangled him.

There he stood yapping: "Blow—kerchoo—Bugles—kerchoo, kerchoo—Blo—," and then he let out a hole flock of kerchoos. It sounded like the exhaust on a motorboat.

Then a lot of folks sitting near the stage began kerchooing, and as some one

hollered to turn on the lights I blew the rest of the powder in the air, and the hole audience began sneezing, and every one staggered out of the hall kerchooing and blowing their own bugles and wiping the tears from their eyes with there hankkerchiefs.

I sneezed as loud as any so they wouldn't catch on to me, and between sneezes I said it was a darn shame who-ever did it.

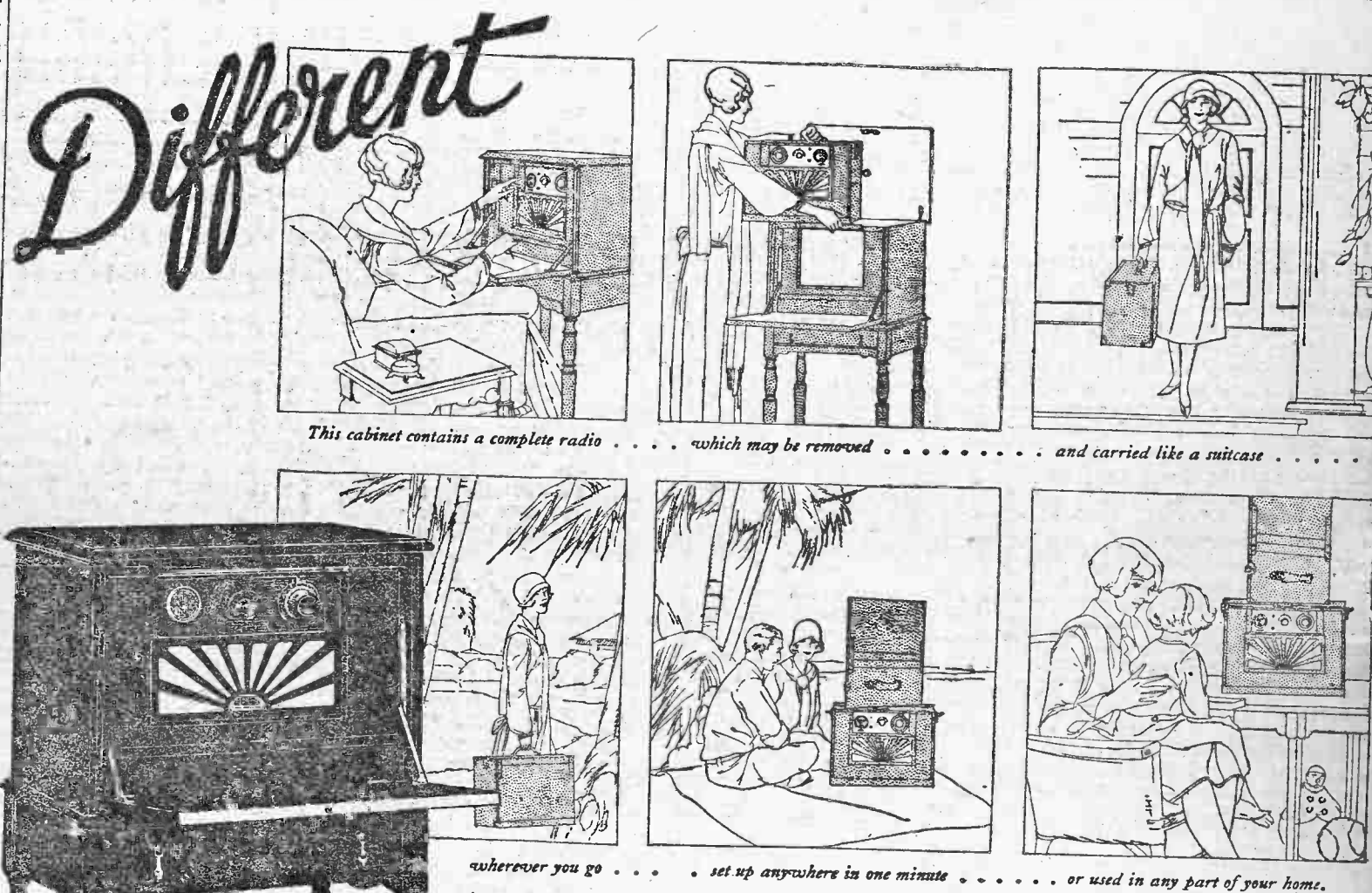
When we got outside Billy blamed me, and I told him he hadn't ought to kick, it hadn't spoiled his peace.

Anyway, that busted up the entertainment, but no one asked for there money back except old man Traynor, and he's a tightwad, anyway.

Next day at school every one was wondering who busted up the show, and Yaller he said he would be greatly surprised if the one who did it was very far away, and he gave me a dirty look. He couldn't prove anything, so I should worry.

Miss Osgood said that now they had funds enough for the radio the next thing would be to organize School No. 4 Radio Club of Ponchhockie and that we should lect officers and everything, and that the lection would take place the next day. She said that the president would have the

(Continued on page seven)



## Everything any radio can offer plus advantages no other set affords

Radio of the finest quality. Simple, powerful, reliable and so convenient that it may be enjoyed anywhere—indoors or out, upstairs or down.

That is the Operadio—a complete, compact, self-contained receiver with loudspeaker, six tubes, batteries, loop and all parts fitted into a case of unbelievably compact proportions. No aerial or outside connections of any kind are required.

A single hearing will convince you that its performance is far ahead of any radio set you have ever heard. Performance of such superb quality and reliability

that the Drake, Roosevelt, Ben Franklin and many other leading hotels chose this set for the entertainment of their guests.

The portable Operadio in its extremely smart carrying case is complete in itself and harmonizes with the most beautiful surroundings. In this form it is now being used in thousands of homes.

And for those who desire it, the distinguished walnut cabinet shown above is available for housing the set in the home—thus combining the beauty of a furniture model with the convenience of absolute portability.

THE OPERADIO CORPORATION  
8 So. Dearborn St. Chicago, Illinois

# OPERADIO

The Original Self-Contained Radio

The illustration shows the portable Operadio in the cabinet from which it may be removed in one minute's time and used in any part of the house or wherever you go. For those who want a compact set for home use only, the Operadio also is available in a distinctive semi-portable mahogany case—the Consolette.

Prices without tubes or batteries, Portable \$160; Consolette \$180; Tudor Cabinet (for housing portable) \$68.

The Operadio idea was conceived sixteen years ago when J. M. Stone built the first successful self-contained radio receiving set, using a kite to carry the aerial wire aloft. The accompanying sketch was made from a photograph taken in 1909.



For further information call, write or telephone Operadio Sales Corporation, 1476 Broadway (Times Square), New York



# Trans-Atlantic Liners Make Use of Radio Apparatus for Reproducing Music

Lectures, Entertainment and Radio Programs Are Reproduced at Remote Parts of the Steamer

By A. DINSDALE

Member Radio Society of Great Britain

THE recent introduction and rapid development of radio broadcasting has brought in its train a development also of electrical apparatus capable of picking up and reproducing elsewhere at will both speech and music to an extremely high degree of perfection.

The possibility of being able to do this has opened up entirely new fields in acous-

magnify them to an extent approximating the intensity of the sound at its origin. In order to do this the microphone energy must be magnified several thousand times. An audio-frequency amplifier is employed for this purpose, as in the case of a broadcast receiver, where it is necessary to magnify the feeble signal output of the detector.

The moving coil, which is in the form of an extremely thin annular ring, is wound with very fine aluminum wire supported on a paper former. It is suspended in the magnetic field between the central core and the outer casing, and the method of suspension is usually by means of small wads of cotton wool fixed to the face of the magnetizing or field coil and to the underside of the moving coil.

The coil is thus left free to move in sympathy with the sound waves, and, as it is extremely light, it has an almost negligible inertia. The whole instrument is supported on a cushion, or cradle, of soft, spongy rubber, in order to prevent vibrations other than those required disturbing the moving coil.

The second type of microphone employed is an extremely high-quality instrument of the carbon type, specially developed by the Marconi Company, and can be used in cases which do not warrant the much higher expense of the Marconi-Sykes magneto microphone. It can be fitted either to a stand or with straps for hanging round the neck.

The latter method is of great value to public speakers, who then have complete freedom of movement, inasmuch as it is not necessary for them to remain in one position facing a table or stand microphone.

In cases where it is desired to reproduce gramophone music a special magneto gramophone adaptor has been developed which can be attached and used in place of the gramophone sound box, thus producing an electrophonic current directly, which can be amplified and made to oper-

iron armature pivoted at one end, the other being fitted with a special gramophone needle pressing on the record in the usual manner.

The intensity of the electrical vibrations thus produced is approximately the same as that produced by the carbon type of microphone.

## The Amplifier System

In order to increase the feeble microphone currents to a value sufficiently high to operate the large sound projectors very considerable amplification is necessary. In the outfit under consideration this duty is carried out by three separate amplifiers, the magneto-microphone amplifier, the microphone contact amplifier and one or more sound projector amplifiers, depending on the number of projectors it is desired to operate.

The microphone amplifier is a five-tube resistance-capacity coupled instrument, specially designed for distortionless amplification of the minute currents induced in the magneto microphone to approximately the same strength as the currents delivered by the ordinary carbon microphone.

The input circuits are designed for accepting ultra feeble A. F. currents, and each tube is mounted on a special mechanical filter staging to protect it from unwanted vibrations. All tubes and transformers are inclosed in separate shielding boxes to prevent both reaction and induction between circuits.

In the grid circuit of the second tube an inductance and variable resistance are included for the purpose of emphasizing the high tones, and in the grid circuit of the third tube a variable condenser is ar-



The Grand Salon with microphone in the foreground from which entertainment is broadcast to all parts of the ship

tic science which are only just beginning to be investigated and enlisted in the service of man. One of the possibilities with which most readers are already familiar is what has come to be known as the public address system, which makes use of a microphone for picking up the voice of a public speaker, an amplifier for magnifying the feeble microphone currents to a suitable value, and one or more loud speakers for reproducing the words of the speaker at a distance.

In such a way it is possible for politicians, lecturers, etc., to address a very much larger audience than could possibly be accommodated in any hall, and do so without in any way raising or straining the voice.

A new development along these lines has recently been brought out by the British Marconi Company, who have installed apparatus similar to that used in the public address system aboard certain well known British liners for the purpose of reproducing radio music, the music of the ship's orchestra in all the various public rooms, salons, smokers, etc., while it is playing away somewhere else in some distant part of the ship.

## Radio Apparatus Used

It should be clearly understood at this juncture that, although this new system makes use of apparatus originally developed for radio broadcasting purposes, radio itself does not come into service as a carrier for the speech currents. Wire connections are used throughout, and the interest centers round the technical details of the various instruments employed, for they can be made to serve equally well the purpose under review or the needs of a regular broadcasting station.

In any equipment designed for repeating vibrations at audio frequency there are three operations involved.

Firstly, there is the picking up of the sound vibrations and their conversion into equivalent electrical impulses, the relative amplitudes and frequencies of which must correspond as exactly as possible to those of the sounds producing them. This function is performed by the instrument known as the microphone.

Secondly, since the electrical impulses produced by the microphone possess only a very minute amplitude, or strength, it is necessary, before we can reproduce these electrical vibrations again as sound, to

Thirdly, there is the retransformation of the electrical impulses into the original sound vibrations which were converted by the microphone and magnified by the amplifier. To do this we must arrange to make the amplified currents set up powerful mechanical vibrations in the atmosphere and project them to a distance. The instrument which does this is called a "sound projector."

## The Microphone Used

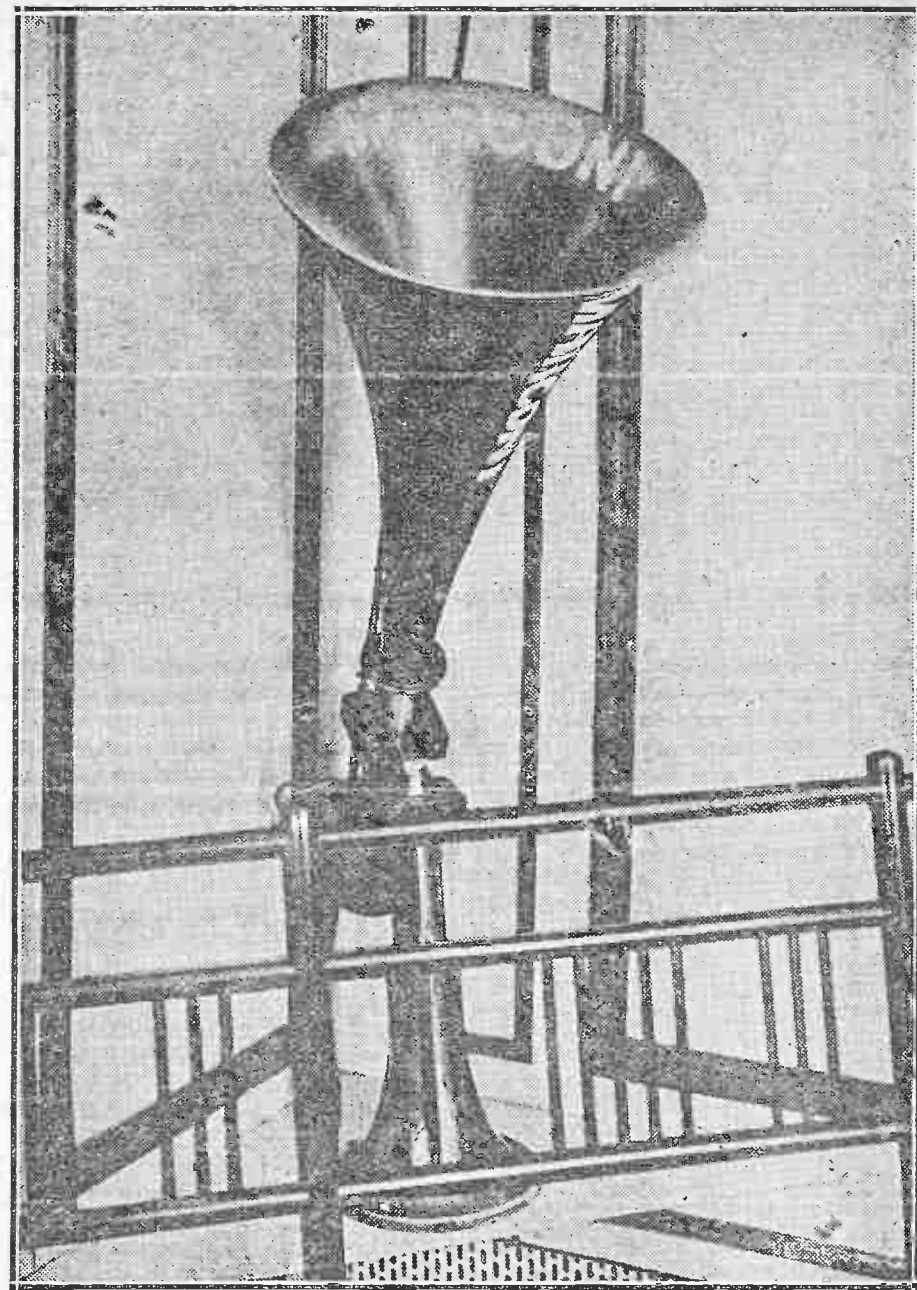
These three stages are in every way identical with those carried out in the course of broadcasting, the difference in this case being that both the radio transmitter and receiver are eliminated, and we jump from what in a broadcasting station is called the "speech input amplifier" direct to the sound projector, or loud speaker, at the reception end, direct connection being made by wire.

In every one of the various stages described above possibilities exist for a certain amount of distortion of the electrical impulses and the corresponding sound waves reproduced by the sound projector. For the last three years the Marconi Company have been conducting researches with a view to producing apparatus on a commercial scale which would eliminate any possibility of distortion. Apparently insurmountable obstacles have been overcome, and the results are reflected in the perfection with which the instruments under consideration perform their various functions.

Two types of microphone are in general use with this equipment, the Marconi-Sykes magneto microphone and a type of carbon microphone which has been developed to a high degree.

The former type, shown in one of the accompanying illustrations, is a moving coil instrument, in which the moving coil itself acts as the diaphragm. It is aperiodic to all audio frequencies, and is able to deal faithfully with an extraordinarily wide range of amplitudes without blasting or other forms of distortion.

The microphone consists essentially of a heavy cylindrical iron container with a magnetic system and the field winding is wound on the central core. These two parts form a magnetic system and the field winding is wound on the central core. These two parts form a magnetic system and the field winding is wound on the central core.



One of the loud speakers used for reproducing entertainment in remote parts of an ocean liner

ate either a sound projector or an ordinary broadcast transmitter.

By the use of this adaptor imperfections due to faults in the gramophone sound box and horn are eliminated. The instrument consists essentially of a small

ranged for the purpose of reducing the high tones in relation to the low tones.

These two adjustments permit the operator to balance the sounds produced by the

(Continued on page six)

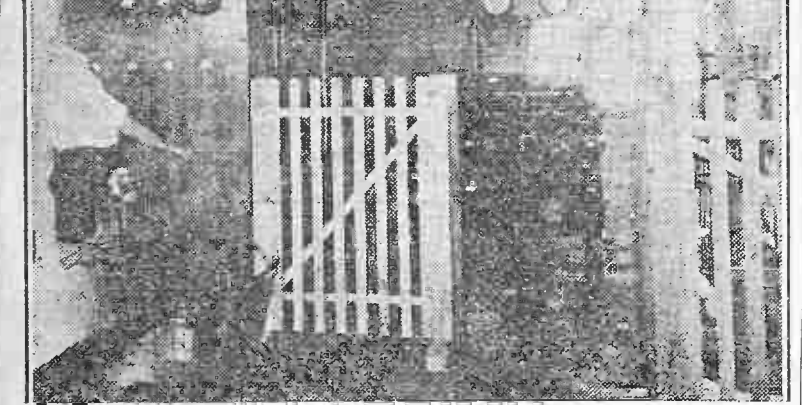
## WGY's Short-Wave Signals Heard 8,850 Miles From Station

Short wave signals transmitted by WGY at Schenectady have been received with fair quality and easily read volume during the day, 8,850 miles from the sending station, and have been inaudible 200 miles from the transmitter. For several months tests have been conducted by the radio engineers of the General Electric Company on 41.88 meters wave length, using approximately one kilowatt of power, and from the reports received over a great territory it is apparent that this wave length is especially suitable for daylight transmission.

All programs of WGY have been transmitted on 41.88 meters, 109 meters and 1,560 meters, in addition living in Belfast, Ireland; Liverpool, London, and Furness, England; La Platte, Argentina, and Calgary, Alberta, Canada, have successfully heard the Schenectady developmental transmitter.

In studying the behavior of short waves the radio engineers have made reception tests within a 200-mile radius of Schenectady. These tests have shown that the short-wave signal was inaudible within that radius except on a few occasions, when very weak signals were detected. This is known as the "skip-distance" effect.

The transmitter used for the 41.88 meters broadcasting is located at the South Schenectady radio developmental laboratory of the General



The 41.88-meter transmitter at the development laboratory of WGY

Electric Company, where engineers are carrying on intensive research in all phases of transmission. The equipment is located in a separate building and uses not only the push pull circuits, but also intermediate amplifiers and crystal quartz in order to steady the frequency.

The antenna used is known as the vertical doublet. This is simply a vertical wire tuned in the middle. It is necessary on this type of antenna to have the meter in the middle with tuning coil on each side.

## Keep Filament Normal

Do not burn the thoriated filament tubes at too great a brilliancy; do not turn up the filament rheostat above normal. This will force too much current through the filament and release the electrons so fast that the filament will become "run out," or free electrons in a short time. The filament will burn all right, but there will be little or no signals.

## An Exhibit of Horn-Type Loud Speakers



Several hundred persons were present at a talk and demonstration given by Dr. A. N. Goldsmith, chief broadcast engineer of the Radio Corporation of America, at the Hotel Pennsylvania last week. The subject of the talk, which was non-technical in nature, was "Radio Acoustics and Reproduction," and to assist him in his talk Dr. Goldsmith displayed a remarkable collection of loud speakers which were in various sizes and shapes and represented different steps in the evolution of the horn-type speaker.

## 12 Stations to Give Talks for Women

To-morrow morning a new type of chain broadcasting will be introduced to radio listeners on a scale more extensive than anything yet tried in commercial broadcasting, when twelve of the principal broadcasting stations of the United States, from the Atlantic to the Pacific Coast, will start the simultaneous broadcasting of the Betty Crocker Home Service Talks. Three times a week, on Mondays, Wednesdays and Fridays, at 11 a. m., Eastern daylight saving time, Betty Crocker will talk to the nation's housewives from the following stations: WEAF, New York; WEEI, Boston; WFL, Philadelphia; WCAE, Pittsburgh; WGR, Buffalo; WEAR, Cleveland; WWJ, Detroit; WHT, Chicago; KSD, St. Louis; WDAF, Kansas City; KFI, Los Angeles, and WCOO, St. Paul-Mannepolis.

This hook-up of these larger broadcasting stations will be the first in history exclusively for women. The talks will deal with preparation of food for the table, model menus, party suggestions, proper diet for children and, in addition, three complete cooking schools. The series, with brief interruptions at Christmas and Easter, will continue for twenty-nine weeks.

## Senator C. C. Dill Speaks at the Radio Industries Banquet

Last Wednesday evening the second annual dinner of the Radio Industries took place at the Hotel Commodore. Senator C. C. Dill, the outstanding speaker of the evening, pledged himself to continue working against any tax that might be imposed on radio receiving sets by the government. He pointed out that the radio industry was only five years old and that a tax on radio apparatus would greatly hamper the development of the industry.

The entertainment included a long list of radio artists all of whom are well known to the radio fan. The speakers were E. J. Cattell, of Philadelphia, and Will Rogers, both of whom gave interesting and humorous talks on the radio industry and were successful in drawing their share of applause. The toastmaster was Paul B. Klugh. Major J. Andrew White was in charge of the program and introduced the artists. The dinner was broadcast by WEAF and twelve other stations.

Senator Dill pointed out that the United States was the only country that did not have a tax on radio apparatus and the only country which did not charge a license fee for owning a radio receiver. Some foreign countries do not allow the use of radio apparatus. This is the reason why the American people have progressed so far in the radio industry and why over 90 per cent of the radio broadcasting of the world is done in this country.

On the question of royalties Senator Dill said that he did not believe that the broadcasting of songs and other compositions could be classed as reproduction for profit.

The dinner music was supplied by Vincent Lopez, who concluded his entertainment with a special arrangement called "Echoes of New York" in honor of Senator Walker. Other entertainers included the Happiness Twins, the Capitol Gang, the Eveready Quartet, the Victor Salon Orchestra, Burr McIntosh and many others.

**Want Home-Built in Austria**  
Austrian radio manufacturers, protected in their home market by an import license, were, during the last winter, hardly able to supply the domestic demand for radio equipment according to consular advice to the Department of Commerce. The interest of the populace in radio is evidenced by the increase in the number of registered receiving sets from 50,000 on January 1, 1925, to 129,000 in March, 1925. Interest seems to be lagging at the present time, however, and as a result sales have dropped off to approximately one-third of those made during the past winter months. It is believed that this condition is largely seasonal and that during the coming fall and winter interest in radio and the demand for radio equipment will again be in evidence.

A small watch case voltmeter is a valuable accessory to any radio set.

## Canadian Railway Minister Indorses Radio Publicity

Hon. George P. Graham, Minister of Railways for Canada, in a recent speech paid a high tribute to radio as utilized by the Canadian National Railways for advertising and publicity purposes. It will be remembered that the Canadian National is the only railway in the world operating its own broadcasting system, which includes eight high-power stations. During his speech Mr. Graham said:

"When Sir Henry Thornton took charge of the system the Canadian National was practically an unknown quantity on this continent, and people traveling east and west from the United States and elsewhere who might well patronize our railway knew nothing of it."

"To-day, however, the entire continent of America knows there is a Canadian National Railway. Even the name Canada itself has been carried to the uttermost parts of the continent, and we are becoming better known every day through the use of the radio. All companies spend millions of dollars advertising, and this modern method is being used by many of the advertisers."

"I have no hesitation in saying that for the money expended the Canadian National Railway has received three times the publicity it could for the same money through any other means."

The new studios, which have been planned by the architect and are being built directly in the hotel, will include an orchestration studio, solo studio, lounge and offices for the studio director and chief engineer. The new studios will be located on the top floor of the building, twelve stories above the street.

## Radio Exchange

Rate, 40 cents a line; minimum, 3 lines. Adgate caps and white space only display permitted. Ads. accepted until 12 o'clock noon Friday.  
PHONE PENNSYLVANIA 4000

### Parts and Equipment

EVERY KNOCK A BOOST. FACTORY MADE CHARGER FREE WITH EVERY COMPLETE BATTERY. There are three types of "B" batteries, the dry cell, the lead storage battery and the alkaline battery using Edison element. The Edison element "B" battery has long been the marvel of battery users, thereby surpassing all others. Can be short-circuited, over-charged or discharged without its being damaged in the least. The See-Jay Battery is constructed from genuine alkaline elements and connected with a non-corrosive connector. No holes to drill or wires to loosen. If you drill a hole in the element the active material will eventually drop out and ruin the entire battery. Connectors crimped on under heavy pressure. Each battery guaranteed or money refunded. No red tape! 100-volt unit, consisting of 78 pair connected elements, 78 heavy glass cells, 78 perforated separators and two soundings. Complete assembly, \$50.00. Complete assembly, 100-volt battery in beautiful finish oak cabinet, \$125.00. Factory made Universal "B" battery charger, \$17.50. Order direct, no agencies. Send for FREE SAMPLE AND LITERATURE. See-Jay Battery Company, 915 Brook av., Bronx, N. Y. (181st St. 3rd Ave. L.) Phone Jerome 1738. Mail orders solicited. Open until 9 P. M.

**BUY DIRECT—FIVE-TUBE RECEIVERS** in solid mahogany cabinets with battery compartment; bakelite panels and parts; patented circuit employing regeneration for extreme distance; 135 to 500 miles loop or aerial; introductory price \$27.50. BATTERY RADIO SERVICE, 68 Jamaica av., Astoria, L. I.

**SOMETHING ENTIRELY NEW!** Receiving set with only two parts; no tubes, no batteries; costs but \$1, and it works! Mailed upon receipt of price. See it demonstrated. Agents wanted. D. S. WYLLIE CO., 1 East 42d St.

**BUILD your own "B" Battery.** Nickel and iron elements and all supplies. Roberts, 1122 Myrtle ave., Brooklyn.

**For Sale**  
25 To 40% off on Brunswick Radiolas, Superheterodynes, Victorias, Records, Gramophones, \$3.94 to \$17.25. Bingham

**See Edith Radio Advertisement** in the columns of this magazine.

**Wanted**  
MEN to build radio sets in spare time. Leon Lambert, Wichita, Kansas.

**John TeeVan to Give Second Talk on Oceanography, WJZ**  
John TeeVan, assistant to William Beebe, director of the Arcturus oceanographic expedition, will give the second talk in the series under the auspices of the New York Zoological Society from Station WJZ at 9 o'clock Tuesday evening. Mr. TeeVan is considered one of the world's leading authorities on the subject of oceanography, and in addition to the Arcturus expedition has been a member of eight similar ventures in British Guiana, South America, the West Indies, Venezuela and the Galapagos islands.

**Kurz-Kasch**  
Aristocrat  
"Aligns rite—Holds tite"

4-in. Dial with 2 1/2-in. taper Knob  
Markings 0-100 0-200  
100-0 200-0

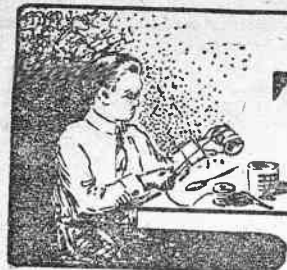
To have been "first" shows antiquity. To have become "first" proves merit. Over two hundred Radio Manufacturers use Kurz-Kasch products. The beauty of design—the painstaking workmanship—the exclusive patented split bushing—all have combined to earn for Kurz-Kasch products the enviable position of leadership.

Kurz-Kasch bear this trade mark: Products of the genuine

Ask your dealer for Aristocrat E-Z-Tone, the key to simplified tuning. Aristocrat dials, knobs, potentiometers, rheostats, sockets, etc. If he can't supply write:

**The Kurz-Kasch Company**  
Largest Exclusive Moulders of Bakelite  
Dayton, Ohio





# The Radio Beginners' Series

By R. P. Clarkson  
(Copyright by the Author)

IT WAS in the issue of August 30 that I first promised to show the hook-up of the constant current amplifier, but it has taken considerable time and space to lead up to the point where this particular form of amplification would be readily understood. All the ideas involved have already been explained rather fully in the preceding articles and can now be put together intelligently.

In the August 30 article a diagram was shown of the common form of resistance coupling, both one and two stage amplifiers, added to one stage of transformer coupling. The single stage resistance amplifier connected to one stage of transformer amplification is shown first in the figure published to-day. Between points P and B is inserted a resistance. It makes no particular difference what that resistance is made of, so long as it is non-conductive and is permanent. As a resistance of a certain value, it always is the same in effect. Remembering that, we can see that this resistance in its ordinary tubular form can be removed and in its place we can substitute the internal resistance of a lighted vacuum tube. That is shown in the second diagram to-day.

For this tube resistance, the filament must be heated, of course, and a separate A battery must be used for this purpose. We must consider the tube with its own A battery as the substitute for the tubular resistance, just as it is shown in the figure.

## Proper Value of Resistance

There has been much discussion over the proper value of the resistance to be used with a resistance coupling. There has been much talk of matching the internal resistance of the tube. Obviously, the internal resistance of the tube varies continually with the grid voltage applied to the tube. You cannot match the internal resistance of any tube with an external resistance and there is no particular reason why you should. The idea of matching the tube is stressed in the wrong place. What actually is the case, is that the power output of the tube is maximum when the external resistance equals the internal resistance. That is a matter of tube power efficiency. It has nothing particular to do with the results you hear on the speaker.

On the other hand each tube has a certain amplification constant, which is a sort of theoretical figure. It is a basis to compare amplification. It is not the amplification you will obtain from a stage of audio using that tube. As a matter of fact, if the external resistance equals the tube resistance the amplification of the combination will be one-half the theoretical figure. The higher the external resistance with the tube resistance fixed, or the lower the tube resistance with the external resistance fixed, the greater the proportion of the theoretical amplification you will have.

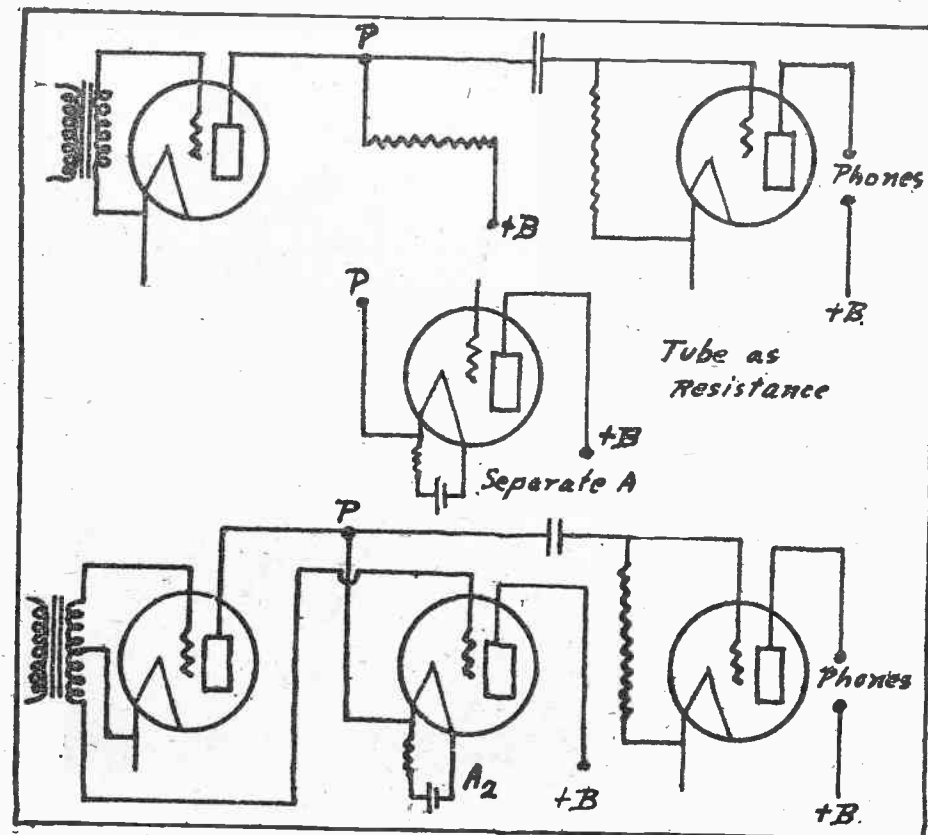
## External Resistance

Usually the external fixed resistance used varies from 80,000 ohms in some amplifiers up to 150,000 ohms in other amplifiers. It is not a critical value and the resistances commercially furnished are not generally exact anyway. Anywhere in or about the figures named give fair results for this type of amplification.

If the tube is used as a resistance coupling, as shown in the second diagram, the value of its internal resistance will be fixed, if the filament stays at constant temperature and the grid is not connected to anything. The lower the filament is turned the greater the resistance, and the higher the filament is turned, the less the resistance, within limits. This adjustment from dull electron emission to high electron emission gives a variation in the coupling resistance. Also, as pointed out in the article discussing this type of amplifier two weeks ago, a great change in the internal resistance of the tube may be made by connecting the grid to a separate battery, corresponding to a C battery. The positive end of the B battery can be connected to negative filament and the grid connected to the center arm of a potentiometer across the B battery. The same effect can be obtained by connecting the grid to the center arm of a potentiometer across the separate A battery shown. The difference is that with the C battery you can merely vary the

internal resistance, but with the potentiometer across the separate A battery you can both increase and decrease the internal resistance of the tube. When you make the grid negative the internal resistance is greater. When you make the grid positive the internal resistance is less.

Now, in place of changing the grid voltage by hand, you can connect it up to the preceding transformer so that it will vary with the signal. This arrangement is shown in the third and last diagram of the figure. Here the middle tube is purely a resistance which couples the first tube to the third tube. It is the same diagram as at the top of the figure except that the coupling resistance now is variable, the variation being caused by



The wiring diagram for the constant current amplifier referred to by the author

the grid voltage variation due to the amplified signal.

## Grid Voltages

With the tubes as here shown, and the first tube having exactly the same characteristics as the middle tube, the secondary of the transformer being properly split (and for this a push pull transformer can be used), the grid voltages of the two tubes will be equal at all times, but opposite in phase. As all is positive the other is equally negative. Then when the resistance between plate and filament of one tube is increased, the resistance of the other tube is decreased by exactly the same amount. The total resistance, which includes the internal resistance of the first

tube and the resistance of the middle tube together, will be constant. The plate current will be of constant value. Instead of fixed resistance with varying plate current, thus giving a variable voltage drop across the coupling resistance, we now have fixed current and varying resistance, giving a varying drop across the coupling tube. This varying voltage drop is impressed on the grid of the last tube, if the blocking condenser is large enough, and the resulting amplification is good. We can thus have audio amplification in a radio set or for any other purpose, using only tubes and batteries, no coils or transformers being used.

As has frequently been stated before, in any form of coupling using a condenser as a blocking condenser, with a compara-

resistance values are used, although there would seem to be no call for them and they are not as economical as the UV tubes already widely used. The new tubes are specifically for the last stage, particularly for very high B voltages, and particularly designed for the operation of particular types of loud speakers. They are not generally adaptable as general purpose tubes. We recommend that you stick to the well known types of tubes for your experimenting with audio circuits and thus eliminate one possible source of trouble.

## Two Constant Questions

Before closing this discussion of audio amplification with which we have now been busy for four weeks without digressing, we might bring up again two constant questions. First, the question of ratio, and second, the question of transformer curves.

When the question of ratio raged like forest fire in the news columns and advertising columns of radio magazines some two or three years ago it largely centered about a 10 to 1 ratio, which then was common in transformers. To-day few transformers have a much greater ratio than 5 to 1, and the transformers themselves are far better in performance than was looked for then. The 10 to 1 ratio transformers gave a corresponding amplification, but only on a narrow band of frequencies, so far as could be seen by static tests, with a resulting blast on those notes. A lower ratio usually had a hump in the curve at some other point, and the result of placing a high ratio and a low ratio transformer together was to more or less smooth out the curve resulting from the two stages. When nearly all manufacturers came down to 3, 4, 5 and 6 to 1, transformers generally gave pretty flat curves over a wide band of frequencies, and even two of the same identical make could be used together without blasting or blaring. The question of ratio settled itself, and now it would make no particular difference if all transformers were put out without ratio marks. They mean little and have become of less importance. The construction of the transformer is now the important thing. We want quality more than we want volume in most cases.

## Transformer Curves

It was and is the fashion to show a straight line as the curve of a transformer. Just how much this means has never been figured out. This is a static characteristic; that is, a curve taken point by point on a testing apparatus, and not a test in actual service. Whether this means anything we do not know, but it has been suggested that the transformer in action may behave differently than it does under test, and the reason for this belief is that some transformers with terrible curves have given pretty good results from the audibility standpoint. An explanation of this is that the curves were taken with plenty of time for the adjustment of conditions within the transformer as the frequency is changed while in use, there is a shift from one frequency and back to another instantaneously. There is very little sustained frequency, but constant change from one frequency to another. The coils and core are subjected to instantaneous effects rather than to prolonged effects. The curves show the action under prolonged effects, but the ear hears the results of instantaneous effects.

We have shown seven methods of audio amplification, all of them requiring a first stage of transformer coupling to give maximum results. There is plenty of room for study and experimentation in these circuits and, in many ways, it is the easiest way to become familiar with wiring, tube action and radio parts. You have the advantage that you always have a signal to start with and you cannot lose the signal in the amplifier. You will always get some sort of results and your ingenuity will be exercised in making these results better. You can become familiar with methods of finding trouble and remedying it and thus become prepared for experimental work with radio frequency, where you have nothing to start with, and very often after hours of work, your position has not been materially improved and you conclude that all the broadcasting stations in the world must have signed off.

John Arnold, safety director of the Cincinnati Automobile Club, is broadcasting a series of safety talks over WKRC, Cincinnati, every Tuesday night as a contribution to the national safety campaign carried on by the American Automobile Association.

Those who have the means, the time and the sporting instinct, go to the jungles of Africa in their quest for big game, but the white man living in Africa finds zest in hunting for American radio stations on the air.

A. M. Creighton, a Lyon, Mass., manu-

## Tendencies of Radio Programs During the Last Four Years

The Majority of Radio Fans When Broadcasting Was First Initiated Were Amateurs; Out-of-Studio Events Were Part of Development

By J. A. Holman

Manager of Broadcasting, American Telephone and Telegraph Company

PERHAPS you are one of the radio listeners who heard the recent fourth anniversary program broadcast by station WEAF. You may even have been one of the many who wrote congratulatory letters to the station on that occasion. The great difference in the radio program of four years ago and to-day and the marked trend in the development of radio programs must have occurred to scores of the more thoughtful radio fans. It will be interesting to follow program tendencies by tracing briefly the history of WEAF.

Although the birthday recently celebrated was WEAF's fourth, it was more than four years ago that the American Telephone and Telegraph Company started experimental work in radio telephony. Being pioneers in the art of voice communication, our engineers were actually engaged in the advancement of the art since the birth of the vacuum tubes. For example, in 1915 speech was transmitted successfully from Arlington, Va., across the continent to the Hawaiian Islands and at the same time in the opposite direction across the Atlantic to Paris. This was done by engineers of the company in co-operation with the government.

With the advent of radio broadcasting WEAF was established as the company's experimental station for the purpose of studying the engineering economic problems confronting this new art.

Was there a demand for radio broadcasting? If so, what did the public want? How was the demand to be met from the economic point of view? Finally, how could facilities be set up to meet the demand on the part of those who had legitimate use for the new medium? These four questions were and still are the outstanding ones presenting themselves for solution.

The first question was answered immediately. The demand was overwhelming, not only from radio listeners but from business organizations which sought to utilize the new art by installing their own broadcasting equipment. In New York alone more than 100 inquiries were received regarding the purchase of radio transmitters. This would have meant 100 broadcasting stations transmitting all kinds of programs simultaneously, with the attendant economic and engineering inefficiencies and a positive disservice to the radio audience. The reason for WEAF will now be evident. It was to determine how genuine was the demand by these organizations for broadcasting facilities and to carry on the general experimental work that the station was provided.

Amateurs Were First Radio Fans At the time this station was started broadcasting was looked upon as a novelty. The majority of radio fans were the amateurs, the old dyed-in-the-wool fans who, while they are still with us to-day, are greatly outnumbered by listeners preferring program quality to experimentation. This audience grew rapidly, for the fascination of radio telephony seized the public imagination with an overwhelming force. At first, mechanical music by phonographs and player pianos sufficed. To cater to the growth of amateur, aspiring vocalists and instrumentalists desiring to take advantage of the new publicity medium requested placement on the programs. For the first year or two programs were disconnected presentations of one soloist after another. While in the very earliest days of the art it was possible to secure a few of the outstanding artists they performed only because it appealed to them as a novelty and as a means by which they might secure other engagements.

What were the program tendencies in those pioneering days? It was the natural development from the simple studio programs to out-of-studio events. Program managers were aided then as now by the radio fans' letters. While the mail was fairly heavy, it contained a smaller proportion of constructive criticism, the majority of letters being expressions of enthusiastic surprise at the new medium and its quality programs. Our station impresarios carried on extensive experiments and increased the number of program hours from fourteen a week to the present average of fifty-two. WEAF's personnel was doubled and then tripled. Every step was taken as a result of carefully arranged experimentation. As

the more thoughtful letter writers the station branched out into many new fields. Musical programs, while forming the backbone, could not fill out the structure. Education, religion, arts and sciences, politics, sporting events, governmental and public proceedings, each was studied to determine its place in the program structure.

## Religion in Radio

Take the question of religion in radio as an example. The important religious bodies were consulted. From the first we felt that broadcasting activities along religious lines should be confined to such times as would not conflict with regular church services. The Catholic, Protestant and Jewish bodies were consulted and invited to participate in the big radio experiment.

The educational problem was handled in conjunction with an outstanding educational body in the city, Columbia University. That there was a place in radio programs for serious lectures authoritatively and interestingly presented, was expected, but no one anticipated the public response. When the home study department of Columbia University selected as its first experimental course the series of lectures on the poetry of Robert Browning, it was felt that radio broadcasting was being given the educational acid test. The result was immediate and astounding. The university was encouraged to further efforts. Since that time, two years ago, there has been a continuous series of lectures by university authorities, discussing such subjects as history, psychology, religion, politics, economics and other major subjects. Education and radio were inseparably linked.

## Political Organizations

As may be expected, national political organizations eagerly seized upon radio's opportunities. The new medium could counteract the evils of the voter's indifference and reach the citizen and his family within the confines of his home. The real problem for the broadcasters was not to obtain the co-operation of political bodies, but rather to keep political activities from pre-empting a larger share of program time than the radio audience desired. Great care has been exercised in political presentations from the earliest times. Absolute impartiality must be shown, as the radio fan has taken much interest in politics and will be the first to notice and to decry any leaning toward one party or another. Equal opportunity was offered last year to the major political parties for the broadcasting of their national conventions, with results that are known to every radio fan in the country.

With the fondness of the American public for sporting events, it was not long before WEAF made experiments along these lines. The first great effort was on the occasion of the famous Princeton-Chicago football game, played in Stagg Field, Chicago, in the fall of 1922 and relayed by specially engineered telephone circuits through the station to the metropolitan audience. This was the first important broadcasting from a remote point, and words fail utterly to describe the thrill which the Eastern football fan experienced when he heard that Princeton student band playing in Chicago and followed one of the most exciting football games in years, play by play, simultaneously with the actual happening, a thousand miles away. So quick was the radio audience to respond to this type of program that the tendency to present sporting events on a larger scale each year has been marked. Now the radio audience follows every important sporting event, whether on the Atlantic or on the sun-kissed fields of the Western Coast, be it football, baseball, horse

Strand studio.

Out-of-studio events such as concerts by the Philharmonic Society Orchestra, the Oratorio Society of New York, the Schola Cantorum and others proved from the outset to be popular, also an occasional Broadway show, confined mainly to musical comedy. These programs from sources outside the studio proved to be so acceptable that there never has been any question of their continuance and growing importance. Permanent installations were made to convey splendid hotel music at regular intervals, and similar installations have been made to provide other forms of entertainment.

The tendencies in the development of radio programs from simple studio events to those presented on the national scale, could not help but bring important engineering and economic problems with them. To link up stations in distant cities meant the utilization of special high quality long distance circuits. While the telephone company maintained long distance telephone lines across the country, much engineering work had to be done to fit all of these lines for radio purposes. These circuits were designed for telephone subscribers' use and in addition to talking circuits were utilized for telegraph service. When demand was made for their use for radio broadcasting, telephone and telegraph facilities had to be removed from the circuit and there had to be substituted equipment for the transmission of radio programs. Special engineering and balancing were required for the broadcasting circuit, as the radio signals would be amplified to such an extent as to produce what in telephone parlance is called "Morse chatter" and "crosstalk." It was found that a limited amount of facilities could be so arranged that the circuits would be available for broadcasting purposes at a time when the long distance telephone traffic was at a minimum. The result was a ready means for connecting a network of stations in various parts of the country to station WEAF to present important sporting events and other programs to the radio audiences eagerly awaiting them.

While the many letters of the radio audience were being carefully analyzed to study program tendencies, and while the station managers were conducting independent experiments regarding program values, business organizations were not slow to step into the picture and to bring a valuable contribution to the art's development.

In the earlier days the radio audience was small. It is now nationwide. It staggers the imagination to realize that the areas covered by the present fourteen network stations contain almost two-thirds of all the people in the United States and that the potential radio audience is similarly two-thirds of all the potential listeners in the country, or an estimated total of 12,500,000. The potential audiences listening to network programs will grow. Only the very best can be considered worthy of such wide distribution. Our responsibility is keenly realized by our officials. A definite program structure is being evolved. Time is not being filled in a haphazard way with whatever material may be available at any particular time and in whatever order may best fit the conditions of the evening. Having laid out a definite plan for presenting only the very best of program material, our impresarios will move more and more tend to follow this definite order so that the radio audience will receive a prearranged and balanced program of music, whether vocal or instrumental, operatic, semi-standard or popular, a program of educational, enlightening lectures, news, household information. The program structure will, in fact, be a cross-section of the best in human endeavor.

Station WEAF is quietly but painstakingly keeping abreast of this development. It is our spirit to keep many steps ahead of the public in anticipating the public taste and in an endeavor to serve.

## "Plunketeers" Return With A Homecoming Celebration

With the return of Joseph Plunkett from his vacation in Havana, Cuba, the programs by the "Plunketeers" of the Mark Strand Theater have been resumed from WEAF, New York, and WOO, Philadelphia. To-morrow the entertainment will start at 7:15 p. m., continuing to 8:30 p. m., Eastern daylight saving time, and will consist of the music from the stage, including the overture by the orchestra, and a special homecoming celebration by the individual artists from the

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Radio Broadcast endorses the B-Limitator. In endorsing the B-Limitator, the Radio Broadcast Laboratories wrote: "We are entirely satisfied with the results of our tests." We'll send a folder telling what other publications and authorities say about the B-Limitator. Timmons Radio Products Corporation, Germantown, Philadelphia.

Now \$28.50 with special tube

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## TIMMONS Radio Products

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like this will never again be presented as long as you live. This is not just advertising talk, but a statement of fact which cannot be Contested, Disputed or Doubtful. Please note—We advertised 1,400 of these sets in The Herald Tribune the past few weeks. Hundreds bought from all over the country. They're going fast—very fast. First come, first served.

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**TYPE 110 RECEIVER, 3 TUBES**  
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SUPPLY HOUSE, INC.  
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Brooklyn, N. Y.

## Army Band to Start Series of Concerts

The United States Marine Band closed its summer broadcasting season through Station WJZ of New York and WRC of Washington on Thursday night, September 17. In the future the Thursday night concert of band music will be furnished by the United States Army Band, playing in Washington and brought to New York by land wire and broadcast by WJZ at 8:30. The first of this new series of concerts will be given on Thursday night, September 24, and will continue indefinitely. The major portion of the band music during the last summer has been furnished by either the Marine or Navy band, and now with the advent of the army organization the listening audience will have the opportunity to hear the music characteristic of the third arm of the service.

## Radio Is More Intimate Than Legitimate Stage

There are any number of people who think that beyond its financial compensations, radio broadcasting is a thankless job, and that the radio artist does not receive any of the plaudits and personal admiration of his fellow artists on the stage. Whereas, if the truth were known, it would seem that the radio broadcaster is the recipient of an even friendlier and more personal appreciation and affection than can possibly be engendered by work behind the footlights.

"I am constantly receiving letters from my radio fans," says Miss Lillian Gordone, the popular "Jane" of Station WJZ, "and these are often of a warmth and sincerity which I am sure would gratify even our most popular stage favorites. My correspondence ranges from sincere little notes of gratitude from aged folk who in the seclusion of their own homes have heard wafted some chance song which has evoked happy memories for them, to fragrant mash notes from members of the younger generation."

"Very often, too, girls drop in at the studio to see me after having heard my voice over the radio," continued Miss Gordone. "Recently a young lady walked in just as we were commencing our program for the afternoon. She had a rather pleasing voice, and so I asked to have her put on with me in a duet. The song was a success and the girl was delighted beyond words."

"One of the sternest tests of the worth of a permanent staff artist at a radio broadcasting station is his or her versatility and adaptability," says Miss Gordone. Innumerable times artists who are scheduled to play or sing default at the very last moment and other entertainment must be provided. Miss Gordone recalled one particular evening at the station when of necessity she was called upon to sing as "Jane," and as Madame Gordone play as "Mabel West," accompany another artist in his performance, and improvise soft music to Mr. Elliot's reading of some poems from a volume by Robert Service. This program incidentally was acknowledged the best of that day given by any station, and this news when it was received at the studio caused a great deal of hilarity among the principals of the almost entirely impromptu performance.

"There is a delightful and gratifying lack of antagonism between radio players," Miss Gordone remarked, "in regard to the absence of rivalry between performing artists and their readiness to assist each other without additional recognition or announcement, a situation rarely found on the stage where various actors playing on the same bill must compete for the favor of the audience in front of the footlights."

**Brooklyn Show to Broadcast**  
Arrangements have been completed at the Brooklyn Radio Exposition for the installation of a special broadcasting studio on the floor of the armory, where programs will be broadcast each afternoon and evening. The artists to broadcast from the exposition will be chosen by the radio audience through a voting contest conducted in the newspapers. The show is scheduled to take place during the week of October 17 at the 23d Regiment Armory in Brooklyn.

## Sec. Hoover Opened Radio Show From Washington With Speech

There Are 600 Broadcasting Stations With More Than 6,000,000 Receivers in the U. S., and There Must Be Regulation

Following is the text of the address delivered by Secretary Hoover at Washington, D. C., on the occasion of the opening of the fourth annual National Radio Exposition at the Grand Central Palace, New York, and broadcast through stations WRC, WJZ and WGY Saturday night, September 12.

THE opening of the fourth annual National Radio Exposition is one more reminder of the youthfulness of this great system of communication. Radio has already become so imbedded in American life that we forget that the development of this great scientific discovery is but five years old. Five years ago we had scarcely a single broadcasting station. To-day we have more than 600 stations and probably 6,000,000 homes with receiving sets. Five years ago the total expenditure in the industry was less than a million dollars for the year. It will probably exceed \$400,000,000 this year.

I do not believe any other generation in history has had the privilege of witnessing the progress from birth to adolescence of a discovery so profoundly affecting the social and economic life of the peoples of the world. You who attended the first National Radio Exposition four years ago and who have the privilege of being present again to-night can see marvelous advances in the art. No other invention in all the time invaded the home so rapidly and intrenched itself so securely as radio, and though it is still far from maturity we see great advances every year. Every year brings additional scientific discovery and there follows upon it new inventions and new application to service.

The annual national radio exhibitions serve as milestones to disclose these advances. In the course of another month I am summoning the Fourth Annual Radio Conference in Washington in which all elements—the listeners, the manufacturers, the broadcasters, the radio press, the distributors and the government—will come around a common table for the fourth time to discuss the mutual problems of this industry.

This is the only industry where everybody agrees that there must be regulation. Without regulation we should have complete chaos in the air, and as every word by radio is an interstate performance we cannot avoid Federal regulation. Attempts to regulate rigidly by law without the co-operation of the industry and the public would, I believe, stifle progress, and this manner of regulation by which all parties sit in for solution of problems is unique in our relations of government and industry.

**Keystone of the Industry**  
Every radio activity exists finally and lastly to serve the listening public. The keystone of the industry is to maintain their interest by service. That is the motive of the broadcaster who gives us better programs and better quality of transmission and is the object of the manufacturers of receiving sets. It is the object of the Department of Commerce which has the very difficult task of keeping the traffic lanes clear so that the voice over the radio may reach the listener. It is, therefore, the listener in whom we are primarily interested, not only as an industry, but as a public service. There is no industry so dependent upon public good will and interest.

**United States Leads in Radio**  
In radio we are far in advance of all other countries and I feel it has been in large measure due to the co-operation worked out in these conferences. And with the fine co-operation which we have developed we have done something new in the whole development of relations between the industry and the public, though we still have plenty of unsolved problems.

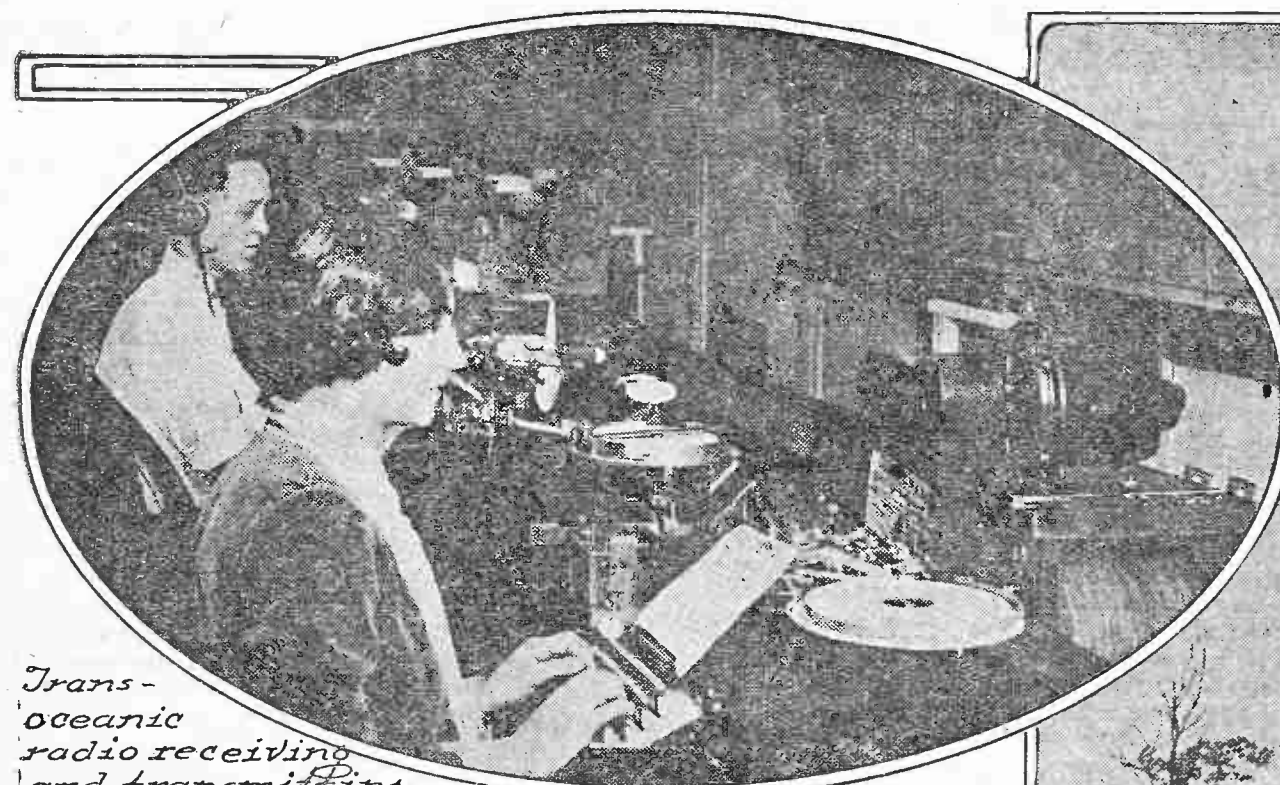
The number of radio channels is limited. They are already so overcrowded that there is little room for the newcomers. They jostle each other a good deal. More legislation for the solution of our difficulties is being frequently suggested, and we must sooner or later determine the major issue—whether we will continue to allow every new broadcasting station access to radio paths or whether every applicant entering must first show a legitimate and a valuable purpose to the listener before we allow him to further congest the overcrowded airwaves.

We have a great unsolved problem in the amount of power necessary to give real service to listeners even against opposition of static and summer conditions and without adding still further to congestion and interference.

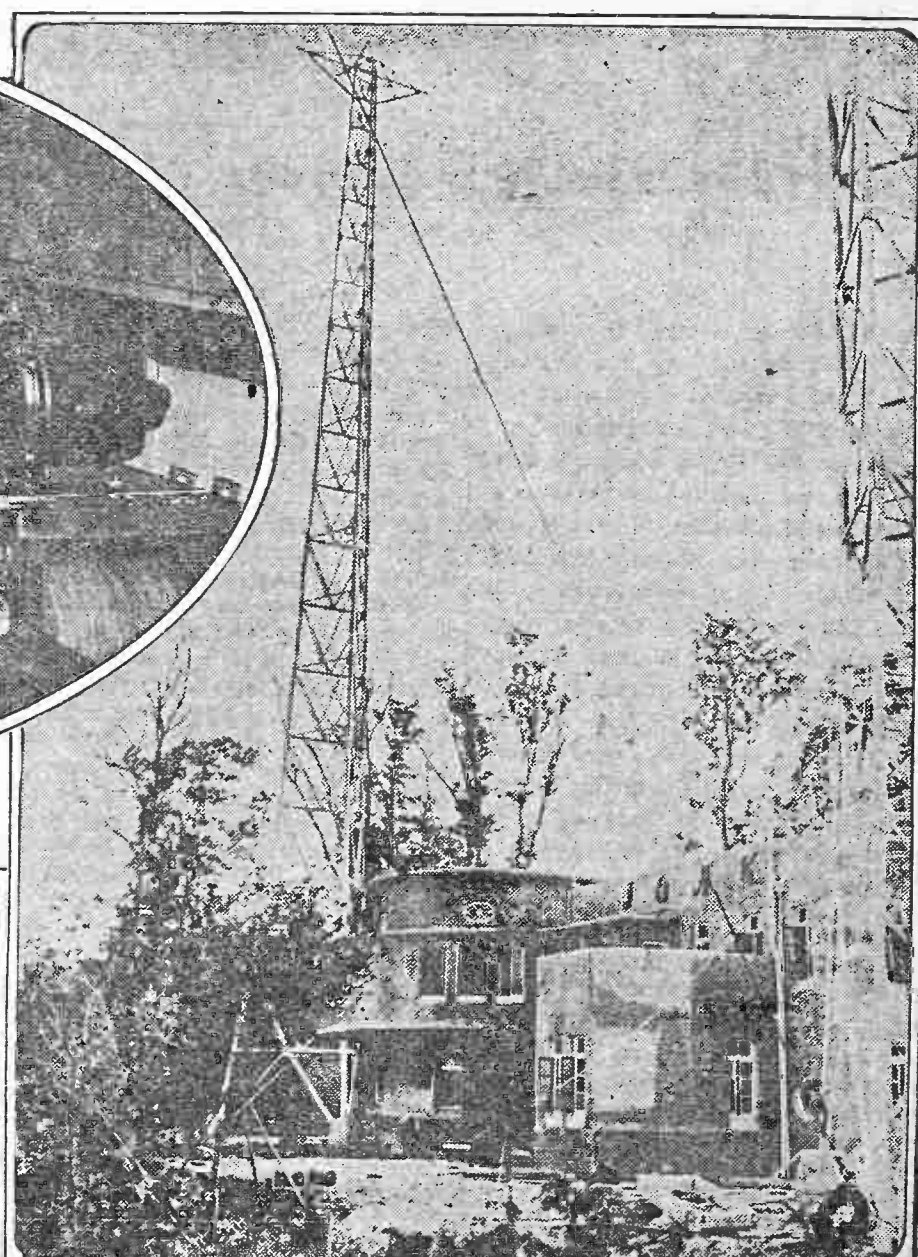
**Radio Is Universal**  
We have all watched this industry grow from curiosity of a scientific toy to a communication system now well nigh universal. It is better and greater than it was a year ago. So great has it become in service that I believe it would be almost possible in a great emergency for the President of the United States to address an audience of forty or fifty millions of our people. It is bringing a vast amount of educational and informative material into the home, and it is bringing about a better understanding among all of our people of the many problems which confront us. It is improving the public taste for music and entertainment. It is bringing contentment into the home.

We are at the threshold of international exchange of ideas by direct speech. And it will bring us better understanding of mutual world problems. Only over-optimistic prophets would attempt to predict radio advance. One thing we are sure of, that the radio industry is only in its youth, that it will continue to grow with increasing strength. If it will succeed it must continue as in the past to devote itself to actual public service to which it is already dedicated.

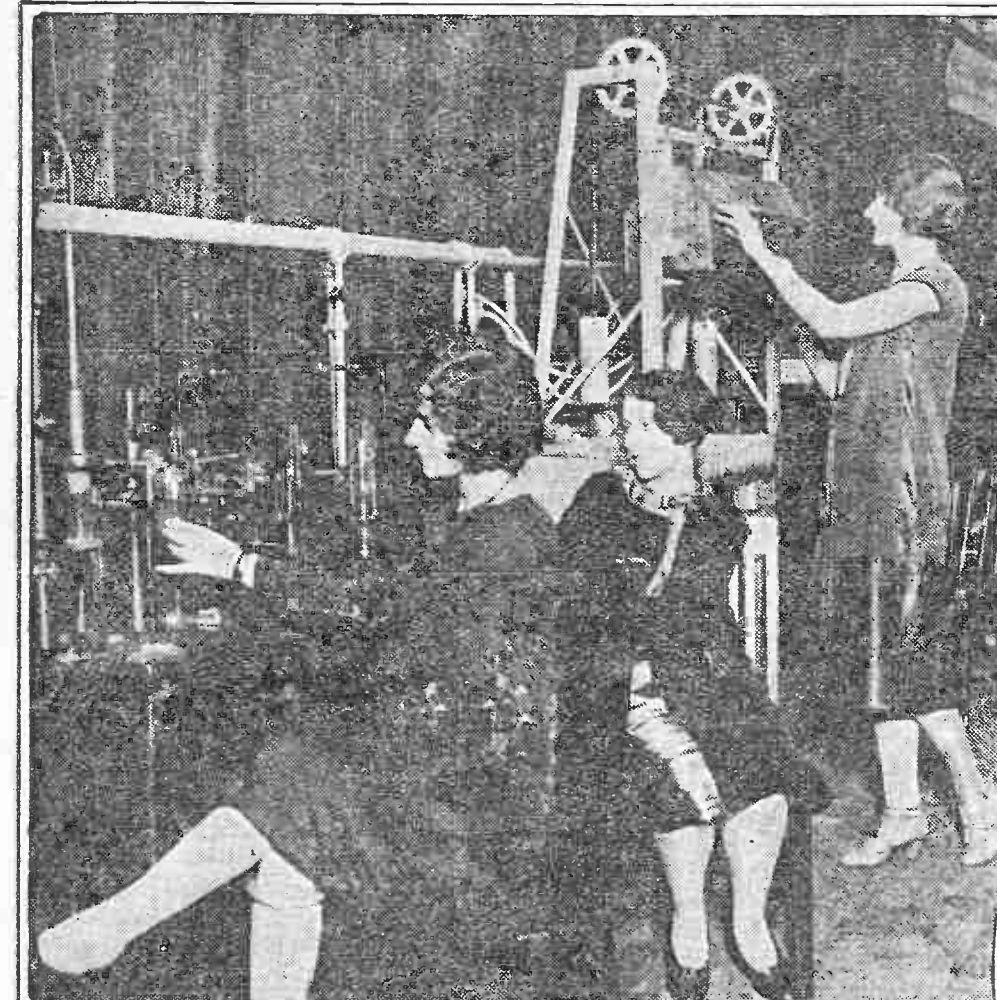
## Up-to-the-Minute News of Radio in Pictures



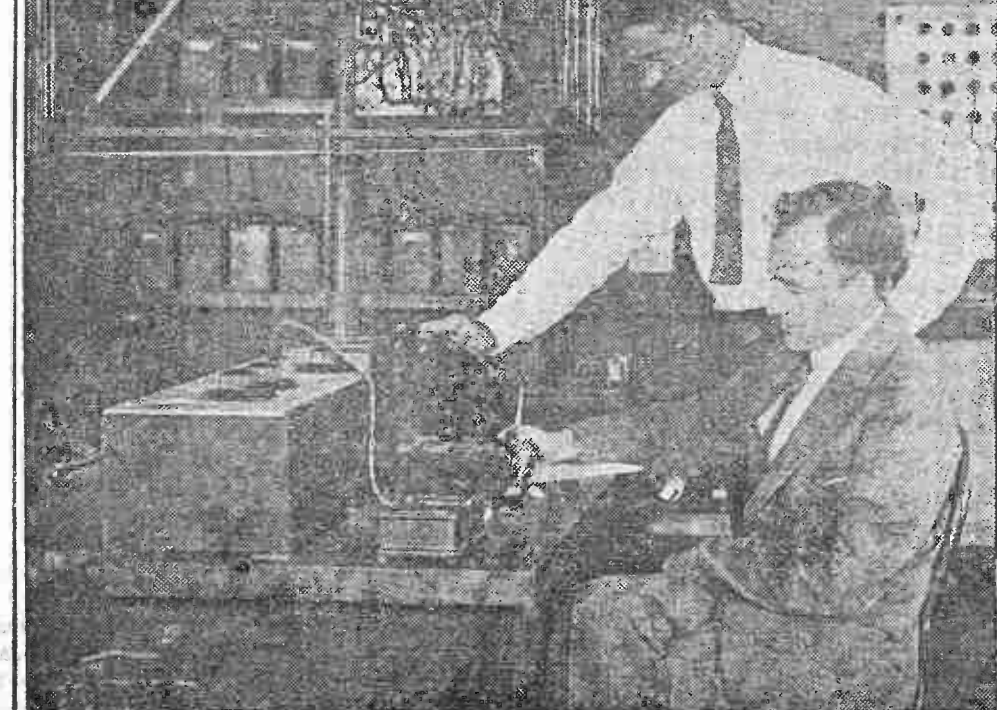
Trans-oceanic radio receiving and transmitting apparatus was demonstrated at the Grand Central Palace radio show



A view of the new Tokyo radio broadcasting station which is expected to open in a few days



A complete tube-makers plant was installed and operated at the radio show last week. S. L. Rothafel, Remy, photographed on the S. S. Leviathan with the portable radio set he is taking abroad



Dr. J. H. Dellinger, Chief of the Radio Laboratory of the U. S. Bureau of Standards, checking up the intensity of broadcasting stations



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# Now Is the Time to Overhaul the Set in Preparation for Winter

For the Mechanically Inclined Fan the Process Is Simple and the Results Are Worth While

By R. C. HITCHCOCK

A RADIO set should be carefully looked into at least once a year.

If you owned a car you would certainly have it looked at by a mechanic as often as that if you wanted best results, and your radio set deserves a similar amount of attention. This is a good time to go over your set—before the long, clear winter nights, when reception is ideal. Take "time out" some night when the static is especially bad, and do your set a few good turns. You may find worn parts that need replacing; loose wires on your rheostats, and even corroded connections which permit the current to flow only with difficulty. To find such incipient troubles is to find the "stitch in time that saves nine." Sometimes even when you think your set is doing all that can be expected of it you will be surprised at the immeasurably better results that come from a comprehensive cleaning up.

While the complete overhauling of a set is not to be recommended to every one, it is really quite a simple operation, and if one is at all mechanically inclined the process is quite simple and the results will be infinitely worth while. Many of the hints will be applicable to factory-built sets, but this article is written especially for those who expect to completely dismantle their radio sets. If you yourself made the set that you are about to overhaul, it will be much simpler and easier to put things back after you have cleaned them. If the set is a commercial one, it will be best to draw first a diagram of the places of the various instruments, and then sketch in the wire connections.

Having done this, you are sure you can get things back in the same fashion as they were at the start.

For a really thorough job everything should be disconnected—all apparatus taken off the panel and unscrewed from the baseboard. Take apart all the wires from the instruments, and leave them in a pile together; put all nuts and screws, including binding posts, in a box so they will not become lost; and stand up the instruments by themselves. The panel will now be free to be cleaned. Use denatured alcohol for most of the cleaning, and give the final polish with a rag wet with some light oil, such as three-in-one. Tighten the wood screws which fasten the panel to the base; quite often the wood has shrunk a little, and you may be surprised to see how much the screws may be tightened. Dust off the wood base and apply a little furniture polish. If the set has a cabinet, use the furniture polish on this, too.

The main thing to do to the instruments is to clean them thoroughly, and that is done in a slightly different way in each case. One of the most important single items is the rheostat. Many operators tune with their rheostats, and so a lot of wear is likely to occur; other persons, having no filament switch, turn the rheostat arm clear around every time they use the set, to turn the battery off—this causes wear. So look carefully at the rheostats; you may decide that they are too worn to put back, but if they are only slightly worn the following is a good procedure: Take off the switch arm, shine it up with a little piece of sandpaper; then wipe off the resistance wire with a rag soaked in alcohol, and sand-

paper any places that seem rough. Then reassemble the rheostat and see if it works smoothly and without unnecessary rubbing; if not, smooth the parts a little more.

## Cleaning the Tube Socket

Another very important item is the tube socket. If your set has been out in the open—that is, without a cabinet—it will be best to dismantle the socket completely to clean the accumulated dust. Take off the springs and the nuts, leaving just the shell. Clean the shell with alcohol and look over the springs, polishing them, at the places where the tube prongs touch, with sandpaper. Then put the socket springs and nuts back, reassembling the socket.

Telephone jacks are in constant use in many sets—they are being used to change the connection from phone to loud speaker, and it is quite likely that at some time these jacks may become worn so that they will not work properly. Of course, if the springs have lost their "springiness" it will be best to obtain new jacks. This is seldom necessary, however. Look carefully at the connections, and see if they are clean and soldered securely; scrape the contact points with the tip of a sharp pocket knife, and finish by drawing a thin strip of sandpaper across them to insure clean and perfect contact. In rare cases a jack may prove to be so dirty that it is best to take it apart. The writer had such a case; after the two main screws were removed the jack springs and separators, washers, etc., were laid on the table in the order in which they were removed so that they would be easier to put back. After the corrosion, caused by acid solder-

ing paste, had been sanded off, and the jack reassembled, no further trouble developed.

Such large instruments of molded dielectric as variometers can have little the matter with them, especially if the contacts between the rotor and the stator are flexible wires. However, if connections are made through their bearings, these should be inspected, and, if found loose, they should be tightened. If they cannot be tightened it may be best to obtain new instruments, as loose bearings will eventually lead to scraped windings, which soon become worthless. If bearings are slightly loose and the connections run through them the set will be noisy, due to the imperfect contact. In this case new instruments are not needed; simply solder a piece of flexible electric light cord to the two bearings, and they will cease to be noisy. The whole instrument should be cleaned with a rag wet with alcohol to remove dust and grit. Variocouplers should be treated in a similar manner. Variable condensers may have their plates cleaned with an ordinary pipe-stem cleaner.

Transformers, both audio and radio, are not subject to much motion, as are many of the other instruments, and generally all that has to be done is to dust them off carefully and see if all the outside connections are whole and sound.

In reassembling the set first put on the baseboard the instruments that are nearest the panel and wire them according to the diagram. The other instruments will then be ready to place and connect. If some connecting wires seem to be poorly soldered or corroded replace them with new wires.

## An Impedance-Coupled Receiver That Brings In All Notes

(Continued from page three)

tendency to turn them down when distortion due to overloading is noticed. This is no remedy; it is an aggravation of the trouble. The control of the volume in the audio amplifier should be by means of input voltage variation, and this is controlled best by varying the radio-frequency amplification.

### Volume Control

As a fifth volume control means have been provided for cutting out one of the audio tubes from the circuit. This is done by switch S2, which opens the filament circuit of A3 and at the same time sends the output of A2 directly to the plate of A3. A switch such as is called for at S2 is somewhat difficult to obtain, as few radio stores carry them. It is a type of jack switch which closes two contacts and opens one. If one of these cannot be obtained, or if it is not desired to put the switch on the panel, an ordinary double-pole, double-throw switch may be used. Or a still simpler arrangement is to have a flexible lead connected to the plate of A2 and provided with a clip at the other end. This clip may be connected either to the junction point between L7 and C7 or to the junction L8 and C8. When it is in the latter position the tube may be lifted out of its socket or R10 may be removed. This, of course, is less convenient than the switch.

The condenser C1 is used to keep radio-frequency currents out of the plate battery and to assist in keeping out noises. It should preferably be a large one like C6.

There is only one jack, J2, provided for the output. Only one is needed, because if a person intends to use a headset only he will not build this set, and if he has a loud speaker he will not use anything else. If he should want to listen in on the detector he can connect his headset in series with B1.

The panel arrangement of this receiver is shown in Fig. 2. Only the centers of the main parts are shown, the locations of the mounting screws having been omitted. Of course, this arrangement is only suggested, since it may not fit parts

different from those used by the writer. The legends given in Fig. 2 correspond with those given in Fig. 1, the circuit diagram.

### Transformers in Series

It has been frequently stated that it is very difficult to tell when the windings of a transformer are in series aiding. It is by looking at it or by connecting it in the receiver and trying to tell by sound. But it is very simple if the eyes and ears are given a little aid. In the first place, transformers are usually marked P, B, F and G. In most cases they are so marked that if B and F are joined they are connected in series aiding, or if P and G are joined. But it is not at all certain that all manu-

facturers of transformers mark them correctly. The above connections may result in series opposing. To make sure run a little test.

The first is simply to connect up a Hartley oscillator, using the transformer as the oscillation coil. No condenser is needed. First assume that the markings are correct. Then connect G to the grid of the tube, B and F joined together to the filament, P to the negative of the plate battery, the positive terminal of the plate battery to the phone, and the other side of the phone to the plate of the tube. If the circuit howls when the tube is lighted the transformer windings are in series

## Ocean Liners Reproduce Music

(Continued from page two)

different instruments employed in different items and to reproduce them in the best possible fashion to suit the acoustics of the hall or room in which the reproducing apparatus is installed.

From the microphone amplifier the output currents go to the microphone control amplifier, which is also a five-tube instrument, the first two tubes being resistance-capacity coupled and connected in cascade with separate adjustable grid resistance. The last three tubes are connected in parallel, and all the tubes, grid resistances and the transformer are inclosed in metal shielding cases.

The final stage of amplification is the power amplifier, which supplies the large amount of energy necessary to operate the sound projectors. This amplifier consists of eight small power tubes connected in parallel, and if a large number of sound projectors is required, several of these amplifier units can be connected in parallel. The various components are mounted on a teak panel, which, if desired, can be mounted in a teak traveling

case fitted with carrying handles.

A fourth type of amplifier, called the microphone control and power amplifier, is a single self-contained unit, designed for sound projection on a smaller scale. Seven tubes are used in this instrument, the first three being resistance-capacity coupled in cascade, and the last four connected in parallel, through an interstage transformer. A potentiometer in the grid circuit of the second tube provides a means of controlling the degree of amplification.

### The Sound Projectors

The sound projectors, so called to distinguish them from the ordinary form of loud speaker used in a small room, have been specially developed on a commercial scale in the Marconi research laboratories, for use with public address and ship equipment.

The principle of construction of the instrument is entirely different from that of the ordinary loud speaker. It is due to Sir Oliver Lodge and lends itself to practically unlimited increase in size and power.

aiding. If no oscillation takes place reverse the terminals of the primary. If it howls then the windings are in series aiding. If no oscillation occurs in either case then there is no test.

A quicker way of testing the connections is to set up a circuit like that shown in Fig. 3. Neither the condenser value nor the voltage of the battery is critical, but the values given work. If the condenser is too large the test will not be satisfactory.

First connect the condenser to the battery by throwing the switch to point (1). This charges the condenser up to 45 volts. Then quickly throw the switch to point (2). This discharges the condenser through the transformer windings and the headset. Now if the condenser is not too large, the circuit formed by the headset, the transformer and the condenser is oscillatory. The oscillations are highly damped, but they persist long enough to enable the listener to tell the pitch. Charge and discharge the condenser several times in rapid succession until the pitch is impressed on the mind. Then reverse the connections of the transformer so that P and B are interchanged. Again note the pitch. The connection which gives the lower pitch is the series aiding.

In making the change the only thing that changes is the inductance of the circuit. The resistance and the capacity remain the same for either connection. Hence the change in pitch is due to the change in the inductance, which amounts to four times the mutual inductance between the two windings. This is considerable, particularly for transformers of moderate turns ratio.

The time required for the condenser to discharge to a given fraction of its original charge is proportional to the total inductance in the circuit. Hence the series aiding connection gives a discharge of longer duration and it sounds duller. The series opposing connection gives a sound sharper both in pitch and apparent intensity.

The change from point (1) to point (2) should be made quickly, otherwise the charge might leak off in transit.

## Thousands View Radio Exhibits At 258th Artillery Armory

In Addition to the Display of Apparatus Many Interesting Talks, Demonstrations and Entertainments Were Provided

WITH the presentation of a gold cup to Graham McNamee as the most popular announcer in the United States, the Radio World's Fair ended last night in the 258th Field Artillery Armory, after a week of record breaking attendance and a daily revelation of new wireless wonders. It housed on a single floor the largest showing of radio receivers and radio parts ever displayed, and at least \$100,000,000 worth of business was done.

An independent tube manufacturer, for example, scored a record of \$240,000 worth of business in a single afternoon.

"This exposition has amply demonstrated not only the intense interest of millions of people in the development and improvement of radio broadcasting but firmly established the radio as a leader in American industry, with unlimited possibilities for future expansion," was the statement made at the conclusion of the fair by U. J. Herrmann, managing director, addressing Herbert H. Frost and members of the Radio Manufacturers' Association, who have been in constant attendance at this their official show.

The Radio Manufacturers' Association, as one of its final acts, has gone on record as making the Radio World's Fair next year one of its three official shows, the others being the Pacific Radio Trade Association Exposition in the Pacific Auditorium in San Francisco and the Chicago Radio Exposition in the Coliseum.

The chief features of the Radio World's Fair included the greatest program of broadcasting ever conducted from a single place. Eight stations were linked up by hundreds of miles of wire and a central switchboard that was a marvel of ingenuity in the quick transferring of music and song from one station to another.

It seemed to work as if by magic. In the center of the armory the actual broadcasting was witnessed during the week by fully 150,000 people, and the great artists of the air, like Billy Jones and Ernest Hare, had the unique experience of actually broadcasting before a visible as well as an invisible audience. From the time that the exposition opened until the exact moment when the doors closed entertainment was going out to millions of people. It was a costly gift to the radio fans, and that they appreciated it was evidenced by the messages that came from as far west as Ohio; also it may be noted as a matter of interest that Dr. Donald McMillan, way up in the Arctic, flashed a message that he had heard some of the programs.

Thousands of women were present at the exposition, amply demonstrating that the manufacturers acted wisely in putting their sets into handsome cabinets—the eye appeal in radio. There proved to be just as great a market for the very expensive apparatus as for the one and two tube sets. This circumstance may be attributed to the greatest interest in radio by women, and in recognition of this interest of the feminine fans the Radio World's Fair entertained throughout the week an official representative of the women listeners in the person of Miss Rena Jane

Frew, of Beaver, Pa.—"Miss Radio, 1925."

Miss Frew participated in the demonstrations and was a guest of honor at the first wireless tea, at many theaters and receptions in the studios of the broadcasting stations, and in addition she made a visit to the Metropolitan Hospital to look over the radio installation there and to offer advice based on her long experience on the technical side of radio for improving the reception to the benefit of the patients who listen so eagerly for the joy that the ether brings.

The wireless tea was given in her honor by Sir Thomas Lytton through a radio message. Tea was brewed on a cake of ice through the mysterious rays from Bernays Johnson's wireless light transmitter, just as he cooked eggs in a pan on top of a cake of ice by this beam.

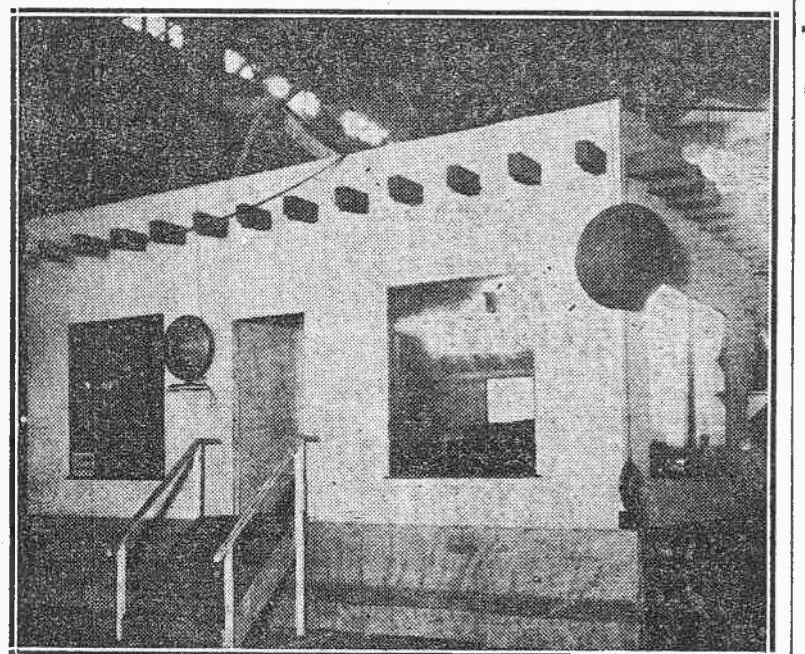
Mr. Johnson claims that his experiments at the Radio World's Fair quickly demonstrated that the so-called death ray may be harnessed for useful purposes and that it will be a simple matter in the next few years to light homes and factories by a central wireless transmitter. Mr. Johnson, a guest-inventor at the Radio World's Fair, also gave public demonstrations of the crystal set which gave tremendous loud speaker volume. The power tone of the reproduction was much admired.

Last night and all through the afternoon the big 258th Field Artillery Armory at Kingsbridge Road and Jerome Avenue, in the Bronx, was crowded with school children from the entire metropolitan district who were particularly delighted with the marvelous intelligence of the radio pony, a Shetland, owned by E. P. Knapp, who followed the instructions and answered questions on radio subjects and seemed to delight in tuning in various stations on the radio receiver by using his mouth to move the dials. He also kissed Miss Radio and other women visitors.

Rewards were made to fifty amateur set builders, who showed home-constructed outfits of unique design yet very efficient in operation, from the minute crystal sets to elaborate eighteen-tube receivers. The awards were made under the direction of Edgar K. James, C. Warfield Kiefer and Miss Frew, with the co-operation of engineers representing the large manufacturers.

Many letters were received from radio fans reporting the address of Governor Alfred E. Smith on Monday night, opening the exposition, echoing his appreciation of radio's service in the enlightenment of the public and a general contribution to good government.

## The Crystal Studio at the Show



Above is pictured the Crystal Studio, which was located in the center of 258th Field Artillery Armory during the Radio World's Fair. Eight stations linked up with the fair broadcast from this studio every day.

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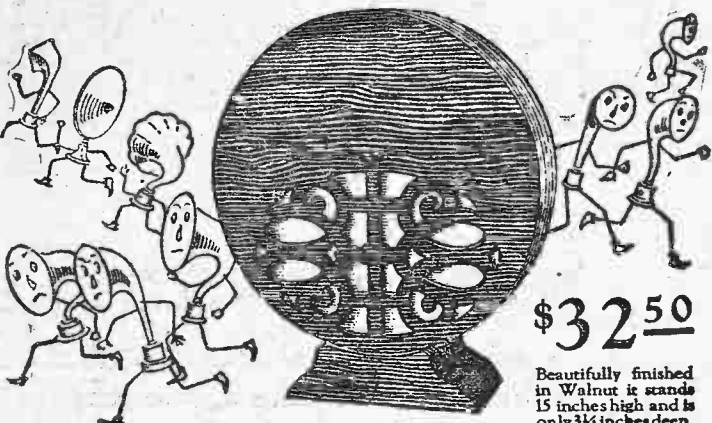
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## Attendance Records Broken as 42,000 Jam Into Radio Exhibit

The Greatest Crowd Ever to Enter Grand Central Palace Came on Monday to View the Radio Show, the Manager Says

WITH an average attendance of more than 40,000 daily, the fourth annual National Radio Exposition at Grand Central Palace, New York City, held vast throngs spellbound with its displays of marvelous developments in radio equipment. The public had expected to see some new improvements, but it was astounded when it beheld the great panorama of radio progress of the last year spread before its eyes on three floors of the exposition building. The exposition opened Saturday, September 12, and continued until Saturday night, September 19. On Monday more than 42,000 persons jammed into Grand Central Palace, declared by the managers of the building to be the greatest crowd ever to enter the building in a single day.

The outstanding features of the 400 exhibits of leading manufacturers are the extraordinary developments in the production of loud speakers that reproduce broadcast programs with unprecedented fidelity of tone; the great strides made by set manufacturers in improving the appearance of receiving sets, making them pieces of furniture of unusual beauty and suitable to take their place in the living rooms of thousands of homes; the phenomenal advance in perfecting equipment that permits the operation of tubes and sets directly from home alternating currents, with the consequent elimination of batteries; the incorporation of the single control principle in many of the new models, making them easily tuned by a woman or a child, and because of the elimination of dials, thereby permitting the attainment of greater artistic effects.

The cone type of loud speaker seems to be in the ascendancy, because of its all-embracing range of pitch and its non-resonant characteristics. Its excellent tone qualities, in addition to its attractive appearance make the cone speakers popular. Numerous cone loud speakers are being shown at the exposition, some of them well known makes and others newcomers in the field. As a sample of what quality can be obtained by loud speakers, visitors to the exposition are treated to broadcast reception as rendered by two huge Hewlett induction type loud speakers suspended over the side aisles. These units have nothing to suggest the usual loud speaker. With their spiral windings supported on radial arms, and with their concealed aluminum diaphragms supported between the spiral windings, they seem more like decorative devices than powerful loud speakers that will fill the immense exposition building with sweet, far-reaching, realistic music.

Examination of the working parts of the radio receivers exhibited reveals refinement in many details. For one thing, there has been a marked change in the audio-frequency transformers. Instead of small transformers designed mainly for volume, the more carefully designed receivers contain larger transformers with plenty of iron and with characteristics which make for distortionless amplification. The best loud speaker in the world would sound like a tin horn with some of the audio-frequency transformers of the past which failed to amplify all frequencies uniformly. Hence, some notes caused a blast, while others were simply chopped off. But now the larger and properly designed transformers have changed all that. By-pass condensers, special resistances and many other improved devices are also in evidence at the fourth annual National Radio Exposition at Grand Central Palace. Obviously every effort has been made in the present offerings to obtain the tonal quality as well as ample volume for all requirements. And it is in the refinement of the little things that the perfection of the receiving set as a whole has been realized.

Aside from tonal quality, the necessity for sharper tuning is admitted and met in virtually all the receiving sets shown at the national exposition. Condensers, which now have become the generally accepted means of tuning, are especially designed for straight-line frequency operation—that is to say, the condenser dials spread out the wave lengths at the lower end of the scale so as to separate the existing congestion with the older types of receiving sets.

Four years ago no one foresaw the advent of some 600 broadcasting stations in regular operation. For that reason radio receivers of the past were not designed to handle fifty or more stations within the narrow confines of the broadcast wave band. Consequently, with the present con-

## How Detector Tubes Amplify Radio Signals

A detector is simply a rectifier which allows current to pass in only one direction, stopping it off when the voltage tends to force any current in the other direction.

It is necessary to chop off the lower half of the modulated wave as it comes out of the tuner in order to get a current which will affect a telephone; this is only another way of describing the rectifying action of the detector.

There are two devices in common use for doing this in radio reception: The crystal detector and the vacuum tube.

The crystal detector rectifier is not well understood, but these simple devices give very good results for short-distance reception and have the great advantage that no battery is ordinarily required, thus eliminating upkeep expense. Detection by vacuum tube is an intricate science, and no attempt will be made here to explain the theory of it.

Originally, the two-electrode tube was used, just as in a battery charging rectifier. The direction of electron flow, minus to plus, is always from the hot filament to the cold plate—never the other way. At the present time the three electrode or electron tube (audion) is used, because the addition of the third element of grid produces an amplifying as well as a rectifying action.

In order to make the tube rectify or detect we insert in the grid circuit a small fixed condenser, usually a .00025 mfd., with a grid leak. The latter is usually a fixed high resistance of from 1/2 megohm (500,000 ohms) to 3 or 4 megohms. Most commonly the leak is parallel with the grid condenser, but with some tuners it is found better to run the leak directly from the grid post of the tube socket to which the grid return runs from the tuner.

Regenerative tuner-detector units are still widely used. In discussing them it is simpler to think of the tuner and detector as one unit, since in all forms of regeneration it is the object to feed-back some of the plate circuit energy to the tuner or grid circuit, thus strengthening the grid voltage so as to produce still stronger variations in the plate current.

There are two principal schemes of connection to bring about this result. The first is to run the plate current through a coil known as the tickler coil, which is coupled to the tuner coil in the grid circuit. The tuner coil here referred to may be either a single inductance used in a single-circuit tuner or the secondary of a two-circuit tuner. The second scheme of feed-back is to tune the plate circuit, usually by inserting a variometer in it.

In the first the amount of regeneration is adjusted by varying the extent of coupling of the tickler with the tuner coil, usually by rotating the tickler coil within it. In the second type of regenerative circuit the amount of feed-back is regulated by the variometer in the plate circuit.

In the case of the tickler circuit the principle of operation is not difficult to see. The plate current in the tickler coil being coupled to the tuner coil induces in it a voltage of the same radio frequency and of amplitude varying according to the sound, like the oscillations already present in it. The two effects may either add together or oppose each other. Consequently, it will be necessary to reverse the connections of the tickler if it is found to be weakening the reception instead of strengthening it.

The tuning of the plate circuit by inserting in it a variometer and also a fixed condenser across the output of the detector unit actually has an effect very similar to that of the tickler, though its cause is not so apparent to the beginner. The transfer of energy from the plate circuit back to the grid depends in this case on the fact that the two circuits are actually coupled through the capacity existing in the detector tube, its grid and plate acting as the two plates of a small condenser.

In any method of regeneration the feed-back action is practicable only up to the point where self-oscillation begins. If carried beyond the oscillation point the effect is to cause the sounds heard in the phones to lose their clearness and become mushy. The amount of regeneration should always be kept under this point, as a self-oscillating tube by producing beat notes heard as squeals is likely to disturb all receivers in the neighborhood.

# Description of the Army Broadcasting Station Located at Bedlow's Island

This Transmitter Is Equipped So That Either Telegraph or Telephone May Be Used

By WILLIAM FORTINGTON

SHIPS that ply their way up and down the Hudson, both liners and tugboats, are little aware that upon Bedlow's Island, where the Statue of Liberty is located, there is something more than the edifice signifying American liberty.

It is common knowledge also that there is a military station of a handful of men at this point, but many people will show surprise when told that there exists upon this island one of the first broadcasting

stations of the Eastern states. At present most operating is done by remote control from Governor's Island, an operator being left in attendance at the power plant where the apparatus and antenna are located.

Trippers visiting the Statue of Liberty are sometimes curious as to what is connected at the other end of the huge antenna located at Fort Wood. It was with this curiosity that the writer during the

summer of 1924 found a pioneer of the world's broadcasters which to-day goes forgotten.

In its day of operation as a radiophone station the operators and engineers at WVP were the recipients of numerous gifts as a return for the programs transmitted, which, incidentally, were mostly gramophone music. To-day the radio listener is not nearly so enthusiastic in acknowledging programs and efforts of the broadcasting stations.

The transmitter at WVP, the call letters of the station, is a General Electric set of 3 1/2 kilowatts input, working at 1 1/2 kilowatt antenna efficiency. This station puts 3 1/2 amperes into the aerial on radiophone. On continuous wave, as it is used for military communication, it, of course, gives a much higher aerial current. Six radiotron UV-204 tubes are used, three oscillators and three modulators. The plate current on each tube is

states covered an enormous wave band. The set at the left of the photograph is a 100-watt continuous wave transmitter which has several distinct records to its credit. This set up to last year was in constant use. It was not used for broadcasting purposes. Returning once more to the big set, it will be noticed that there are two extremely large inductances at the top right hand corner of the picture. These are not the tuning inductances of the set, as might generally be supposed, but are a part of the apparatus for eliminating harmonics which are radiated by this transmitter and were at one time a source of considerable annoyance to listeners on other wave lengths.

The power plant is located in a separate room, access to which is gained by the door at the left of the picture. A 2,500-volt generator is used, giving 1 1/2 amperes, driven by a suitable motor. Owing to this high voltage it is found necessary to em-

ploy a separate exciter to excite the fields of this large generator. The large handle in the middle of the panel, when switched in one direction, starts up the generator automatically and connects up the various parts of the circuit, such as filament of the tubes, Morse keys and other apparatus necessary for its daily working as a military station.

The other instruments visible on the panel are the aerial ammeter, the high tension or plate supply voltmeter and the filament voltmeters of the tubes. All the apparatus is contained in a rugged iron frame at the rear of the panel.

Returning once more to the question of radiophone transmission from this station, the writer can recall during one of his visits that two-way communication was established with a military station at Chicago in broad daylight. The speech was perfectly clear, accompanied by, of course, a little static, which was only to be expected at that time of the year.

WVP is heard many miles out at sea constantly by seagoing operators, and it is quite obvious by this that this station is capable of covering great distances under favorable conditions. This is accomplished on a wave length between 1,000 and 1,300 meters.

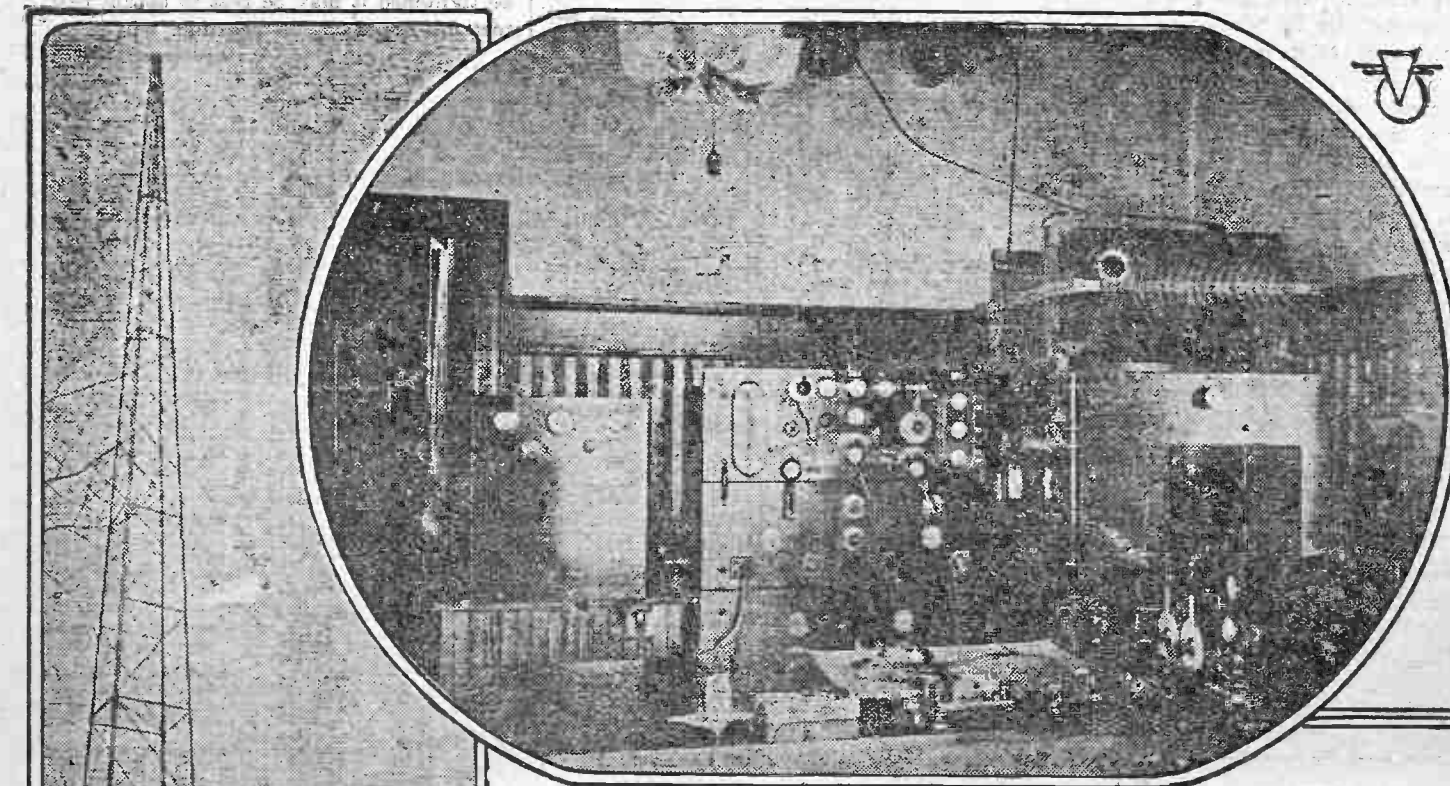
CW or Telephone Used

Owing to the method of construction employed in the set, it is possible to change over quickly from CW transmission to phone. A touch of a few switches is all that is required. It is, therefore, obvious how this station could be operated until 5 or 6 o'clock upon its usual duties—namely, military communications—and then change over to a phone transmitter for the entertainment of the eager listeners.

Viewed from the top of the Statue of Liberty, the aerial passes almost unnoticed, but as soon as one reaches the base of a tower its immense size becomes apparent. Although at the moment the writer cannot recall the exact height of the masts, it might be stated that they are within the region of 200 to 300 feet above the earth. Some idea of the height will be gained by the accompanying photograph, illustrating one of the masts, which is located over the power house.

The receiver in the right-hand foreground is one of the universal variety and is capable of covering a wide band of wave lengths which is necessary for international communication.

The keys are visible upon the table, together with the rest of the apparatus necessary for commercial working. The reader cannot fail to notice the two lead-in wires passing through the walls of the room. These are one-quarter of an inch square copper bus bars.



Two views of Station WVP

stations in the United States and perhaps in the world. This station is owned and operated by the United States Army Signal Corps for communications of a military nature between the New England states and New York. Although it is a back number to-day in the field of broadcasting, it was in its time one of the leading broadcasting

ing to do about it, but I said I wasn't ready with any plan yet, but no feller like Yaller was going to get the best of me if I knew it.

Miss Osgood said that the Radio Club would hold its first meeting that evening and that President Ralph Selgood would preside and operate the radio set.

"Are you going to the club meeting?" asked Billy.

"Well, I should smile," said I, and then we dropped the subject for the time being. Billy came around for me that evening and we went over to the school kinder early, but Yaller and that Malone girl were there ahead of us and Yaller stuck his finger on his nose to me.

Billy wanted me to plug him one on the beezey, but I bided my time, knowing of a better way to get hunk with him. When all the club was assembled Miss Osgood, who had been lectured secretary as she knew more than any one else, called the meeting to order and introduced President Selgood who she said would preside. Yaller got up and went to the front and

made a speech about how he would let actions speak louder than words, and then as it was 8 o'clock he started to tune in on the new set.

You could hear a pin drop as Yaller fiddled with the dials, but the more he fiddled the less results he got and his face began to wear an anxious look and he was about to say something about maybe the set hadn't been hooked up right when there was the goshawfullest sound that seemed to burst right out of the loud speaker.

Yaller jumped about ten feet in the air and some of the girls giggled hysterical-like.

Then there followed the weirdest, eeriest sound that fairly set your teeth on edge and drove cold shivers up and down your spine, and little Millie Samson, a colored girl who lives on Gill Street, rolled her eyes, plopped down on the floor and howled: "Oh, Lawdy, it's the whale of a lost soul."

Then the electric lights snapped out, plunging the room in darkness, "Stop that noise at once!" commanded

Miss Osgood, but no one could hear her on account of the girl's hollering and the spine-shivering sounds that seemed to come from the loud speaker.

By this time some one got to the electric light switch and turned on the lights.

When things quieted down some Miss Osgood said the meeting would stand adjourned to the next day, when there would be a thorough investigation.

Me and Billy skinned out in a hurry after that and I removed the extra big ticktack I had attached to the window pane back of the radio set and stuck it in my pocket.

"That sure is a humdinger of a ticktack," said Billy, and I agreed with him. After fixing it on the window before the club meeting we had run the cord into the schoolroom where it wouldn't be noticed and all I had to do was pull the string and the good old ticktack did the rest.

"That wasn't a bad idea of yours in dousing the lights," said I to Billy.

"Nor that of yours in fixing the radio set so Yaller couldn't work it," said he.

Then we both laughed and Billy said, "You sure got hunk with Yaller all right."

## Bob's Class Buys a Radio Receiving Set

(Continued from page one)

honor of tuning in on the new set she had ordered and which would be installed for the next night.

I kinder thought that the president oughter be me or Billy, for we know a lot about radio, and at the meeting Billy nominated me for president. Mollie Malone, who is sweet on Yaller, nominated him. As a politician I got to hand it to Yaller he is a regular Old Smooth which is what the Democrats call the boss of the Republican party in Ponckhockie.

Yaller's father runs a candy store and he had got his Dad to give him a lot of old lollypops and around each one he wrapped some paper on which he wrote "Vote for Ralph Selgood for President" and gave all the girls one free. Girls will do anything for candy and they all voted for him and he was lected.

Then to rub it in Yaller nominated the Malone girl for vice-president and she was lected.

"Yaller sure put it over on us," observed Billy to me after the lecton.

"I ain't through with him yet," I replied, and Billy asked me what I was go-

ing to do about it, but I said I wasn't ready with any plan yet, but no feller like Yaller was going to get the best of me if I knew it.

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10

**FRIDAY**

**ORKE CITY-465**  
Orams' Orchestra.  
12.25 p. m.-News.  
1.30 p. m.-Racing (half-hourly).  
reports.  
2.30 p. m.-Summary.  
3.30 p. m.-Racing returns.  
4.30 p. m.-Orchestra.  
5.30 p. m.-Racing results.  
6.30 p. m.-Of the Jewish Atone-  
ment.  
7.30 p. m.-Knecht's Orchestra.  
8.30 p. m.-ORKE CITY-492  
with exercises.  
9.30 p. m.-Orchestra.  
10.30 p. m.-Orchestra.  
11.30 p. m.-Worth, barytone.  
Malt, pianist.  
12.30 p. m.-Male Quartet.  
1.30 p. m.-Misses Street.  
2.30 p. m.-Male Quartet.  
3.30 p. m.-Rickett's Dance Or-

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 Society Trio.  
 l Avis, whistler.  
 teach Trio.  
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 Lopez's Orchestra.  
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 Klub program.  
 n Quiz.  
 Andrews, tenor.  
 Reading.  
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 Strahl, soprano.  
 lessons; songs.

**FRIDAY**

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 Cortina, soprano; W.  
 Ails.  
 Jordan, barytone; Fran-  
 Theater.  
 and Dance Orchestra.  
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 Turis, soprano.  
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 YORK CITY—259

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 bers, soprano.  
 enberg, musical saw.  
 Besner, pianist.  
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 Golden's Orchestra.  
 YORK CITY ORCHESTRA  
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 mama, musical saw.  
 Meisler, recitation.  
 ummers, whistler.

LAND, N. Y.—273  
 Laag, violinist.  
 Questions and answers.  
 HILL, N. Y.—316  
 program.  
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 VARK—405  
 Gym class.  
 Adams, soprano.  
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D. N. Y.—319  
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NGTON—469  
Orchestra.  
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s Saturday Night—  
BURGH—309  
half hour)



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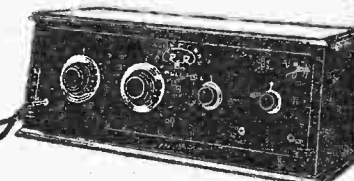
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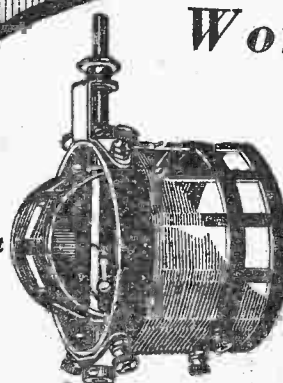
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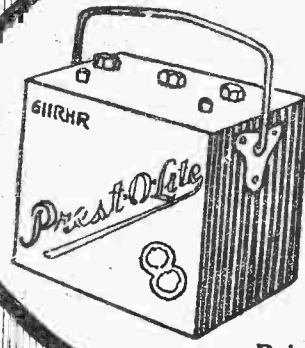
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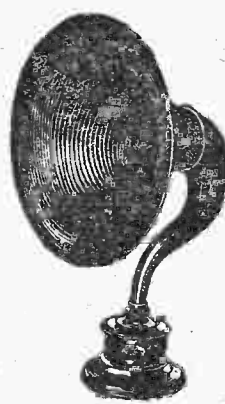
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# THE NEW YORK HERALD New York Tribune RADIO MAGAZINE

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SECTION SIX

SUNDAY, FEBRUARY 22, 1925

20 PAGES

## What Radio Means to Isolated People

Cut Off by Winter Snows, Separated by Great Distances, These Folk Get Real, Living Benefit From Broadcast Programs of Music and Education

By WALTER CHAPPELLE



Good music entertainment and education are carried free by radio to the most distant human habitation

FOR three years past I have been living among the farmers in a rural district of New England. It is essentially a rural district in winter. To-day as I look out of the window the snow lies three feet deep on the level, running in unbroken lines up to the pine woods in the west, to the sea in the east, the only moving thing visible being a double team of horses crossing the furthest hill after opening the mail route, the snow having drifted over from the previous day's storm. The nearest neighbor is three miles away, the nearest city fifteen. For six months we are practically isolated. Last winter we passed one month without newspapers or magazines of any type.

This year we determined that we should not pass through this isolated period without a radio receiver. At a slight sacrifice we invested in one. I assure you that it has not been responsible for the emptiness of the several seats which we used to fill in Broadway theaters when living in New York, but, on the other hand, has kept us in touch with the innovations which several far-sighted professionals have seen fit to broadcast. Then, too, we have already planned our trip as soon as the roads open in the spring, before planting time is upon us, to make a point of getting down to see in full regalia certain of the echoes which have reached us from

time to time during these last winter evenings. Right here I wish to say that "Roxy" will not be the least of the favored. And if John McCormack is to be heard in concert his box office will receive its share of the hard-earned cash we plan to spend. Also we have lived in New York some ten or fifteen years and never had time to attend a Philharmonic—that is, we never made the effort to find the time. We have enjoyed several this winter and have become in consequence Philharmonic hounds. We learned something of the League of Nations through Viscount Cecil's speech at the Hotel Astor dinner, something of the hopes and aims of Walter Damrosch at his dinner recently. More than this, we learned something of the business of running our government when we listened in on the budget meeting and heard President Coolidge tell of the finances of the United States of America. I have never read printed speeches through before, but I listened through on these.

### The Exiles

You will probably wave aside what I say as an exception, a metropolitanite exiled. To be trite, "the exception proves the rule." Other exiles exist within the radius of a few miles of us. A letter I received from one contains this:

"Fred was gone all week. It was lonely without him, but there was excitement

of a sort. The things in the cellar froze. I fed, watered and otherwise valetted the animals. Then one morning an erstwhile employee of Fred's called for a handout and insisted on coming in. Fed him and had difficulty in getting rid of him. I became hard-boiled and shook him, but afterward put a loaded gun on the table lest he return. Next came the big wind. Blew the outside antenna right in two and wound the longest (if there is one) half in an apple tree. Had to wade out behind the barn to get it out and got one ear touched. Gosh, it was cold and terrifically breezy! WEAF coming in strong to-night and excellent music."

There is yet another one up in the hills behind us somewhere who has one of the first De Forests put out. So much for the exceptions—now for the rule.

"My boy has made himself a radio receiver this year," the native clerk beamed over the grocery counter to the gathered evening bunch. "It works fine. Heard all about the eclipse. The older boy, Ed, he was thinking some of going away, but has gotten kinda interested in seeing if he can't make the apple trees bear heavier than last year. Now, with the market reports coming in by radio, seems as though there might be a chance of doing something with the crop, 'side of lettin' what you don't need rot."

I might go on, but the published reports of the Bureau of Agriculture of

the benefits the farmer receives from radio which appeared recently in The Herald Tribune Radio Magazine will prove far more convincing than any word of confirmation I might strive to record here. The few experiences which I set forth are confined to about a hundred persons. Multiply this by any reasonable figure and you will have an idea of what good stuff through the receivers mean to the great mass of human beings, who are giving the best of their limited means the acme of service when called upon to stoke the engines of the great ship United States.

"What do you hear ovy thet thing?" an old farmer asked me one evening last fall, as he stopped by with the milk.

"Music," I said. "Want to listen?"

"Music!" he scoffed. "You waste your time listenin' to music? I hearn gude music ovy to Fireman's Hall last summy when a quartet sang. Wudn't walk a mile to lissen again. Well," as I still offered the phones, "I might!"

The Waldorf was playing. An hour later he reluctantly put down the phones with a sigh. "This," he said, "ain't gettin' around to customers. Say," he paused at the door, "how much did you say one o' them things cost you?"

This, which is my experience, is the experience among all those people who are

Continued on page two



# Two-way Radio Communication With a Submerged Submarine Is Now Possible

## Dr. Rogers Performs Successful Experiments With Subaqueous Wireless Transmission

By THOMAS STEVENSON

THE attempt of Germany to terrify and subdue almost the entire world with submarines may occupy the most interesting pages of history for future generations. Horrible as will be the account of ships sunk without warning and of thousands of innocent lives taken, even more thrilling will be the story of the means taken to combat the menace.

Outstanding among the developments which helped to combat the submarine was the development of undersea wireless. The struggle of Dr. James Harris Rogers, of Hyattsville, Md., to perfect such apparatus and his fight for credit for the invention should interest every "fan."

Dr. Rogers is a man well advanced in years and a scientist who from youth to old age has devoted himself to electrical research and the study of electrical phenomena. As early as 1908 Dr. Rogers entertained the theory that messages and signals could be sent and received by means of ground antenna, and by actual tests made in that year established that they could be sent and received. The messages and signals were received by ground antenna, and Dr. Rogers thereafter made only occasional tests of his discovery.

The outbreak of the World War brought Dr. Rogers to the realization that the underground antenna might be used with good results in dugouts, on submarines and as a valuable adjunct to coast defense. Incited by that realization, he actively resumed his experiments with ground antenna and made arrangements with Harry T. Lyon, a youth nineteen years old, to assist him in making the necessary tests.

After developing the practicability and utility of insulated underground antenna Dr. Rogers and Lyon then proceeded to test the efficiency of uninsulated antenna, whether laid under ground or under water, on the bottom or above the bottom and beneath the surface of water.

A test was also made with insulated wires laid on the bottom of a lake, and communication was established between the lake and Dr. Rogers's laboratory. This last test was repeated for the information of navy experts and for the purpose of showing that such a system could be used on submarines.

### Tests Excite Interest

These tests naturally excited the intense interest of the navy, which was bending its energies to check the operations of enemy submarines. The Navy Department expressly agreed to afford Dr. Rogers such

facilities for test experiments with its systems as might be feasible and practicable without interfering with the transaction of government business. It was also agreed that the inventors would keep secret all knowledge of the invention.

Immediately after the execution of the contract Commander Hooper of the navy requested Dr. Rogers to go to New Orleans to test the system. Dr. Rogers was

Commander Le Clair of the navy requesting information as to what had been done by Lyon. That information was not furnished. Under date of April 12, 1918, Dr. Rogers again wrote to Commander Le Clair asking what had been done by Lyon at Key West and received in reply the curt answer that Lyon had not had very much success with his experiments.

Hampered as he was by the lack of

grounded it to the north end of the other pipe. The inner ends of the insulated wire were connected in the laboratory to the receiving apparatus, and a variable condenser was also connected in the circuit. The iron pipes took the place of a submarine and the insulated wires connected with the ends of the pipes were the antenna.

### Experiments With Loop

During the latter part of February or the first part of March, 1918, John A. Willoughby and Percival D. Lowell began experiments on single turn loops at the Bureau of Standards to establish the possibility of transmitting and receiving radio messages in wave length suitable for submarine work.

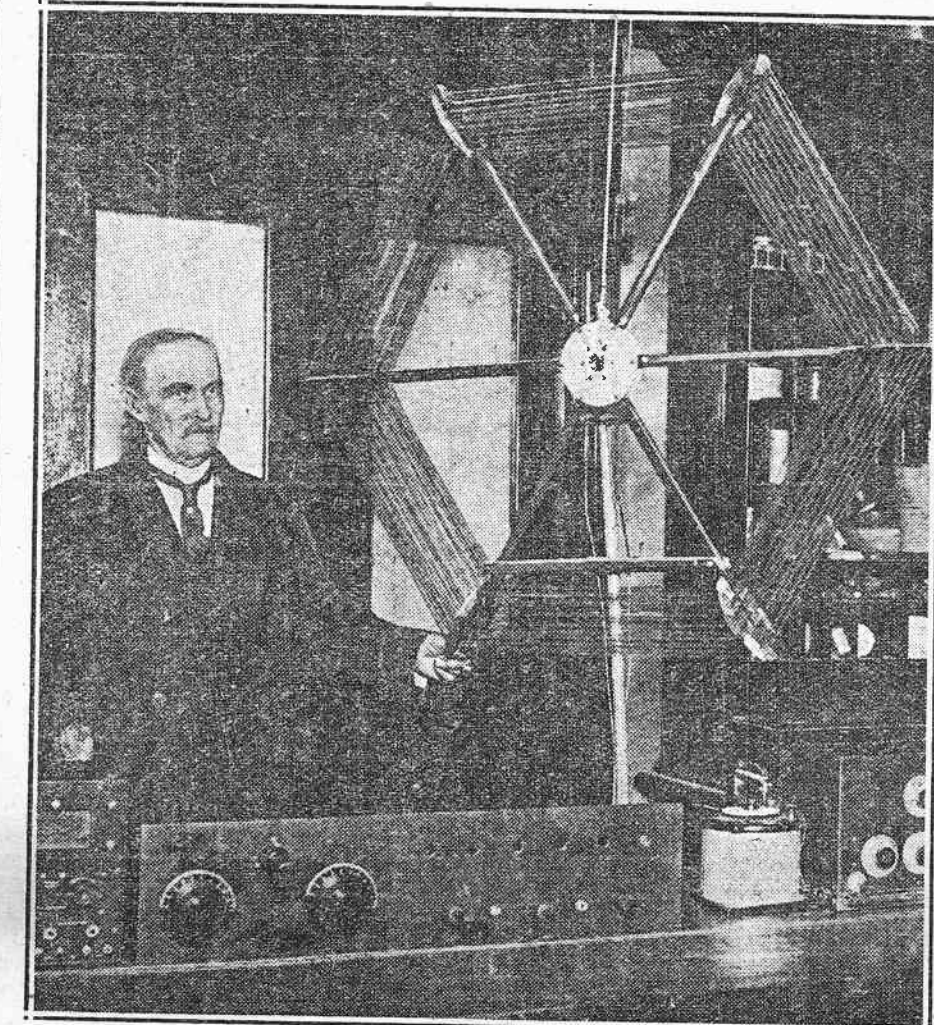
On March 4 Willoughby made a single turn loop of 150 feet long by 50 feet high, on which he was able to get a range of wave lengths from 100 to 1,500 meters. By means of that loop he was able to receive signals better than any theretofore received from any of his tests. He claimed that it was at this time that he got the idea of using the hull of a submarine as one part of the loop. As he had no submarine on which to make a test of that idea he used a radiator in his house for one side of the loop in place of a submarine and found that the loop worked satisfactorily.

For the purpose of securing an opportunity to try his tests on a submarine Willoughby reported the invention to Dr. Rosa, of the Bureau of Standards. On the basis of the report the matter of making tests was taken up with Commander Le Clair, of the navy, and at his suggestion Willoughby and Lowell were loaned to the department.

After the war was over the Commissioner of Patents granted a patent to Willoughby and Lowell for a special kind of loop antenna designed for vessels of metal, and particularly for submarines. This action was taken by the Patent Office on the ground that "the test made by Lyon at Key West of the invention of the antenna grounded to the bow and stern of a submarine was not a success, and that for the additional reason that the test was made while the submarine was not submerged, the test was not a reduction to practice; third, that from April to December, 1918, Rogers was not active in making tests of his invention under service conditions, and that he was not diligent in filing his application for a patent."

The Court of Appeals of the District of Columbia, however, reversed this decision of the Commissioner of Patents and granted credit for the invention to Dr. Rogers.

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Dr. J. H. Rogers, Hyattsville, Md., inventor of the underground and underwater radio communication systems, is here shown with the loop antenna he recently used in receiving signals from across the Atlantic. During this reception the loop antenna is submerged in a well.

unable to go and sent Lyon in his place. Before Lyon was permitted to make any experiments he was required to enroll in the navy, and thereby become subject to the orders and control of that department. In consequence of Lyon's relations to the navy he made secret reports of his tests to the navy and Dr. Rogers found himself unable to secure such reports. In addition to this, bad feeling broke out between Dr. Rogers and Lyon when the latter learned that Dr. Rogers had sought a patent in his own name instead of jointly.

In February, 1918, Dr. Rogers wrote to

whole-hearted co-operation on the part of Lyon and the lack of information as to experiments made by the latter, Dr. Rogers determined to make experiments of his own as to the feasibility of submarine radio communication. Not having a submarine at his disposal for uninterrupted and uncontrolled experimentation, he simulated a submarine by laying underground two lengths of pipe each 100 feet long, the inner ends of the pipes being slightly separated but connected by wire. He then ran an insulated wire from the north window of his laboratory and

# What Radio Means to Isolated People

Continued from page one

far away. I do not mean necessarily in distance, but in spirit and understanding. Little and big pockets of people whom we all know, distributed throughout the entire country, are seeking with open hands for this greater thing which radio has the power to grant them and has promised to grant them. They want music, they want education, they want intelligent discussion of national politics and the world questions of finance, trade and disarmament. These they wish explained so that they in turn may logically interpret of their own accord.

It is interesting to watch the stride of their growth, these pockets of people. Radio has become almost godlike to them in their reverence for it. Jazz and vaudeville in their turn, but only in their turn. The dials spin seeking something more.

Back in the country sections, where the snows lie heaviest in winter and acres of run-out farms stay muffled to the summer sun, a continued menace to the fertility of America, the last generation of farmers, old men and discouraged, sit night after night while the world marches over

them. Their sons, one or two, two or three, here and there, who have not been able to tear themselves away to city routine, have sat, discouraged as well, realizing their helplessness against their own lack of knowledge and their own inheritance of poverty and disease, without understanding the aid that is just beyond reach of the hand.

Such a boy, I heard a short time ago, has bought a small radio receiver and through it he is going to expect the aid which he has the right to demand from those more fortunate—he is going to demand his birthright of education. He wants to know how to fight the borers out of his corn patches, the white pine blister out of his woodlots, the dry rot out of his orchards, and how and where he can market his products. Is he going to get the information?

### Woman on the Farm

Records show us and it has been proved by observation that the woman on the farm is beginning to take interest in things without her domicile. She is ap-

pearing more and more often at town meetings and taking voice in the distribution of the public funds which she has swelled by her individual taxes. Last year in this particular district every increase of funds voted for the public schools and sanitation was carried by the woman vote. The women on the farms are asking for information of government, information of household appliances which will relieve their drudgery, knowledge of how to plant their home gardens so that they may gain the most beauty therefrom, and last but not least they are asking over and over again for music, good music, and amusement. Are they going to get it?

Not so far away where the small village sleeps quietly waiting the next spring is a young native, a college graduate studying through a correspondence school for his bar examinations. But he is losing heart. "It is difficult," he says; "I have a wife and baby who need my care. And this book studying is all right if I only had some one who could tell me things as well." Is he going to find that some one?

A carpenter, a man who has taught himself his own trade, who takes out his boat at sunrise to fish, returns, has his breakfast and is on the job at 7:30. During his evenings he built his own home. He talked radio to me the other day. "I want to hear good things when I get my radio receiver, things I have never heard before, things that will help me to know." Is he going to hear these things?

These are my examples. I could duplicate them many times. Seeking, reaching minds are clutching tightly at what little has been given to them already. Closed minds have opened a little mite to the value of the offerings.

The miracles of yesterday are to-day's luxuries, to-morrow's necessities. Mute lips are learning to speak, blind eyes to see, deaf ears to hear and brains, stupefied, stunted, starved, have in their turn a right to demand and receive. The motion picture and the call of the great war have lifted them out of the cellar of their confinement, and frail leaves are even now opening up to the sun. Radio must cultivate and water them.

# Construction of Tuned Intermediate Transformers

Continued from page three

number of turns. The first condenser was 3.9 per cent larger than the second, and the third was 6.8 per cent smaller.

Now, in order that the circuits be tuned to the same frequency, it is required the product of the capacity and the inductance be the same for all. But the inductance of a coil is very nearly proportional to the square of the number of turns. Hence, for small changes in the turns the required change in the turns is one-half the percentage deviation of the condenser from the mean. That is, the winding across which the first condenser is connected should have 1.95 per cent fewer turns than 1,000, or 980 turns; and the winding across which the third is connected should have 3.4 per cent greater number of turns than 1,000, or 1,034 turns.

### Precautions to Take in Winding

In winding both the primary and secondary it is important that a certain tension be exerted on the wire so that the coils will not bulk too much. That is, the windings should be firm and not spongy. It is also important that the same tension be exerted for all the coils, or the distributed capacity and the inductance will be different. If these precautions are ob-

served, it is not necessary to adjust the coils any further. A closer adjustment of the tuning would be meaningless, because the capacity of the leads to the tubes and the capacity of the grid circuit differ, and the latter depends somewhat on the setting of the filament rheostat. The tuning is usually close enough.

If wooden spools are used, the tuning condensers may be measured before mounting, which is done after the spools have been wound. The same pressure should be used on the mounting screws for all the condensers, because the pressure exerted on the screws will change the capacity.

### Method of Winding Coils

It is a very tedious procedure to wind these coils by hand. Hence some kind of winding jig should be used. The simplest jig to use and one which is nearly always available, is one made of a hand drill, as is illustrated in Fig. 4. The drill is placed horizontally in a vice and the coil to be wound is placed in the chuck in the most convenient manner. The wire spool is placed on a rod placed parallel to the axis of the drill. A brake of some kind should

be provided on the spool so it is dead beat, that is, so it stops as soon as the drill stops, or there will be no end of trouble due to kinking of the wire. The chucking of the spools depends on the kind of spool used. If a wooden spool, a rod driven through the center hole will do nicely. If the other type has been selected a strip of brass or composition in which holes have been drilled to fit over the binding posts may be used. A long screw through a hole half way between these may be used for insertion into the drill chuck.

The best way to keep track of the number of turns is to use a revolution counter. But a fairly good substitute is to determine the gear ratio of the hand drill and then count the number of turns of the handle. This part of the work is important and is rather trying.

The number of turns in each of the primary windings should be about 225. The basic number in the secondaries should be 1,000, except as modified as suggested above.

Start the winding by connecting the wire on the spool to the terminal wire on bind-

ing post P. Make a neat joint, solder, tuck away in the corner of winding space and cover with a little beeswax. When the required number of turns have been put on for the primary, cut the wire and connect and solder as before to terminal wire on binding post B. Next put a couple of layers of paper, preferably paraffined, over the primary. Then fasten the secondary on in the same manner, beginning with terminal marked F. Over the secondary put a layer or two of paper of the same kind as was used between the windings. Over this a layer of some stronger material, such as bookbinders' cloth, of a color to match the color of the spool. This completes the transformer except for the mounting angles.

In the case of the wooden spools the mounting angles are simply fastened to the form by means of small wood screws, as shown in Fig. 1. In the other case one of the long screws used to hold the form together may be removed, if done carefully, and the mounting angles placed under the head and the nut. In either case the appearance of the finished transformer will be like that shown in Fig. 1, except in the hard rubber composition case the tuning condenser is not visible on the outside.

### Grand Street Boys' Dinner From WFBH

The seventh annual dinner of the Grand Street Boys' Association, Inc., will be held this evening, Washington's Birthday, at the Hotel Commodore. An attendance of 4,000 is expected at the affair, comprising members of the political, commercial and professional worlds. Judge Max S. Levine, president of the Grand Street Boys' Association, will act as toastmaster at the dinner. Several gentlemen of prominence will make addresses, including United States Senator James W. Wadsworth Jr., Colonel Theodore Roosevelt, the Hon. James J. Walker and Acting Mayor William T. Collins. The speeches will be broadcast at 10:30 p. m. over station WFBH.

### Case Glee Club Concert Monday Night From WTAM

Twenty-four alumni societies of the Case School of Applied Science will meet at the same time in twenty-four widely scattered cities on February 23, and all will be entertained by the same Case Glee Club concert. Thousands of other Case alumni who remain at home will also hear the "Alma Mater" sung by their successors in the school. WTAM, broadcasting station of the Willard Storage Battery Company, Cleveland, has arranged with Case School of Applied Science to broadcast the glee club in connection with the regular Monday night concert.

### Alleged Infringer Enjoined

Judge Albert L. Reeves, of the United States District Court for the Western District of Missouri, has granted an injunction to Charles Freshman Company, Inc. of New York City, against the American Radio Manufacturing Company, of Kansas City, Mo., restraining the latter from using the word "Masterpiece" and from offering for sale radio receiving sets similar to the Freshman Masterpiece, and from offering to supply as the Freshman product any radio receiving set or part thereof which is not actually the genuine product of the plaintiff.

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# The Radio Beginners' Series

By R. P. Clarkson  
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THE idea of a coil is that it forms an opposition to the flow of oscillating current because of the building up and collapsing of the magnetic field that always surrounds anything which carries current. It forms no opposition to direct or continuous current except at the very start of the flow, because the field is built up once for all. No energy is used or required in field changes because there are no changes. A coil is therefore a "choke" for radio frequency just as a condenser "blocks" the passage of direct current. Whenever you want radio frequency to follow one of two paths and direct current to follow the other you can divide them by putting a radio frequency choke in one path and a direct current choke in the other.

Such an arrangement may well be required, or, at least, may be desirable in the plate circuit of a detector, especially of the Weagant divided circuit type, where the "B" battery circuit and the feed back

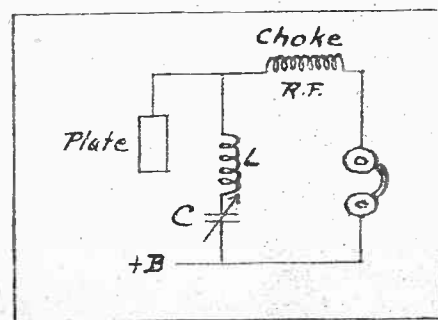


Fig. 2: How radio frequency and audio frequency choke coils are employed

circuit are separate, as in Figure 1 and Figure 2.

Figure 2 shows the plate circuit of a detector. In the plate of the detector is the rectified signal, an audio frequency component, a pulsating direct current from the B battery. There is also a radio frequency component which has leaked by the tube, partly by reason of the fact that the grid to plate path is just a condenser to radio frequency. It is the radio frequency component which is fed back to the grid circuit by means of the tickler coil or by means of tuning the plate circuit with a variometer or a tuned inductance of any kind.

Figure 2 shows the plate circuit of a regenerative detector according to the Weagant X circuit. The coil L may be

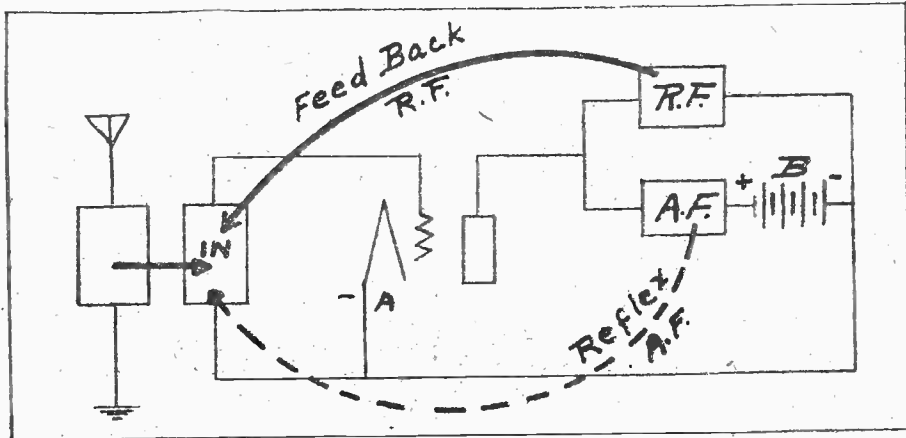


Fig. 1: The difference between reflex and regeneration

a separate coil or it may be the whole or a portion of the primary coil, as in some forms of the Reinartz. Condenser C is in series with it and tunes the plate circuit with reference to the radio frequency component, so that the plate and grid circuits approach the condition known as resonance, where the tube gives its best volume and its greatest selectivity and sensitivity. This condenser C blocks the B battery voltage from reaching the plate and no direct current will pass through it.

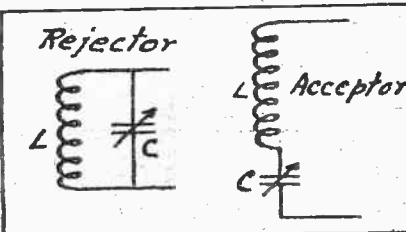


Fig. 3: An illustration of parallel and series resonance

A parallel circuit is provided for the headphones, and in this circuit the B battery current flows. A radio frequency choke coil may be inserted in series with the phones and no R.F. current can pass

through that direction. In this case, of course, the terminal of the R.F. circuit may be connected direct to minus filament instead of to positive "B" battery, as the path through the batteries is of no advantage to the R.F.

Such a choke usually consists of from 250 to 500 turns of small wire, about No. 26 or No. 28 wound on a 2 or 3 inch form. This is a high resistance or reactance path to R.F., but amounts to only a small proportion of the D.C. resistance of the receivers for the B current.

## Rejector Circuit

Sometimes in reflex sets where the A.F. and the R.F. are inextricably mixed up in various parts of the circuit, they can be routed correctly by means of condensers and R.F. chokes, and a set otherwise a failure may be made to operate well. Such a device is not common, but it is met with frequently enough to deserve some study and experimentation. Turning the choke, of course, will effectively block certain undesired frequencies. In such case the coil is usually of less turns, a condenser is connected in parallel with it for tuning, and the whole thing is given the high sounding name of a "rejector circuit." It is used as a wave trap in a case where it is desired not to get a particular frequency; as, for example, suppose WJZ has their watch listening for 600 meters while the program is on to hear any SOS. For some reason, suppose that their own program, because of proximity of the antenna and leads, drowns out everything on the watch's set. In order to cut out their own station a rejector circuit tuned for 455 meters would be used. An "acceptance circuit" for 600 meters would not be desirable for the reason that, while it would facilitate the reception of 600 meters, it might not cut out 455 meters.

It is apparent, therefore, that a tuned coil may be tuned for the purpose of facilitating the reception of a certain frequency or for the purpose of rejecting some certain other frequency. In our radio sets we tune to receive a frequency, and because of the high resistance of that circuit to other frequencies we depend on such an arrangement to keep out other frequencies. Under some conditions, however, a specific frequency may disturb us at all times. Then we would build a rejector circuit to always cut that frequency

detector tube, and we feed back the R.F. component to build up the signal for the regenerative effect. In the reflex circuit, we do not have the tube as a detector, but as an amplifier. The plate circuit contains only R.F., and we put in a crystal usually, sometimes a tube, to rectify this R.F., that is, to get rid of the carrier wave and have simply the voice changes. This gives us A.F., which we feed back to the input and amplify again with the same tube.

Substantially, then, in both cases we have both R.F. and A.F. in the plate circuit. In the regenerative we feed back the R.F., and in the reflex we feed back the A.F. The first feed-back is shown by the full heavy line, and we ignore the dotted line. In the second case the feed-back is shown by the dotted line, and we ignore the full black line.

It is obvious, I think, that we may take the R.F. which we feed back in the regenerative circuit, and rectify it and feed it back through an audio transformer as A.F. That is, we can rectify this slight component of R.F., if we wish, on the way back to the grid circuit. The difficulty of doing it is the difficulty of making a tube act both as a detector and as an audio amplifier at the same time. We would require a separate tube for amplifying the rectified feed-back R.F., and the output of that tube would be amplified A.F. to be added to the A.F. already in the detector circuit.

An R.F. amplifying tube gives us exactly the same trouble. When we have R.F. amplification it is easy to cause the tubes to oscillate because of the feed-back action between the grid and plate wiring

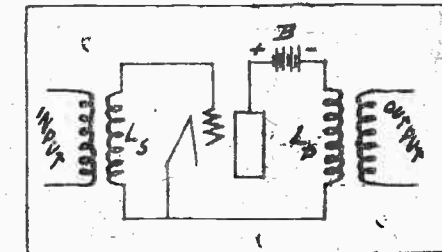


Fig. 4: A standard vacuum tube amplifier circuit

and between other parts of the grid and plate circuits. The bigger the coil in the plate circuit the easier it is to start this oscillation. To get rid of the oscillation, we can abstract from the plate circuit enough of the energy that would otherwise be fed back, so that the tube will not oscillate; or we can add resistance enough to one or the other of the circuits so that it will absorb the energy in its circuit, and there will not be enough to feed back; or we can bias the voltage on the grid that the tube will not amplify sufficiently so that the output is great enough for any energy to spare.

A tube which will give a greater output than its input will always oscillate. A tube which will not give a greater output

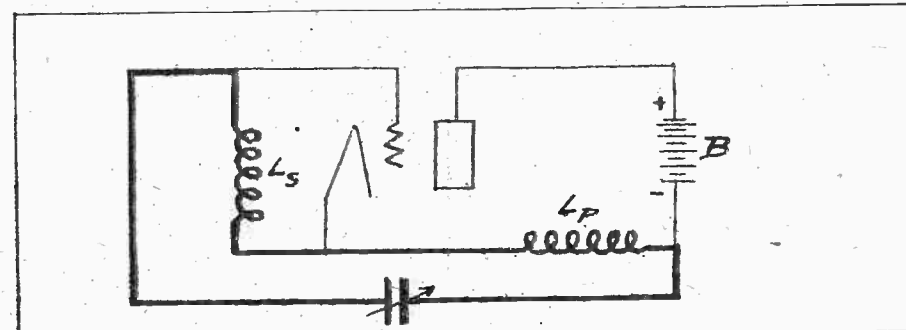


Fig. 6: A standard oscillator circuit

Let us review briefly the action of a tube. We impress on the grid certain varying voltages. These are the received signal voltages. The grid varies from minus to plus and plus to minus. That is, there are changing pressures on the grid. These changing pressures interrupt the flow of electrons to the plate. The interruptions of the stream of electrons from filament to plate constantly changes the resistance of the path of the plate current flowing from the "B" battery from the plate to the filament. When there is a maximum flow of electrons the resistance of the path from plate to filament is a minimum. When the flow of electrons is cut down, the resistance is a maximum. The changing resistance causes corresponding changes in the plate current flow. As the resistance changes with the grid voltage variations, so the plate current variations change with the grid voltage variations. We are therefore getting current variations in the plate circuit which correspond to the signal received by the grid. While the grid variations may be slight, because of the tube design, the plate current variations are much greater, as much greater as we want to make them within the limits of the tube.

It is therefore apparent that the tube output is greater than the tube input, and we could take some of the output and run it back to the input. We might even take enough from the output to drown out the input, and then the grid variations would no longer be those of the signal. In fact, the signal could be entirely disconnected and the tube would go on working, the energy being supplied by the "B" battery. We have got the tube in a condition of self-oscillation, and the grid variations now would gradually change until the frequency became the easiest frequency to pass through the plate and grid circuits.

In handling a regenerative detector, if we tune the plate too closely to resonance with the grid circuit, we feed back more and more of the output until we are feeding back so much that this oscillation takes place. Then the tube squeals, and the signal disappears.

than its input cannot oscillate by itself. An amplifier must have a greater output than input, so an amplifier will oscillate. From this rather non-technical statement of the case it is apparent that a tube which does not oscillate will not amplify. As long as we have amplifiers it seems almost certain that we will have oscillations and squeals. The squeals, however, come from wrong handling of the tubes.

What I have just said is shown in the diagrams, Figures 4, 5 and 6. In Fig. 4 is the standard tube hook-up with a certain frequency of input coupled to the coil Ls and the output coupled from the coil Lp. Now, suppose the output is coupled back again to the input. In effect it is the same as though coils Ls and Lp are coupled together magnetically as in Fig. 5. Now, as much of the output goes back into the input as the coupling and proportions of the coil allow, and the tube will oscillate.

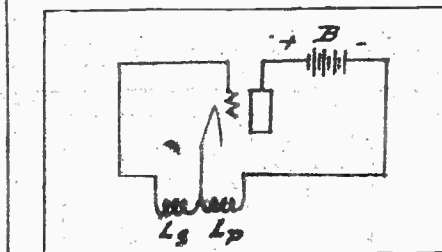
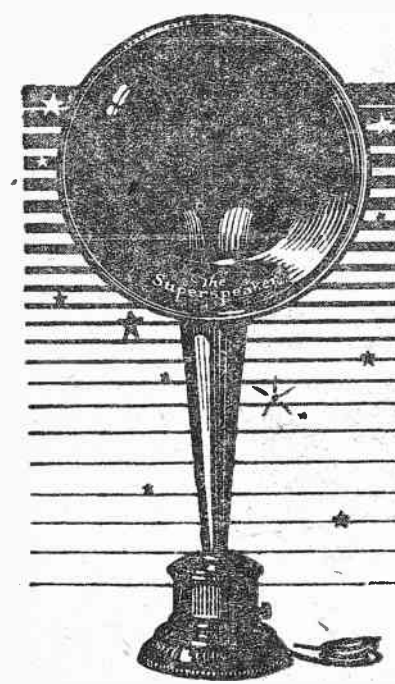


Fig. 5: A method of radio frequency feedback

To control the amount of oscillation, however, the plate and grid circuits should be tuned. If they are tuned to resonance, that is, if each circuit is tuned to the same frequency as the other, a maximum oscillation will ensue. In Fig. 6 we have this condition. In order to control the circuit Ls and Lp are no longer magnetically coupled, but both are included in a single tuned circuit with a condenser, which is shown by the heavy line. The entire circuit being tuned, the same frequency is assured in both the coils. Then one being in the grid circuit and the other in the plate circuit, we know that the tube oscillations will be at the frequency for which the condenser is set.



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## Reminiscences of A Broadcasting Pioneer

By Frank Reichmann

President, the Reichmann Company

The radio listener who now sits back and catches the music, talks and election returns has little if any, conception of the early troubles of the broadcasters, or when broadcasting was first attempted in Chicago.

Wireless broadcasting has been continuous and on a very high plane in Chicago for some four or five years, but the first broadcasting ever done here or any where else in the United States in the way of giving regular programs, took place in 1912. It was wired broadcasting, but it paved the way for the present day entertainment over the air.

Carl Winkler, a former Chicago newspaper man, and myself went into broadcasting as a business in co-operation with the old, and now defunct, Automatic Telephone System. We rented a studio on the top floor of the Westminster Building and got under way. In those days people did not take to dialing their telephone numbers and foregoing the opportunity to cuss the operator. The Automatic needed publicity and friends, and Winkler and I started out to get both, along with some financial return to ourselves.

A loud speaker was devised and installed in more than 300 homes of persons who had automatic telephones. In return, these subscribers paid us \$5 a month for the service. It certainly was service. We gave them everything from Nora Bayes and Al Jolson to talks on dehydrating garden vegetables.

### Carbon Button Relays

There were no flame microphones in those days and we had to get by as best we could with the old carbon button relays. Tubes were scarce and we had to get amplification by attaching a carbon button to each instrument in our orchestra.

But in spite of all these handicaps, the service grew in popularity. They even talked about putting special taxes on us. They didn't seem to realize that we were having plenty of troubles of our own. Included in these troubles was a growing determination of the entertainers to make us pay for their services.

The subscribers, who could stand for the broadcasting, didn't have nearly so much trouble. In fact, the installations in the homes very rarely got out of order. The bell ringer circuit of the telephone was opened and the loud speaker hooked into it. The twist of the key, closing the switch in the ringer box, established a direct connection with the studio.

If central rang on the line during a concert, a buzzing was heard above the other noises emanating from the loud speaker. The listener lifted the receiver from the hook, thereby cutting out the ringing circuit and the loud speaker and carried on his or her telephone conversation.

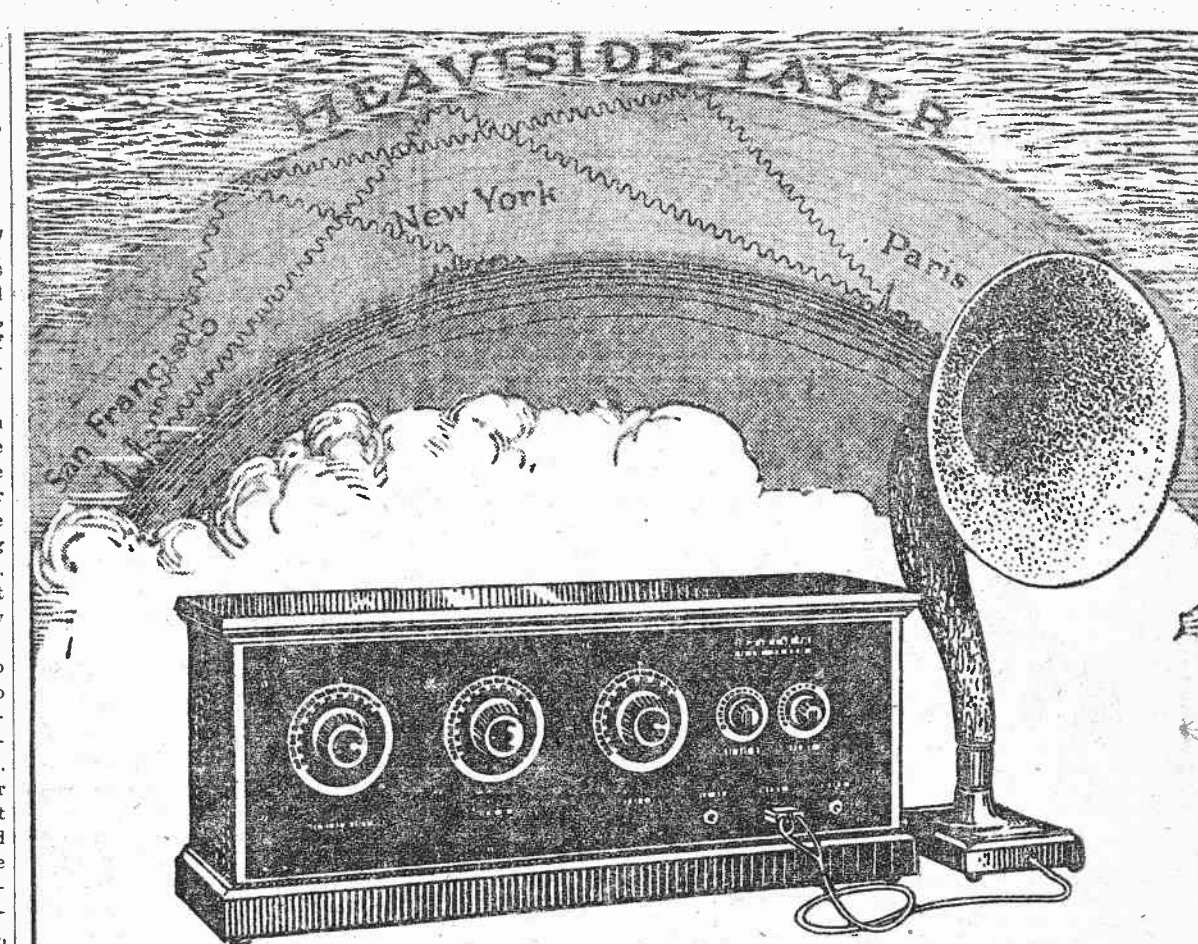
### Coin Boxes Used

We also worked a variation of this scheme by installing loud speakers in saloons and working them by means of coin boxes. Any patron of the saloon who got geared up to the stage where he could stand almost any kind of punishment, would drop a nickel in the slot. This would flash a signal to a girl who sat at a switchboard in our studio. She would plug in on the line, toss a record on the phonograph and the result would be transmitted to the saloon.

The collection of the nickels had a great deal to do with the slightly subsequent closing of America's first broadcasting station. The nickels had to be collected and in those days there were temptations confronting the collector. In fact, the beer man, the ice collector, the men who sold the free lunch and all other material to the saloonist, were all supposed to decorate the mahogany when a collection was made.

To get proper amplifications, we had to depend on a high voltage to give the initial impulse. Along in July, 1913, one of our singers who insisted he couldn't work without a make-up, got his hay whiskers tangled up with a loose connection in the apparatus, and when the fire department had done its work the building management canceled our lease.

On summer evenings I like to tune in a distant station and listen to the wails and hisses of the static. It reminds me so much of what we used to get \$5 a month for from our subscribers. And back of it all is the thought that out of this experiment has come the greatest and most popular form of entertainment.



No. 1-A Neutrodyne Receiver (illustrated above) 5-tube, Table type. Finished in Adam-Brown Mahogany. Connected with Stromberg-Carlson No. 2-A Loud Speaker. No. 3-A Head Set is included with each Receiver.

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Distant reception, scientists believe, is dependent upon the condition of the supposed existing Heaviside layer of gases in the upper atmosphere.

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Reports from users of Stromberg-Carlson radio apparatus prove that the Stromberg-Carlson Receiver and Loud Speaker exhibit exceptional DX performance with fine tone quality.

Mr. George R. Galbraith of Port Washington, New York, reports loud speaker reception of 2-BD Aberdeen, Scotland, P.T.S. Madrid, Spain, P.W.N. Havana, Cuba, KGO Oakland, California, KFI Los Angeles, California, KPO San Francisco, California, etc.

Mr. C. S. Tunwall, of Fort Dodge, Iowa, reports loud speaker reception of PRPP Paris, France and YN Lyons, France.

The splendid performance of these Receivers is due to the fact that they are scientifically designed and correctly constructed. They represent the best thought and experience of an establishment which has been manufacturing voice transmission and voice reception apparatus for 30 years.

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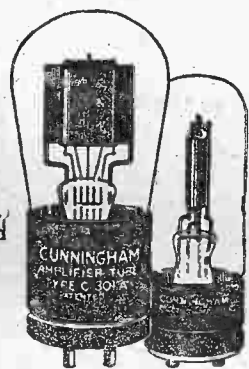
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HERALD TRIBUNE  
RADIO MAGAZINE

## 21 Stations To Broadcast Inaugural

The inaugural ceremonies to be held at Washington at noon, March 4, will be broadcast for the first time in history through a chain of stations from coast to coast. Microphones installed at different locations on the platform which is to be erected on the steps of the Capitol will "pick up" each word and carry it through a public address system, in order that those witnessing the event may hear.

In addition to serving the loud speakers of the public address system the spoken words of those taking part in the inaugural ceremonies will be transmitted by the long distance telephone lines of the American Telephone and Telegraph Company to their broadcasting station WEAH in New York City as well as the following stations: WEEI, Boston, Mass.; WJAR, Providence, R. I.; WTIC, Hartford, Conn.; WOO, Philadelphia, Pa.; WCAE, Pittsburgh, Pa.; WGR, Buffalo, N. Y.; WEAR, Cleveland, Ohio; WLW, Cincinnati, Ohio; WWJ, Detroit, Mich.; WMAQ, Chicago, Ill.; WDAF, Kansas City, Mo.; WHO, Des Moines, Iowa; WCCO, Minneapolis-St. Paul, Minn.; WSB, Atlanta, Ga.; KFI, Los Angeles, Calif.; KPO, San Francisco, Calif.; and KIX, Oakland, Calif. The proceedings will also be broadcast by the Radio Corporation of America through stations WRC, Washington, D. C.; WJZ, New York, N. Y., and WGY, Schenectady, N. Y. It is very likely that other stations will be added to this list of broadcasting stations which will transmit this notable event into the ether for the benefit of a vast radio audience who otherwise would be unable to participate.

Graham McNamee, one of WEAH's popular announcers, will give his familiar "Good morning, ladies and gentlemen of the radio audience" to the chain of stations connected with WEAH at approximately 11:15 a. m. from his position on the platform, and after a brief description of the local color about him, will introduce to his listeners the United States Marine Band, which will be heard until 11:57. At 11:58 a fanfare of trumpets will call the assemblage to order, and immediately the justices of the Supreme Court will approach the platform, followed by the Chief Justice, Cabinet members and President Coolidge.

At high noon the President momentarily ceases to hold the office of President of the United States, but at the next moment takes the oath of office for the term of four years. Following a short prayer President Coolidge will address the multitude, not only visible but invisible, and at the conclusion of his address the United States Marine Band will render "The Star-Spangled Banner," bringing the ceremonies to a close.

### Sherwood Anderson on the Air With 'The Triumph of the Egg'

A dramatic radio offering on Tuesday at 10:30 p. m. will be the presentation at WGBS of the dramatic version of "The Triumph of the Egg," by Sherwood Anderson, which the Provincetown Players are giving for a limited engagement at their Macdougall Street theater.

The main part is taken by John Huston, the eighteen-year-old son of Walter Huston, who is, incidentally, scoring a success in another Provincetown production, "Desire Under the Elms." Others in "The Triumph of the Egg" are John Taylor and Jeanie Begg.

Before the play Sherwood Anderson will give a short talk concerning the nature of the piece and similar works of his.

### Famous Violinist Joins WJZ

The management of the broadcasting division of the Radio Corporation of America announces the addition of Godfrey Ludlow, famous concert violinist, to the staff of stations WJZ and WJY, New York City. Mr. Ludlow will act as assistant to the manager in the preparation of musical broadcasts and will be heard in special WJZ and WJY recitals, accompanied by Keith McLeod, musical director of the stations, at least once a week.

### Data on a French Station

The broadcasting station of "Petit Parisien," Paris, France, radiates on 345 meters with 500 watts power. Concerts are put on the air regularly on Sunday, Tuesday, Thursday and Saturday from 9:30 to 11 p. m., Greenwich Mean Time.

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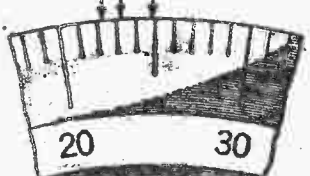
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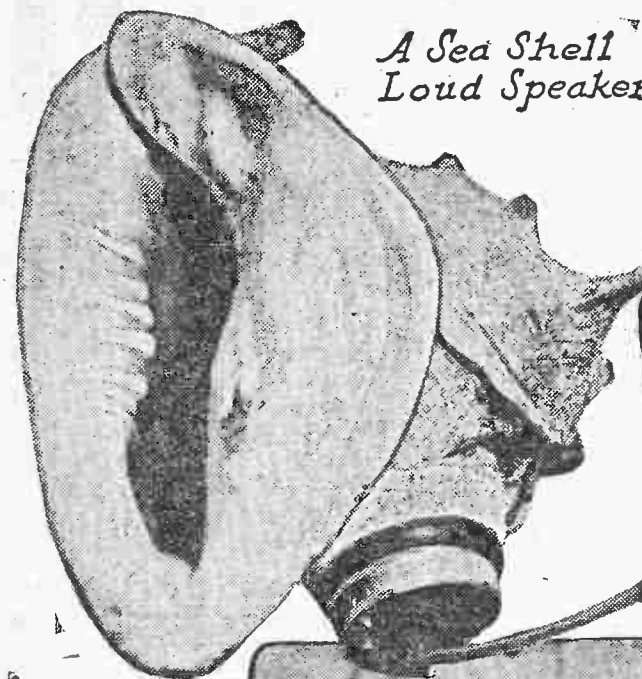
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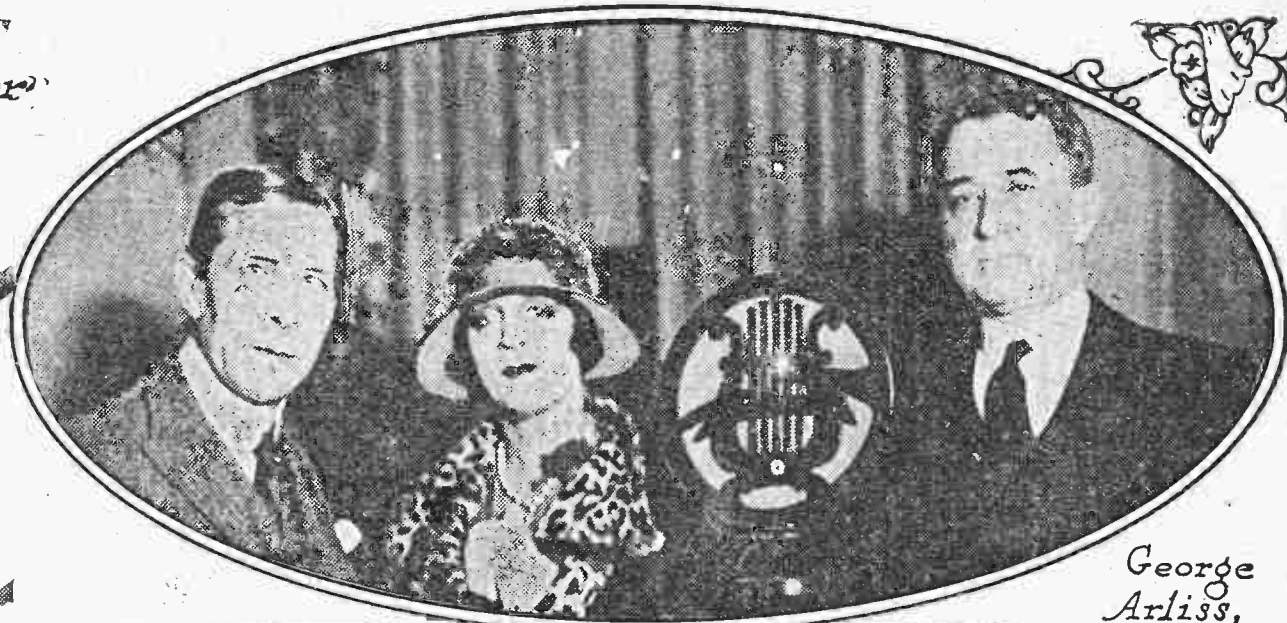
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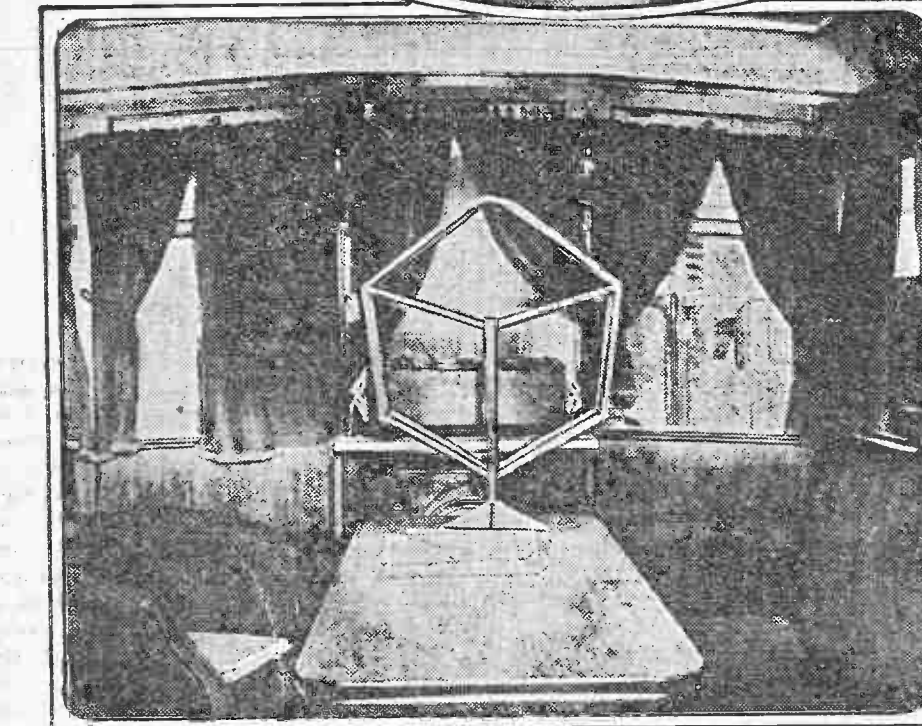
George Arliss,  
Jane Cowl  
and  
John Emerson  
Broadcast  
Appeal  
from WJZ,  
for  
Cathedral  
of St. John  
The Divine  
Fund

RIGHT  
Programs  
Broadcast  
from  
Station  
PWX,  
Havana,  
Interest  
Children  
on Distant  
Sugar  
Plantation  
Cuba

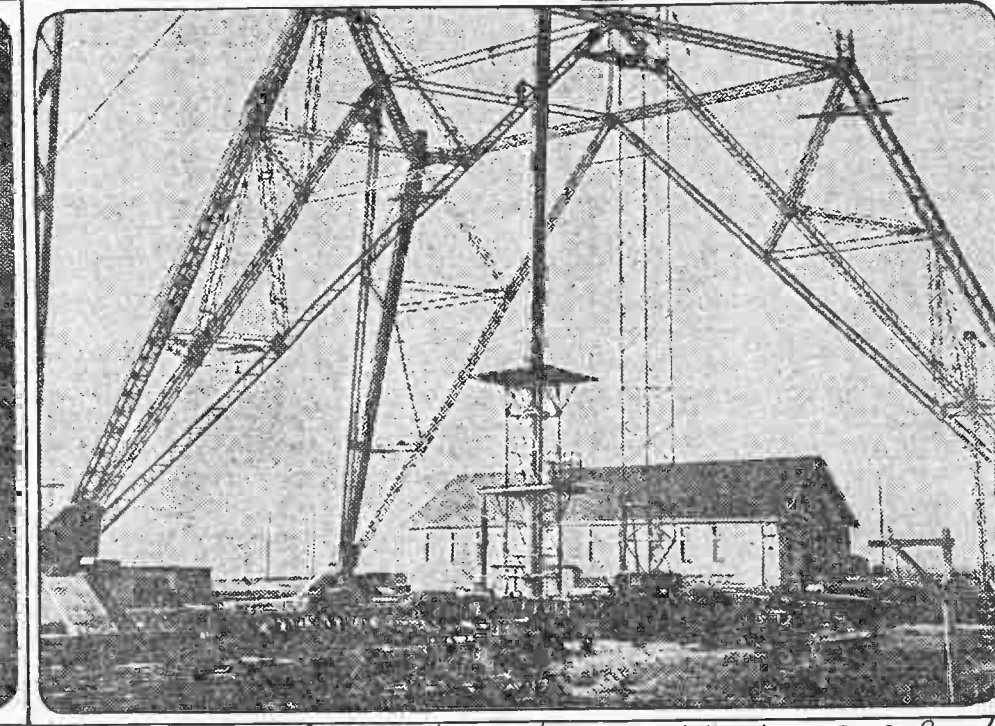
BELOW E.B.  
Corcoran of  
Washington  
D.C. and His  
Grand-  
daughter  
Listening  
in  
Cuba



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an Iron  
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# New Fields Open for Development in Science of Radio Signaling

An Address Delivered Before the American Institute of Electrical Engineers in Cleveland, Ohio

By E. F. W. ALEXANDERSON  
Chief Consulting Engineer, Radio Corporation of America

TRANSOCEANIC communication has always been the force that developed and maintained great civilizations. In classical times the great commonwealth of the Mediterranean was held together by speedy ships communicating with Rome as a center. The modern commonwealth of the Atlantic Ocean has been held together by the telegraph cable system centered in London.

The scene is now shifting and New York is becoming the financial and commercial center of the world. New York now has a well developed new system of communication reaching all parts of the world by radio. It is the growth of this world system of radio communication which I wish to bring to your attention. The Radio Corporation of America started operation in 1920, but the system of communication has already outgrown the experimental stage and become a public service on a large scale. It is difficult to convey by words the appeal to the imagination which the development and operation of this world-wide spiderweb of communication has to those engaged in it. We had to develop transmitting stations and antenna systems, high frequency alternators with accurate speed control, high speed modulation of the antenna current, high frequency insulation withstanding voltages higher than those used in any power lines, etc. Atmospheric disturbances have been conquered by an antenna system capable of receiving all the different signals from all parts of the world, concentrating the operation of the whole system in one large room in New York.

The aims of the engineers responsible for this system are largely the same as those operating a railroad: reliability, service and speed. Such service now is being rendered, but this does not mean that the development of the radio technique with relation to communication has come to a standstill any more than we have a right to say that the steam locomotive will not be replaced in time by an improved form of tractive power. It does mean, however, that one of those phases has been reached in radio communication which occurs in any engineering development, that the technique has, after a strenuous effort, caught up with the commercial requirements and has a breathing spell getting ready for new efforts. This stage was reached by the marine steam engine before it was replaced by the steam turbine. This stage also has been reached in electric power engineering. This is the period when the technical achievements of the past are capitalized and exploited. Technical development work is always done at a loss in the initial stages. If the engineering art did not have these breathing spells it could not proceed, because, in the first place, the source of financial support would dry up, and, in the second place, the engineers would be tied down with details and would not have time for the fundamental research which paves the way for the next advance.

## Broadcasting More Stable

Radio broadcasting has also within the last year settled down to a public service and a profitable field for commercial exploitation. The technique has reached such a degree of perfection that the greater part of the public is interested in radio because of the artistic enjoyment, information and education which it renders, rather than for the chances for experimentation and invention which it offers. There is, however, a large and growing group of amateurs who pursue radio for the love of the art, and the art to them is not the performance in the studio, but the technical art of radio itself. Radio has enjoyed a greater following of amateurs than any other branch of engineering, and it is the thought of these amateurs that molds the future. They are one step closer to reality than the imaginative writers like Kipling and Jules Verne, who give us glimpses of the future long before they can be realized. The amateur likes to anticipate what advances in the art may reasonably be expected within the next decade.

When we try to anticipate the next substantial advance we must first take account of what new knowledge we have acquired in the last few years which we hope to exploit. The present-day radio communication utilizes long waves. The propagation characteristics of those long waves has been thoroughly explored, and we know how much radiated energy is needed for communication over any distances day and night. We know how to build radio transmitters and antenna systems, and we have learned how to control the effect of atmospheric disturbances under practically all conditions.

The long wave follows the surface of the earth and is subject to laws of attenuation, which are by this time well understood. In the broadcast range of wave lengths, on the other hand, there is considerably more irregularity. Signals sometimes go through and sometimes not, depending upon phenomena which are not under our control. Sometimes extraordinary distances are covered with very low power.

During the last year a number of long-distance communication circuits have been introduced utilizing waves below 100 meters. Such circuits are now in operation between New York and Europe, New York and South America, and San Francisco and Hawaii. The adoption of short waves for communication over long distances is contrary to the earlier well established experience, in which it has been found that the longer the distance, the longer should be the wave length for giving reliable service. There are many indications that we are in the short wave field dealing with phenomena of wave propagation quite different from those encountered in the past. This new field of knowledge is being explored and promises to open up new and unexpected fields in radio.

**Short Waves Do Not Follow Surface**

The short waves do not follow the surface of the earth, and we have learned to launch the wave like a high-angle gunfire into space in such a way that it travels in the upper atmosphere and comes back to earth a great distance away. By traveling on this upper track the waves are not subject to the ordinary laws of

absorption. So long as we are working with earthbound waves we must use long waves for long distances, because the earth absorption of the long waves is comparatively small. When, on the other hand, we use high-angle radiation with short waves we utilize a different form of wave propagation. These new tracks in the ether are being explored by systematic research work as well as by commercial communication.

Thus a new phenomenon or law of nature has been established, though we are not yet able to give an adequate explanation. The old theory of the Heaviside layer as a conducting and reflecting surface does not fit the phenomenon, as observed, but there is a more promising theory recently advanced by Sir Joseph Lamor explaining the curvature of the wave by a change in the refractive index of space caused by the presence of electrons in the upper atmosphere.

It took many years before we mastered the technique of the earthbound waves, so that we can now count on continuous and reliable communication. The curved space radiation with short waves will undoubtedly open up new and important fields for radio. We are utilizing it already in commercial traffic, but it will probably be many years before this is as thoroughly understood.

## Possibilities of Short Waves

The short wave lengths open up not only new paths for wave propagation, but give us an almost inexhaustible scale of wave lengths, provided that we utilize it to full advantage. The following facts will make this clear. Almost all the transoceanic telegraph stations in the world are crowded into a wave length band 10,000 cycles wide. This space in the ether is utilized nearly up to its ultimate capacity, but the short wave field below 100 meters includes 10,000,000 cycles, thus there is room for a thousand times as many messages as all the long wave stations put together, and those stations are at present capable of carrying all the trans-Atlantic and trans-Pacific telegraph traffic of the world. To carry a thousand times as many messages would seem fantastic, but attempts at stating our dreams of the future in terms of

the cold facts of to-day always lead to absurdities.

As a matter of fact, we would not have a thousand times as many messages, and if we did they would be of a very different character. But we have a new tool to do things with, and we must use our imagination as to what to do with it.

Two years ago Owen D. Young, chairman of the board of directors of the Radio Corporation and of the General Electric Company, stated his conception of what radio ought to accomplish. He wished to press a key and—zip!—a whole page of a newspaper would be flashed across the ocean. Acting upon this lead, we went ahead to see what could be done, and in less than two years we had demonstrated picture transmission across the ocean. There is a long way between the transmission of a picture and the flashing of a whole newspaper, but the art is rapidly moving in that direction.

## Advances in Past

An inspiring thought is always many years ahead of the event. As an illustration of this I wish to mention an important advance in radio which was conceived of long ago and has now been realized. In 1912 I visited the laboratory of Mr. John Hays Hammond Jr. to make tests of two alternators of 100,000 cycles which he had purchased and installed, and we had some, to me, very inspiring conversations. We discussed the modulation of the antenna current, trans-Atlantic telegraphy and telephony, control of airplanes and submarines, and Mr. Hammond outlined his idea of taking a variety of messages and scrambling them together, superimposing them on one transmitter and sending them forth by radio as a composite message, and then again unscrambling them into separate messages.

Now, after twelve years, we find a paper presented to the Institute of Radio Engineers by Beverage, Hansell and Dean which tells just how this is done and explains the theory of the apparatus and its operation.

This is what happened in the mean time: The fight against atmospheric disturbances and static has led us to build on Long Island a central receiving station with an antenna system consisting of two antennas, ten miles long, joined by a transmission line. This seems like a large equipment, but its cost is insignificant in comparison with the service it renders. This antenna system, known as the Beverage-Rice system, eliminates practically all the static and intercepts on one antenna all the signals from all the stations in Europe. These signals are then automatically separated in more than a dozen receiving sets and sent by wire lines to the operating room in New York.

## Eliminating Static

There is only one kind of disturbance that this system does not practically eliminate, and that is a thunder storm in the neighborhood of the station right on the line from which the signals come. To insure service even in this contingency, a similar large antenna system was built at Belfast, Me., which would be immune to a thunder storm on Long Island, whereas a station on Long Island would be only slightly affected by a thunder storm in Maine. But the problem was how to get the signal down from Maine to Long Island. The authors of this recent paper show how, by much painstaking work and many ingenious new inventions, this has been done, thereby realizing Hammond's dreams of years ago. The signals from Europe are picked out of the ether in Maine, scrambled together and sent out by a single transmitter. This composite signal is then received on Long Island and unscrambled into a dozen signals, which are fed into the long wave receiving sets, where they go through the usual process of detection and transmission to New York. The signals so reproduced are exact replicas of the original signals, so that the operators in New York do not know whether they have received the original signals or the scrambled and unscrambled signals via Belfast, Me.

"Roxy" (S. L. Rothafel) and Raymond Francis Yates have written a book on modern broadcasting which is scheduled for publication about March 15. It should "go big" with the radio audience, which doubtless will rise from its invisibility long enough to purchase many copies.

The publicity man for a nearby broadcasting station supplies a new one—he describes a refurbished studio as "palatial." This strikes us as "delicious."

## Answers to Questions

### Home-Made Loud Speaker

Since the publication of the description of a cone-type loud speaker in the Herald Tribune Radio Magazine of January 4, by Ralph C. Powell Jr., a number of readers have written for further details of its construction. The speaker, while comparatively simple to construct when the idea is understood, was difficult to describe. Answers to the many questions are included in the following information:

Most of those who wrote experienced trouble in changing the Baldwin unit for use with the cone. Accordingly the drawing accompanying this second description is made more in detail. In order to understand the action of the cone it is necessary to examine the unit. It consists of a circular permanent magnet at the ends of which are attached two U-shaped pieces of iron which form the pole pieces. Within

side or loosening the screw which holds it to the support.

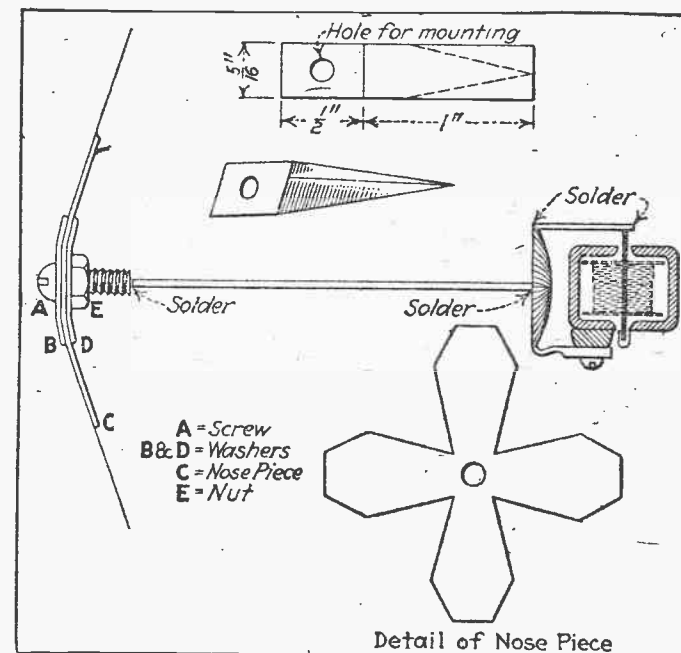
### C Battery Connections

A. E. Cohen—Which terminal of a C battery is connected to the transformer and which to the filament? Answer—The negative to the grid and the positive to the filament.

### Reception on Short Waves

F. B. Hartley—The writer notices there are a number of prominent radio stations operating on wave lengths below 100 meters. Is there any advantage in building a receiver especially for the reception of such stations?

Answer—At present there are only two broadcasting stations operating on these bands, namely, KDKA and WGY. Since these stations broadcast the same program on their regular assigned wave length there is no particular advantage in building a



Constructional data on cone-type loud speakers

these two U-shaped pieces a coil is mounted which forms the winding of the unit. A slot is provided through the center of the coil in which is mounted a thin steel armature about one-half an inch square. This is supported by two pins in the center, enabling it to move back and forth like a seesaw. A pin running to the diaphragm of the unit holds this armature in the center between the two pole pieces. A current passing through the coil causes the armature to vibrate and in turn vibrates the diaphragm, which makes the sounds audible.

This same principle is used in the speaker in question except the vibration of the armature, instead of being impressed on the diaphragm directly, is used to operate the movable arm referred to in the previous description, and this in turn operates the cone.

Fig. 1 shows more clearly the construction of the movable arm. A piece of No. 28 sheet brass, 5/16 by 1 1/2 inches, is cut. One-half inch from one end it is bent so as to form a right angle. On the long leg one-half inch from the bend cut so that it tapers to a point at the end of the long leg. Drill a one-eighth inch hole in the center of the short leg and pinch the sides of the long leg together, V-shape. This piece is then fastened to the end of the permanent magnet through the screw provided so that the long leg extends toward the center of the unit. The end should come just beyond the end of the pole piece. The arm may then be fastened to the armature by means of a pin as shown in Fig. 2. The remainder of the construction is described fully in the previous article.

Some readers ask if units other than the Baldwin may be employed. There are a number of loud speakers in the market, such as the Bristol Audiphone and Western Electric horn, which employ the same type of unit, and these may be used after being changed in the manner described.

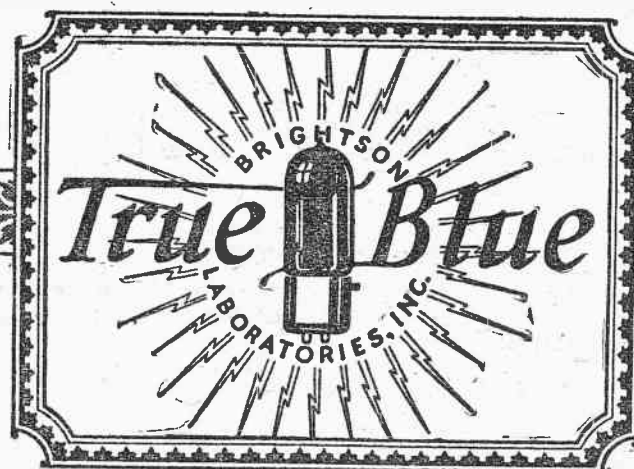
The brass piece in the nose of the cone is used only to add stiffness to the cone at the point where the power is applied.

Blotting paper was used for the cone because it is readily available. Any kind of heavy paper may be used for the cone, such as that used as the cover of pamphlets or parchment. Changes in temperature will cause the cone to expand and contract and thus change the adjustment of the unit. This may usually be compensated for by swinging the unit to one

side or loosening the screw which holds it to the support.

Constructional details of a capacity ground connection

mica or some other insulating material. A piece of copper foil is then rapped around the dielectric and fastened securely by binding with wire. This is then covered with wax. With such a ground connection a medium size antenna must be used in order that the fundamental wave length of the antenna may not be too low.



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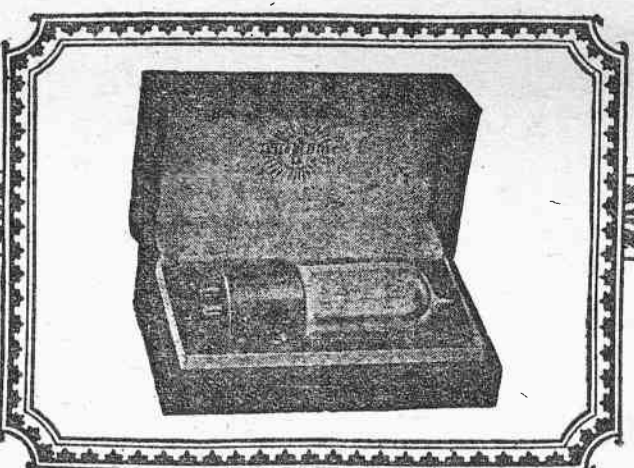
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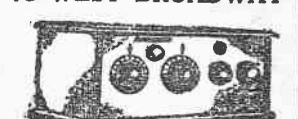
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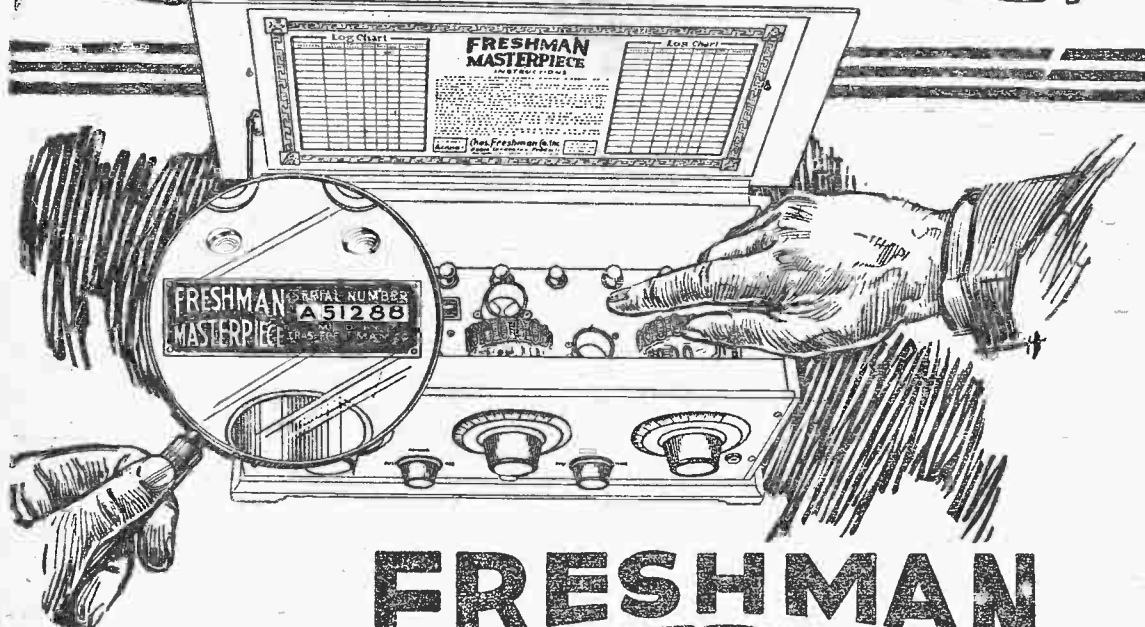
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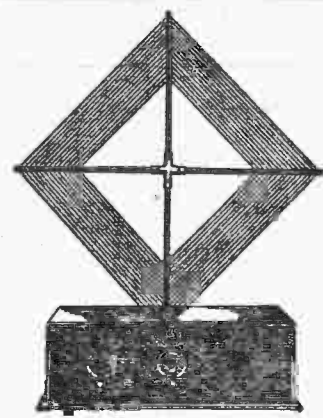
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## Eclipse Radio Data Disappoint

Bureau of Standards Scientists Find Nothing New on Broadcast Band

By THOMAS STEVENSON

SCIENTISTS at the Bureau of Standards are rather disappointed with the results of observations on the effect of the eclipse on radio transmission and reception. Their tests on the broadcast band between 200 and 545 meters during the period of total eclipse revealed nothing which could not occur and has not occurred on any other day.

Tests at the Bellevue Laboratory, however, on high frequencies or low wave lengths were different. Several unusual things happened on these attributed to the eclipse.

At the Bureau of Standards Dr. C. B. Jolliffe and Dr. T. Parkinson had charge of the observations. Dr. Jolliffe observed particularly for fading effects, while Dr. Parkinson sought to determine the effect of totality on directional qualities.

Dr. Jolliffe listened in with a powerful set with which recording was accomplished by a galvanometer. Observations started at 7:30 and lasted until 11 a. m. two days before and two days after the eclipse.

"Apparently nothing happened on the day of the eclipse that could not have happened any other day," says Dr. Jolliffe. "There was a lot of long period and rapid fading which is characteristic of some broadcasting stations."

"Just before the period of totality there was a break in signal reception which may have been due to the eclipse. I am inclined, however, to think it was due to transmission troubles, or else everybody at the broadcasting station went out to watch the eclipse."

Tests After Eclipse

"The record on the day following the eclipse shows what might have happened during the eclipse. The signal intensity went up and down, there was fading all the way through and every other condition which we might have expected during the eclipse."

"There was no conspicuous rise or drop in signal intensity," says Dr. Parkinson. The weather was quite cloudy on the day of the eclipse, which might be responsible. I listened in on Springfield, and, strange to say, there were greater variations on the day after than on the day of the eclipse."

Dr. Parkinson asserts the record on directional effects was not complete enough to make a prediction as to whether the eclipse had any effect on this phase or not.

According to a report to the Bureau of Standards from G. W. Pickard, who initiated the eclipse observations, a big increase in signal intensity for nine minutes during the eclipse was noted. Mr. Pickard was at Ithaca and was taking observations on the signals of WGR, Buffalo. It is believed that the rise was due to the eclipse.

Dr. Taylor's Observations

Dr. A. H. Taylor, in charge of the Bellevue laboratory, observed the high frequencies and reports some rather startling effects.

"I took some observations on two English stations," says Dr. Taylor, "and found nothing that could be called peculiar about eclipse effects." "For a short time during the eclipse I listened in on Cincinnati. During the eclipse the signal intensity increased ten-fold and after the eclipse the signals faded completely out."

"However, out at Bellevue, we did not feel that anything of a striking nature would occur during the eclipse. We were convinced that if

anything happened it would be on the high frequencies.

"On the high frequencies there was a complete change over from daylight to dark during the eclipse. On the band between seventy-five and eighty meters the signals in some cases were a hundred times stronger during the eclipse than just before or after."

Dr. Taylor reports a very interesting change in conditions on 40 meters as compared with 70. It seems that on 70 meters strong fading is experienced in the day time with strong signals at night, with exactly opposite conditions on 40 meters.

During the eclipse the Bellevue laboratory had two transmitters in operation, one of 7 1/2 meters, with 9,000 watts in the antenna, and the other on 40 meters, with 100 watts in the antenna.

"Just prior to the beginning of the eclipse," says Dr. Taylor, "the amateur stations on the band, from 75 to 80 meters, were rolling in from everywhere and distant stations were coming in particularly well. There were one or two 40-meter stations coming in, but only from great distances. During the eclipse the 75 to 80 meter stations came in very much stronger, and particularly those cutting through the eclipse band. After the eclipse the signals of these stations went way down."

Forty-Meter Tests

"On 40 meters there wasn't much doing before the eclipse. The signals of most stations were as dead as a door nail. After the eclipse the 40-meter stations began to come in finely."

Dr. Taylor said there is a station at Hartford on 54 meters with which he has worked every day. During the eclipse he could not pick up the signals of this station, but they were heard in Florida very well.

It seems that the greater the distance the better the reception on the high frequencies. In other words, the signals of a 40-meter station can be heard much better at 5,000 than at 500 miles.

As an example, Dr. Taylor asserts that the signals of the 100-watt transmitter working on 40 meters were picked up at Santiago, while they could not be heard at Savannah. Another interesting fact reported by Dr. Taylor is that the signals of the 100-watt transmitter on 40 meters were picked up just as well at Santiago as were those of the 9,000 watts transmitted on 7 1/2 meters.

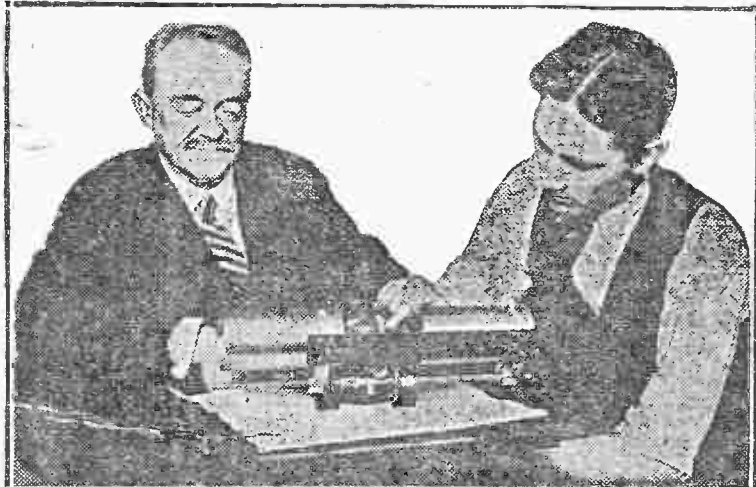
It is Dr. Taylor's conclusion that the eclipse was responsible for a complete change over from daylight to night conditions on the high frequencies.

(Copyright, 1925.)

To Eliminate Howls

The frame of an audio-frequency transformer may be grounded to rid the set of howls caused by magnetic feedback or intercapacity action. These eddy currents are short-circuited to the ground.

## Compact Radio Picture Sending Device



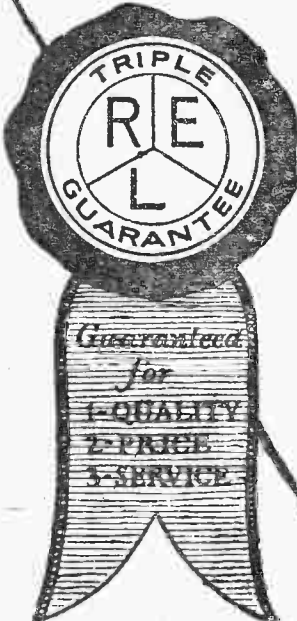
In the picture above are shown, from left to right, C. Francis Jenkins, of Washington, D. C., and his assistant, J. Robinson, who have developed the compact device seen in the foreground for sending pictures by radio or wire. It is stated that the new apparatus will send one picture while receiving another from a distant station.

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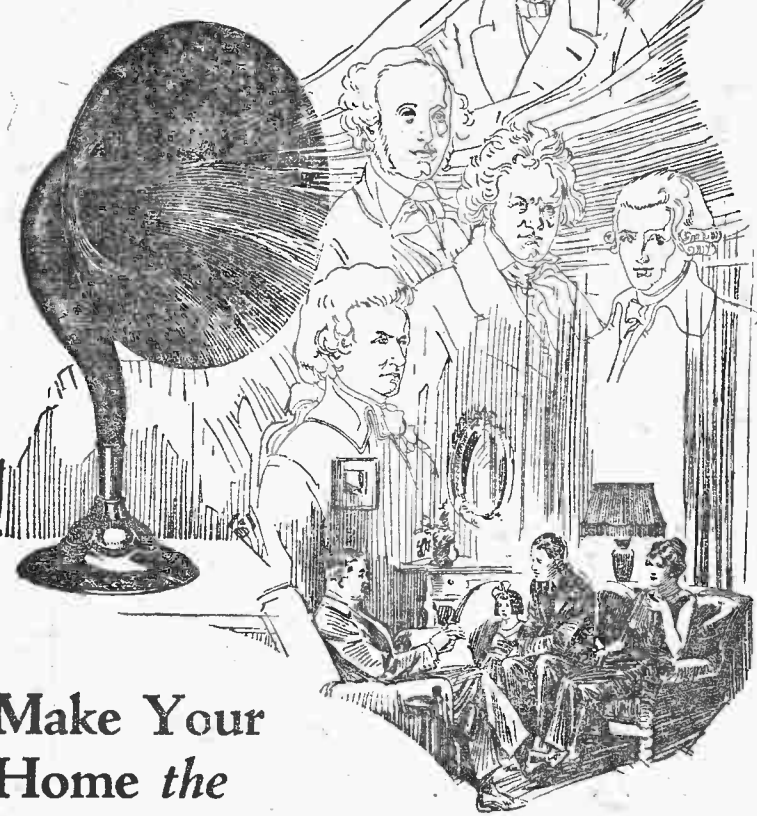
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### Wholesale Distributors:

H. P. Baran & Co., 247 Park Ave.  
Royal Eastern Supply Co., 114 W. 27th St.  
S. E. Pearson & Co., 10 E. 39th St.  
Mfd. by RADIOVATIVE CORPORATION, 21st Ave. and 53rd St., Bklyn.

## WMCA, New York, Goes On the Air

Broadway's Great White Way is to have an official broadcasting station of its own, to provide a nightly rendezvous for celebrated stars of stage, screen and concert platform.

This evening, at 6:30 o'clock, the new station will get under way officially, and the program marking its dedication will extend until midnight or later. A host of Broadway's leading figures have accepted invitations to be present and participate in the functions marking the inaugural.

The event promises to be memorable in the minds of radio listeners. The new station is WMCA, owned and managed by the Hotel McAlpin, at Broadway and Thirty-fourth Street, New York. It will operate on a wavelength of 428.6 meters and will be on the air approximately fifty hours a week. Its keynote will be entertainment.

To-night there will be four masters of ceremonies—Ivan S. Cobb, the journalist and author; Walter Catlett, star of "Lady, Be Good"; Harry Hirschfeld, father of Abie Kabibble and president of the Cheese Club, and Ed Squires, the globe-trotting announcer.

### Radio Announcers

#### To Form Club

At the suggestion of Dutee Wilcox Flint, George Spink, director of entertainment for Station WJEF, Providence, R. I., is organizing a club to be known as the "Radio Announcers of America." The first meeting will be held at the Biltmore Hotel in Providence on March 2. Announcers of the United States and Canada will be invited, among them S. L. Rothafel ("Roxy"), director of the Capitol Theater, New York; Graham McNamee, announcer of Station WJEF, and others well known to fans throughout the country.

Prominent announcers will be asked to serve on the board of officers of the club. General meetings of all announcers will be held in the United States and Canada from time to time to discuss the betterment of radio programs, their amusement and educational features.

A cordial invitation to become charter members of the "Radio Announcers of America" is extended to announcers of all stations throughout the United States and Canada. Details of the organization can be secured by writing Dutee Wilcox Flint, Station WJEF, Providence, R. I.

### To-night, "Barber of Seville," Second Radio-Adapted Opera

Station WGBS in conjunction with Corvire D'America, Italian newspaper, will broadcast Rossini's opera "Barbieri di Siviglia" to-night. So enthusiastic was the response to the first operatic radio presentation that this second popular opera was planned to continue the operatic series started by WGBS and "The Corvire." It is an entirely new venture, for while a few operas have been broadcast from opera houses, in most cases these results have not been as satisfactory as the specially arranged radio version of "Cavalleria" broadcast by WGBS with complete chorus, orchestra and well-known singers. "Barbieri" will likewise be broadcast in similar manner.

The famous role of Figaro in "Barbieri" will be sung by Lucilio Spada; Rosalinda Rudko, soprano, will sing Rosina; Giuseppe Barsotti, tenor, will be the Count Almaviva; Giuseppe Lapuma, basso, Don Bartolo; Ivan Steschenko, comic basso, Don Basilio, and Giuseppina Lapuma, mezzo-soprano, a minor role.

The opera will be given under the direction of Cesare Soderi.

### Pa. University Day From WIP

Back in 1826 the University of Pennsylvania inaugurated the custom of celebrating Washington's Birthday by their first University Day, which is an exercise for the remembrance of our first President and for the conferring of honorary degrees.

Now in 1925 the custom still prevails, and this year the exercise will be held on February 23, as the 22d falls on Sunday. The Academy of Music in Philadelphia will be used, and Station WIP has run private lines to their main station.

The principal speaker will be Dr. Ray Lyman Wilbur, president of Stanford University, and Drs. Wilbur and Hubert Wood, Secretary of the Interior, will receive the honorary degree of Doctor of Laws.

The University of Pennsylvania Band, Orchestra and Glee Club will furnish the music. The ceremonies begin at 10:30 a. m.

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## RADION

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## Broadcasting as It Is To-day

### Decadence of Jazz and Desire for Better Music and Entertainment Noted by an Authority

A T A RADIO luncheon given by the Merchants' Association at the Hotel Astor, New York City, on February 17, John A. Holman, manager of broadcasting for the American Telephone and Telegraph Company, delivered an informal address on modern broadcasting, of which the following is an abstract:

Broadcasting, as we know it to-day, is a husky youngster about three years old. It has brought to our firesides the personalities of Woodrow Wilson, Warren G. Harding, Calvin Coolidge, David Lloyd George, John J. Pershing, Robert Cecil and many others. It has brought us John McCormack and Mario Chamlee.

It has made life worth living to the shut-in and it has diverted the mind of the shell shocked from his troubles. We all know of the thoroughly fine work that has been done by "Roxy" and his "gang" from the Capitol Theater in connection with the installation of headsets for the disabled soldiers, sailors and marines. Through "Roxy's" efforts radio has been made available to every disabled soldier, sailor and marine in the hospitals in the East.

Let us discuss for a moment the function of broadcasting throughout the United States. As against 36,500,000 who ride in automobiles, 38,500,000 who listen to phonographs and 20,000,000 who attend the moving picture theaters, there are 20,000,000 in the United States who listen in regularly on the radio; 3,750,000 have receiving sets, with an average of 5.4 listeners to each set. This radio development covered a period of three years as compared with twenty years in the cases of the automobile, the phonograph and the "movie."

The function of broadcasters throughout the United States is to provide this radio audience of 20,000,000 with broadcast programs. Twelve hundred stations have been licensed up to this time by the government, of which 648, or 53 per cent, have discontinued operating, generally for economic reasons. Five hundred and fifty-four are still active, of which 100 realize their responsibility to the public from the standpoints of quality of program and transmission.

The radio audience There are eighteen stations in the New York area. Each time you tune in on WJEF you may be one of a potential audience of 2,750,000 souls in this broadcasting area. Assuming that only one in four of you are at the time listening to WJEF, you will join the WJEF family circle of 700,000 listeners. Of these 700,000 listeners 51 per cent own their own homes, 45 per cent own autos, 50 per cent own pianos and 73 per cent own phonographs.

Into your intimate home life we come each night without stopping to knock at your door. We realize the full measure of responsibility which your hospitality places on our shoulders. We are striving to justify your faith by serving you clean, wholesome programs—presentations of a high character, inspirational, educational as well as entertaining.

Many of you, perhaps, on your trips away from home have listened in with a friend and were transported back for the moment to your own firesides. You heard WJEF's program. I'll tell you how that happened.

The radio audience throughout the country, realizing that most good things come from New York, has asked that arrangements be made whereby they may be able to enjoy the same advantages as you do by listening to the same program coming from their local station. By listening to their local station atmospheric disturbance is largely eliminated.

To serve this wish we are arranging experimentally to make use of certain of our long-distance telephone lines when they are not required for the transmission of telephone calls. Broadcasting stations in eighteen cities east of the Mississippi are being connected at their request by these specially engineered long-distance lines to Station WJEF.

When this project is completed any one of us talking into this microphone will project his personality, in one breath, to the firesides and into the hearts of 12,500,000 people.

Analysis of Letters Your letters to WJEF are analyzed very carefully and they are of great value to us in planning your future programs. Fifty-four thousand letters received in January, 1925, as compared with a monthly average of

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