

# Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF. & DOM. OF CANADA

Vol. IX

Copyright 1924  
By Radio Digest Publishing Co.

SATURDAY, JUNE 14, 1924

No. 10

## DEATH-RAY NOT FOR U.S.

### ZENITH TELLS ABOUT NEW SUPER STATION

SELLS OUT PLANT IN EDGE-  
WATER BEACH HOTEL

WDAP Becomes WGN—Ex-WGN-  
WJAZ Changes Hands—Zenith  
Station After New Location

CHICAGO.—Final ramifications of the transaction by which the Chicago Tribune has taken over the Drake hotel station, WDAP, changing its call to WGN and wave to 370 meters, have just been made public. The announcement checks in all respects the rumor story given two weeks ago by Radio Digest.

The Chicago Tribune was merely supervising the programs of the Zenith-Edgewater Beach hotel station, formerly known as WJAZ, it became known.

But the surprise of it all, coming simultaneous with news of the Tribune buying Station WDAP, is that The Chicago Radio Laboratory has sold out its interest in Station ex-WGN-WJAZ of the Edgewater Beach hotel.

#### Zenith Builds Super Station

The Chicago Radio Laboratory, manufacturer of Zenith Radio receivers, announces that it will shortly begin the erection of a super powered broadcast station on the northwest outskirts of Chicago, far enough removed from residence sections to prevent it from being difficult to tune out. Elaborate plans call for a magnificent studio atop the McCormick building, in Chicago's loop, where the Zenith offices are now located.

The call "WJAZ" is still held by the Zenith company and will be used for the new plant when completed.



### NAVY CLAIMS DEADLY WAVE OF NO VALUE

But Reports Say Prof. H. G.  
Matthews' Device Kills  
Mice and Stops Motors

#### Army at Similar Scheme

Uncle Sam Watches with Interest  
as France and England Strug-  
gle for Mysterious Invention

(By Special Correspondence)

WASHINGTON. — Invisible, death-dealing electric rays, close akin to the electromagnetic waves of Radio, mean nothing to the U. S. Government, even though Professor H. Grindell Matthews has caused a bitter controversy between France and England as to which country will have the first option at purchasing his mysterious invention.

Professor Matthews came to the fore recently when he claimed that America was bidding for his device, purported to be

(Continued on page 4)



Vivian Duncan (center) and her equally famous sister, Rosetta, recently started an independent music publishing business and will Radio all their hits. Both sisters were heard at the WQJ opening. Rosaline Green (left) is the new eighteen-year-old lead for WGY Players and has green eyes and brown hair. Rosemary Hughes (right) is one of the popular soloists heard regularly from WDAP.



# OFFICIAL BALLOT

## Announcers' Contest FIRST ANNUAL GOLD CUP-AWARD

Editor, Radio Digest,  
Dearborn St., Chicago, Ill.

Please credit this ballot as one vote for:

..... of Station.....  
 (Announcer's name) (Call letters)  
 Signed.....  
 Address.....  
 City..... State.....

If you desire, tell below in five or less words what you most like about the announcer for whom you have cast this ballot:

### 62 ANNOUNCERS GET NAMES IN BALLOTING GOLD CUP NOMINATIONS IN FROM EVERYWHERE

Radiophans. Instructed to Nominate Now, Vote Later—Rules and Regulations Given

Sixty-two announcers, from every part of the country, have been nominated by their Radiophan friends during the first week of the balloting in the Radio Digest First Annual Gold Cup Award. Every one of these have been nominated more than once, strange to say. The average number of nominations is close to fifty. Who is the world's most popular announcer? While it is yet too early to hear from England and other foreign countries, where broadcasting has achieved popularity, it is expected that soon nominations and votes for "Uncle" Arthur Burroughs of 2LO, London, and others across the sea will be pouring in.

The vote is world-wide. The announcer receiving the Radio Digest Gold Cup Award will not flatter himself when he claims to be the world's most popular, for that he will be. The balloting is open to the world.

**Announcers Nominated Now**  
 The announcers nominated during the first week of balloting, their stations and locations, are:

- Arlin, H. W., KDKA, East Pittsburgh.
- Barnes, E. T., WGY, Schenectady.
- Barnett, S. W., WOC, Davenport.
- Buell, Earle, WLAG, Minneapolis.
- Calhoun, Adam, WFAA, Dallas.
- Carter, Jacques, CKAC, Montreal, Canada.
- Cole, N. D., WHO, Des Moines.
- Cooperman, Tess, WLAG, Minneapolis.
- Cadigan, John J., WTAT, Boston.
- Carlin, Phillip, WEAJ, New York.
- Cowan, Thomas H., WJZ and WJY, New York.
- Cross, Milton J., WJZ and WJY, New York.
- Daggett, Uncle John, KJL, Los Angeles.
- DePew, J. H., WCBD, Zion City.
- Erbstein, Charles, WFAS, Elgin.
- Ehrhart, Harry E., WPAR, Philadelphia.
- Emery, C. R., WGI, Bedford Hills.
- Fanning, Major J. J., WYAC, Boston.
- Fitzpatrick, Leo, WDAF, Kansas City.
- Gaal, C. A., KUO, San Francisco.
- Granlung, N. T., WHN, New York.
- Hays, George, WLS, Chicago.
- Hay, Bill, KFKX, Hastings.
- Hired Hand, WDAF, Ft. Worth.
- Haller, Richard V., KGW, Portland.
- Hager, Kolin, WY, Schenectady.
- Herske, Arthur R., WTAM, Cleveland.
- Holliday, Wm. F., WWJ, Detroit.
- Johnson, Elmer (Swan) G., WJAX, Cleveland.
- Johnson, F. W., CHYC, Montreal.
- Johnson, Paul, WLAG, Minneapolis.
- Jones, Miss V. A. L., KSD, St. Louis.
- Kaney, Sam, WGN, Chicago.
- Kay, Lambdin, WSB, Atlanta.
- Kirby, WWJ, Detroit.
- Ludgate, William, KSD, St. Louis.
- Mack, Johnnie, WJAS, Pittsburgh.
- Martin, Victor, WHAM, Rochester.
- Miholland, Howard, KGO, Oakland.
- Nelson, Jack, WDAF, Omaha.
- Palmer, Lester, WQAW, Chicago.
- Paschall, —, WOR, Newark.
- Poehler, Eleanor, WLAG, Minneapolis.
- Pierce, Jennings, KGO, Oakland.
- Pierce, F. W., WOC, Davenport.
- Randall, C. R., WCAG, New Orleans.
- Reilly, John, WJAR, Providence.
- Rothafel, S. L. (Roxie), WEAJ, New York.
- Rouse, Gene, WQAW, Omaha.
- Sartory, Joseph, WCAB, Pittsburgh.
- Salzer, Harold A., WHAS, Louisville.
- Schilling, John T., WHB, Kansas City.
- Smith, Fred, WLW, Cincinnati.
- Smith, Edward H., WGY, Schenectady.

Stefan, Karl, WJAG, Norfolk.  
 Tom, C. D., WXC, Detroit.  
 Trumbull, Steve, KYW, Chicago.  
 Tyson, Edwin L., WWJ, Detroit.  
 White, Major Andrew, WJZ, New York.  
 Weidaw, Robert, WGY, Schenectady.  
 Whitney, Robert S., WMAQ, Chicago.  
 Witten, J. W., WOS, Jefferson City.

#### Nominate Now; Vote Later

The list above is given to show what announcers have been nominated and has nothing to do with their standing so far as the actual balloting is concerned. If your favorite announcer's name appears above, do not bother to nominate him. One nomination is enough.

Just save your votes for him! Remember that consecutive votes, saved in groups, and turned in together, count for more.

If your favorite announcer's name is not

given this week, just turn to page five, all the nomination certificate in and send it to Radio Digest, care of the Gold Cup Award Editor.

Remember to save your ballots appearing on page two each week. It is by the number of the ballots that the award will be made. The man or woman polling the highest number of votes wins.

#### Rules and Regulations of Award

All broadcast station announcers are eligible to enter. Nominations can be made either by the announcer or any Radiophan. Nominations should be made by using the "Nomination Certificate" appearing on page five.

Beginning with the May 24 issue a ballot is printed on page 2 of each issue of this publication. These ballots are numbered consecutively from one to sixteen. The voting officially opened with the publication of ballot No. 1 in the May 24 issue. The contest closes with ballot No. 16 published in September 6 issue of Radio Digest, and the official closing date of this contest is midnight, September 8, 1924.

For sending in four consecutive ballots, there will be a ten vote bonus; eight consecutive ballots, twenty-five vote bonus; twelve consecutive ballots, fifty vote bonus; and sixteen consecutive ballots, seventy-five vote bonus.

Voting will consist of filling in the ballots with the name, initials or nickname of the announcer and the station and mailing to the Gold Cup Award Editor.

#### Highest Vote Wins Gold Cup

The broadcasting station announcer polling the largest number of votes in the contest will be awarded the Radio Digest gold cup. In the event of a tie for the gold cup award each tying contestant will receive the same identical award.

Anyone may vote for their favorite announcer with ballots clipped from Radio Digest.

All votes to be credited must be mailed on or before midnight, September 8, 1924.

The Radio Digest First Annual Gold Cup Award will be made by a committee appointed by the publication.

Any question that may arise during the contest will be decided by the Gold Cup Award Editor. His decision will be final.

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## Looking Ahead

Hupmobile Radio Installation will be described by H. J. Marx next week. He will show, as he has with many other makes of motor cars, just how to proceed to get the best results tuning in a "Hup." He will also discuss various portable set circuits.

Tuning, the Difficult Part of Radio for the Beginner, is explained so simply next week by Paul Edelman, author of the "Thirty-Minute" series, that even we couldn't resist reading it. The procedure is amply outlined by well-planned sketches.

Operating and Trouble Shooting the Deresnadynne five-tube Radio frequency set is one of the less technical articles to appear next week for the benefit of our less technical readers. Owners of similar sets will profit by reading this.

Conclusion of the Nine-Tube, Compact Super-Het Treatise will be given by Harry Abbott next issue. Mr. Abbott describes the construction of the cabinet with details so clear that anyone handy with tools can make it.

The World's Most Popular Radio Announcer cannot remain a conjecture long, for the Radiophan ballots will soon decide who is to get the Radio Digest First Annual Gold Cup Award. Follow the progress of the award next week.

Take Radio Digest with You on Your Vacation

WHEN YOU WANT

# Radio Digest

YOU WANT IT!

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SEND IN THE BLANK TODAY

Publisher Radio Digest,  
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Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name.....  
 Address.....  
 City..... State.....

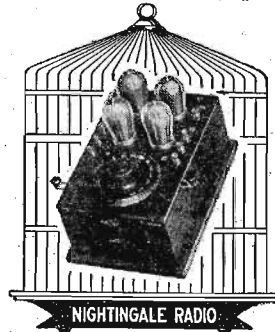
### HANSEN BIRD CAGE LINE

# 'NIGHTINGALE'

4-TUBE RADIO SET

\$32.50

WITHOUT ACCESSORIES



NIGHTINGALE RADIO

It is simplified Radio at its best and at a price within the reach of all.

It is small but has a 2000 mile range with a loud speaker. Its small size makes it ideal for vacations or auto trips.

One stage of R. F. helps to reduce static.

Hansen **MOCKINGBIRD**..... \$90.00

We can furnish, at small extra expense, a fine traveling case, with a place for A and B Batteries, loud speaker and collapsible loop. With this case a Mocking Bird owner can convert his set into a traveling companion in ten minutes and receive broadcast in his auto, camp or hotel. The case measures 9x10x22, and weighs 35 pounds complete with everything, including Mocking Bird set. Why buy two sets when you can make one serve two purposes? Write for Literature

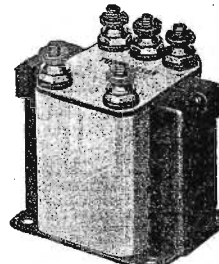
Dealers—A wonderfully attractive proposition. **JOBBERS**—We want one responsible and active distributor in each state.

National Distributor

## HANSEN STORAGE CO.

"The Million-Dollar Warehouse Company"  
 RADIO DEPARTMENT  
 124 Jefferson Street, MILWAUKEE  
 DISTRICT DISTRIBUTORS  
 United Auto Supply Co., Columbus, Ohio  
 Reiss & Reiss Co., Cincinnati, Ohio  
 Penn. Nightingale Co., Bellevue, Pa.  
 Baizer Radio Co., Milwaukee, Wis.  
 Phil Gross, New, Co., Milwaukee, Wis.

# THORDARSON



## POWER AMPLIFYING TRANSFORMERS

Price per pair, \$13.00

The new Thordarson Power Amplifying Transformers (push pull) are designed for use as third stage audio frequency amplifiers, to provide high power amplification for operating loud speaking devices.

With power amplification, not only is it possible to increase volume, but, since two tubes replace the usual one, the distortion and howling which usually accompany the overloading of a single tube on the third stage is done away with entirely.

The Thordarson Power Amplifying Transformers are well constructed electrically and are capable of indefinitely carrying the additional load without breaking down.

In total purity these transformers equal the Thordarson Super Audio Frequency transformer whose rich quality and even amplification has made it the popular transformer of the day.

# THORDARSON

ELECT. MFG. CO.

500 W. Huron St. CHICAGO

# SECRET BROADCAST TEMPTING TO ITALY

## TELL STORMY HISTORY OF INVENTION

John H. Hammond Hopeful of Placing "Scrambling" System of Transmitting

NEW YORK.—Scrambled or secret broadcasting will be an accomplished fact in Italy if plans of John Hays Hammond, Jr., American inventor, are carried through. Mr. Hammond recently sailed for Italy and reports that the Italian government is interested and may begin the operation of the new broadcasting system he has devised which it is claimed will permit of collecting fees from the listener direct.

No effort has been made to introduce this plan in the United States as yet, although American patent rights covering the Hammond inventions are said to be owned by the Radio Corporation of America.

The so-called scrambled broadcasting is said to be none other than the secrecy system invented in 1912 by Benjamin F. Messner, and described in the Radio Digest two years ago. At that time Mr. Hammond intimated that Mr. Messner's circuit would not work, but a demonstration at that time before a large audience of prominent inventors and scientists proved the falsity of Hammond's statement.

### History of Misdealings

Having invented the circuit while in the employ of Hammond, Messner was asked to patent it in Hammond's name, which he refused to do, saying at that time he would patent it under his own name and assign it to Hammond. Because Messner refused to violate the patent law by complying with Hammond's wishes, Messner was asked to leave the employ of Hammond, which he did without any loss of time.

Mr. Messner then dedicated to secrecy system to the world at large upon the publication of his book, "Radio Dynamics" in 1914. The circuits therefore could not be patented, and if Mr. Hammond has obtained a patent on the system, it is believed by followers of the case to be illegal.

The advantage of the secrecy system is that ordinary receivers can only receive a jargon of mixed, unintelligible sounds. Only receivers designed especially for this transmitting circuit can be used.

Beginning with the idea in 1912, Mr. Messner gave lectures in 1914 on the scheme applied to torpedo control, both at Purdue university and before members of the Chicago Electric club.

## Infant Christened Before Microphone of Station KPO

SAN FRANCISCO.—Having the honor of being the godmother to a baby which was christened before the microphone was the fortune which recently befell Miss O'Brien, director of programs at Station KPO, Hale Brothers, here.

The baby, which is the infant daughter of Mr. and Mrs. J. Raegen Talbot, was christened by Dr. James L. Gordon, of the First Congregational Church of San Francisco. At the conclusion of the service Mme. Talbot sang several lullabies to her baby.

Mme. Talbot, who is a protegee of Mme. Calve, has the distinction of being the first voice over the air from Station KPO.

## Boston to Put Harvard Baseball Games on Air

BOSTON.—Broadcasting direct from Soldiers' field, located here, Station WNAC, Shepard Stores, will send out play-by-play the baseball games of the Harvard university nine, June 11 and 13 will be heard the games with Dartmouth and Yale, respectively.

## MERE MALES CLASH ON AIR OVER "BOB"

BOSTON.—Women of the business world proved their ability to entertain the world at large when they recently went on the air through Station WNAC, Shepard Stores, here. The Advertising Women's club dinner was the feature being broadcast, and one of the big hits of the evening was, "Why Women Should Bob Their Hair." The ensuing debate was given by two mere men.

## NOISES OF BUSY CITY INVADE ROOSTERDOM

SCHENECTADY, N. Y.—Station WGY, located in this city, recently broadcast what was called "The Voice of the City," as a novelty feature on its program. The din of a busy corner during a traffic jam, along with the rumble of ash carts and milk trucks as the city woke up were broadcast to the farmer familiar with only the clarion call of the rooster.

## TUNING IN ON THE MERAMEC

Lillian Miller, St. Louis girl, finds great sport listening in on her portable tube set while picnicking on the banks of the Meramec river. A short wire leading from the set to the river acts as a ground and no antenna is used. Satisfactory reception of St. Louis and Kansas City stations is reported by Miss Miller.



## WESTINGHOUSE PLEA DEFEATED IN COURT

### DECISION IMPORTANT TO REGENERATIVE FIELD

Judge Decides Tri-City Co. Has Right to Have Instruments Made By Outside Concerns

DAVENPORT, IA.—Dismissing the plea of the Westinghouse Electric and Manufacturing company and assessing the latter for the cost of the suit against the Tri-City Radio Supply company (Tresco), Judge Martin J. Wade of the federal court here recently handed down a decision of great importance to manufacturers of regenerative receivers.

The judge decided that the Tri-City company had the right to have instruments manufactured by concerns other than their own. The plaintiff company, the judge declared, has been estopped in its claims by the fact that it had accepted royalties on sales from dealers and jobbers on various occasions.

How important the decision is may be judged from the fact that the sales of the company amounted to more than \$90,000 for the first three months of the current year, according to the tender of royalties filed in court.

An appeal will undoubtedly be carried to the United States circuit court of appeals at Minneapolis according to the attorneys for the plaintiff.

## HEARS APPLAUSE FOR RADIO SPEECH

Hoover Listens by Means of Receiver to Reaction of Talk on Unseen Audience

WASHINGTON, D. C.—There have been many complaints from those talking over the Radio that they never know how their speech is being taken by the listeners in.

Secretary of Commerce Hoover had an interesting experience of this kind recently when he was able to hear volun-tunous applause following a speech he made to an unseen audience.

Secretary Hoover, sitting at his desk in Washington, talked to an electrical convention at Atlantic City. On his desk also was a Radio receiving set through which he had been following the proceedings of the convention. Immediately after he had made his Radio talk his receiving set was tuned into the Atlantic City convention and he heard the applause for his speech.

Insofar as can be learned this is the first time this has ever been done.

## Pittsburgh and "Philly" Put on Radio Chess Meet

PHILADELPHIA.—What is claimed to be the first intercollegiate Radio chess meet will be broadcast June 12 at 11:15 p. m. (Eastern daylight saving time) by Stations WIP, Gumbel Brothers here, and KDKA, Westinghouse at E. Pittsburgh. The contest is between University of Pennsylvania and the University of Pittsburgh, WIP and KDKA giving the plays of the respective schools. All that will be necessary to follow the plays of the opposing teams will be a Radio receiver and a chess board with chess men.

## "Bugs" Near Royal Palace Spoiling George's Concert

LONDON.—King George of England is one of the broadcast listeners who curse the careless amateurs these days. It has been found that around Buckingham palace, and also Windsor, there is considerable interference from over-enthusiastic youngsters who would doubtless be horrified if they realized that they were interrupting the drawing-room amusements of their king.

## Reception in Oregon Caves Good and Free from Static

YREKA, CALIF.—Using an eight-tube super-heterodyne receiver and loop aerial, a party of Radio engineers and students from the Yreka high school here succeeded in tuning in KGW, KLV, KPO,

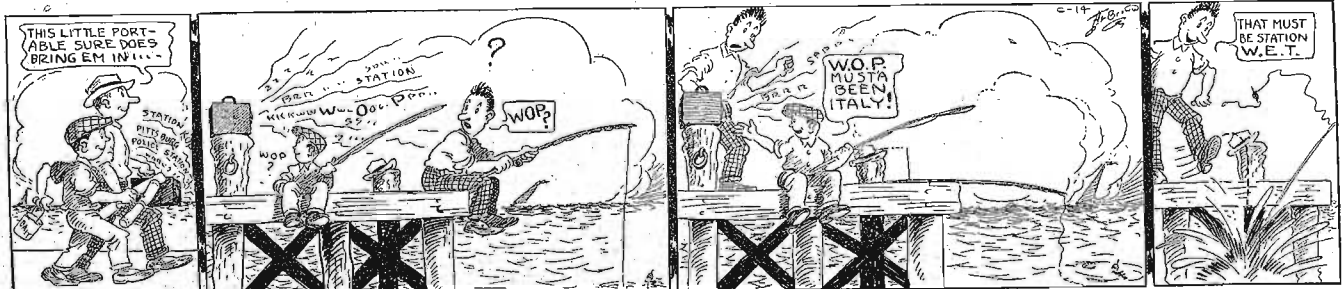
CFCN and KGG while in the innermost chamber of the Oregon caves near Grant's Pass. Very clear reception, free from all static, was obtained.

Beauty treatments are being broadcast by one of the famous beauty specialists of Paris.

## THE ANTENNA BROTHERS

Spir L. and Lew P.

## Heterodyning Opinions



# U. S. AIRPLANES CAN OFFSET DEADLY RAY

## ARMY AND NAVY MEN NOT INCLINED TO WORRY

Cloak of Mystery Belittles Invention, Scientists Say, But France and England Vie for It

(Continued from page 1)

of intrinsic military value in that it could stop automobile and airplane engines and kill human beings at will. He inferred that an offer had been made through a representative of the U. S. Navy.

"Merely a newspaper story," Capt. Ridley McClean, chief of naval communications, characterized the report. The naval intelligence office also denied that the U. S. Navy is bidding or has taken any action relative to the much talked of invention of Professor Matthews.

### U. S. Laughs at Matthews' Device

War department officials laughed at the statement of the English inventor. Experiments conducted by the chemical warfare service indicate that the "death-ray" has no practical military value, it was declared. Besides, it was shown, the air service has discovered an insulating material which will not permit the passage of the ray and can be used to protect the occupants and ignition system of the plane.

Animal life can be exterminated at a distance of forty feet by a similar ray now being experimented upon by an American, according to reports. British government scientists, also, claim results similar to those boasted by Matthews for his invention.

### Cloak of Mystery Belittles Invention

The rivalry between France and England to secure exclusive possession of the invention is being watched with quiet, careless interest by the military and naval attaches of the United States embassy in London and Paris.

Whatever Professor Matthews has perfected has been guarded with such a cloak of mystery that many scientists are almost willing to believe his complete story nothing but a magnificent hoax. At least scientific development of the so-called death-ray hardly justifies the extravagant potentialities with which rumors have credited the device.

The dramatic struggle between the two

# RENE MESNY PUTS MOTOR-STOPPING RAY IN QUESTION

THE STORIES appearing from time to time telling of the perfection of death-dealing and motor-stopping waves or rays by German, French and British scientists caused Radio Digest to query Rene Mesny, professor of Hydrography of the French department of marine and secretary of the foremost Radio society in France.

M. Mesny's comments on the various rumors broadcast by the press of the world are interesting. Excerpts from his study of the situation follow:

"1. The story of the lieutenant who has perfected a practical system for the stopping of gasoline engines is invented out of whole cloth.

### Attempt to Verify Rumor

"2. An article has actually appeared in 'La Liberté' setting forth that an engineer has perfected an arrangement making it possible for him to stop automobiles passing directly opposite him in the street. We have sought to have this invention confirmed and see it in operation. The response has been that the fact is true, but when we have tried to verify it there has always been some good reason for delaying the visit and all information given has been evasive.

"3. Finally, as to that which concerns the possibility of developing such an invention, able to operate at a distance, I shall give you my own personal opinion.

### Possible Means of Accomplishing

"In order to stop a motor I do not see how it can be done otherwise than by one of the following methods:

big powers for the "death-ray" is to be deplored, officials here say, inasmuch as it would be impossible to keep its working a secret once it were put in practical use as in war.

Once the ray is found applicable to war use, it will not be long until all powers will be developing it or its equivalent for their own forces.

British, French, German and American scientists condemn Professor Matthews for his evident desire to attract publicity without foundation in fact. Their attitude is that the professor may have developed the "death-ray" in the laboratory, but will find countless difficulties in putting the ray into operation on the battlefield.

"To suppress the sparks of the ignition, be it by demagnetizing the magnet of the magneto or by changing the gas in which the sparks explode into an electrical conductor.

"To produce untimed sparks which explode at irregular intervals, thus impeding the operation of the engine.

"In order to change the gas into a conductor, I do not see that it can be done by anything but X-rays, and if it is desired to make such rays pass through an appreciable thickness of aluminum, at a distance of several yards, such a result appears to me to be utterly impossible at any distance at which such a result would be interesting.

"As to that which concerns the other methods, the questions of energy available enter again into play."

(Here M. Mesny went into an elaborate discussion of the great amount of power necessary to produce the desired effect. The proof, technical in nature, is omitted.)

### Theoretical Result Often Not Practical

"If it is undertaken to operate upon the magnetization of the magneto, the same considerations lead to the same results. I think therefore that it is actually impossible to act effectively against the

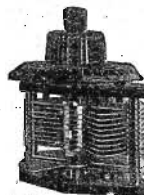
operation of magnetos by means of electromagnetic waves.

"Might an entirely new invention obtain such a result? I do not think so, for such an invention would be closely tied to laboratory work having considerable technical importance. Furthermore, whoever is occupied in placing in operation a scientific idea knows the difficulties to be encountered in passing from the laboratory to the practical; all of which demands a great deal of time. Under these conditions, I am unable to believe that a secret may be kept during such a long time. RENE MESNY."

# \$1,400 Equipment Gone; Former Employee Sought

CHICAGO.—W. K. Shipman, 26, of Buffalo, formerly employed by the Associated Radio Engineers here, has disappeared, evidently with what is estimated to be \$1,400 worth of Radio sets, parts and tools belonging to his employer and customers. A dodger for his arrest describes him as 5 feet 11 inches tall, light complexion, brown suit, gray cap, nearly all upper teeth missing, soft spoken and outwardly very respectful.

Plain type:  
3-plate \$1.25  
5-plate \$1.50  
12-plate \$2.00  
17-plate \$2.50  
23-plate \$2.75  
43-plate \$3.00  
at dealers



Vernier type:  
13-plate \$4.00  
23-plate \$4.50  
43-plate \$5.50  
at dealers

# A SCOTCHMAN HAS NOTHING ON THESE CONDENSERS

If a Walnut Condenser ever let go of more than .00000? It'd probably buckle up with shame. In which event we'd replace it free. Like the Scotch, these condensers are record-holders for "low losses." And, in addition, they stay tight for life.

# WALNART

## VARIABLE CONDENSERS

are the last place to look for trouble. Plates accurately pressed, aligned and locked to stay in strong slotted studs. Bakelite end plates. Ask your dealer first, please.

"Makers of good goods only"  
**WALNART ELECTRIC MFG. CO.**

Dept. 439 Chicago



# The GREBE CLARIFIER

THE first practical, workable solution of the problem of radiation from regenerative receivers. Unlike the "wave-trap" it increases signal intensity.

\$30



- Increases Selectivity
- Increases Signal Intensity
- Improves Quality
- Prevents Radiation

And—  
Is Easily Connected

Ask your dealer or write for literature

**A. H. GREBE & CO.**

Richmond Hill, N. Y.

Western Branch—451 East 3rd St., Los Angeles, Cal.

### BRISTOL SINGLE CONTROL RADIO RECEIVER

This set is completely equipped to use Loud Speaker. The well-known Bristol One Stage Power Amplifier is incorporated as the last stage of amplification. The Bristol Single Control Radio Receiver is designed to get satisfactory results with Antenna or Loop, and in most cases short antenna.

The case is solid mahogany walnut finish. A suitable piece of furniture for the finest home.

The price of Bristol Single Control Radio Receiver is \$190.00. This does not include accessories such as tube, battery, and Loud Speaker.

### AUDIOPHONE LOUD SPEAKER

A Real Reproducer of the Original Broadcasting

It is easy to listen to the Audiphone reproductions because they are so perfect. The speech, songs and instrumental music are not blurred or disguised by mechanical distortion.

No auxiliary batteries are required for magnetizing. Made in three models—Senior \$30.00, Junior \$22.50, and Baby \$12.50.

**THE BRISTOL COMPANY**  
WATERBURY, CONN.

# BEFORE THEY THOUGHT OF "MIKES"



Nudeness doesn't disturb H. M. of K... out west, because the climate's so mild, of course. Tell you more about him next week.

Robert Munn, WGR, has lost some hair and eyesight in 26 years, but his vocal characteristics have improved according to neighbors.

The solemn lad above recently changed stations. G. H. will appear grown up next issue. Guess who.

Kolin Hager, WGY, is a married man. We're sorry, girls. Kolin was the babe with outstretched paws last week.

## SET BUILDERS GIVE HINTS FOR SUMMER

### STRIVE FOR PERFECTION IN SEASON'S RADIO

Experts Tell How to Get Best Results With Any Set During Hot Months

NEW YORK.—The extent to which this will be a Radio summer is becoming apparent with the ever-increasing efforts made by broadcasters, manufacturers and other interests in the Radio industry, to set a high water mark of perfection for Radio reception during the coming months.

Requests from many parts of the United States have led the Radio section of the Associated Manufacturers of Electrical Supplies to issue a series of summer suggestions to the Radio public.

Little difficulty should be experienced in securing good reception in the summer. It is pointed out, however, that in the past year the power of sending stations has been materially increased. This is expected to eliminate many of the previous difficulties noted during the summer months, not to mention the numerous improvements and refinements in receiving apparatus now on the market.

#### How to Get Results in Summer

The suggestions are as follows:  
1. Whether your receiver is to be used at home, at the seashore or in the mountains, see that the connections are gone over and tightened, that old batteries are replaced and that a good set of tubes are installed.

2. In camping erect your aerial wire from the camp to a branch of one of the tallest trees in the vicinity. If thunderstorms are common, erect an additional aerial not over 10 to 20 feet high. This type of aerial is not so readily influenced by atmospheric disturbances. It can be from 100 to 200 feet long.

3. Whether you use a receiver which operates from a loop, or a receiver which operates from an antenna, the sensitiveness of the receiver should be reduced in times of atmospheric disturbances either by reducing the filament temperature or by "loosening the coupling." The long low aerial or the loop type of receiver will give marked relief this summer from atmospheric disturbances.

#### How to Get Good Ground

4. See that you have a good ground connection when an aerial is used. If such cannot be obtained at the camp or at the seashore, the equivalent of a good ground connection can be had in the use of a piece of wire 100 to 200 feet in length laid over the surface of the earth directly beneath the aerial.

5. Receiving apparatus in the camp should be duly protected from moisture and dampness.

6. Listeners should bear in mind that the aeriels erected at seashore or camp may be quite different from the electrical constant of the aerial used with the same set at home. This means that stations heard at home may not come in at the same point on all the dials.

7. Be sure that the headset cord is not worn, that the connections are tight at the back of the headphones and that the caps are screwed tight.

Between \$250,000,000 and one-half billion dollars will, it is believed, be spent on Radio during 1924.

Robert Munn, WGR  
ROBERT MUNN was shown on this page last week in the role of a fat, dark-haired, cherubic being commonly known as Infant. As the announcer at WGR, Buffalo, N. Y., he is still dark-haired, but that is where the physical resemblance to his infancy ceases. Mr. Munn is sometimes referred to as the "studio pinch-hitter" at WGR. He is probably the most versatile man at the studio. If one or more members of the program do not show up on time, for the sake of punctuality Mr. Munn frequently "does their stuff" until they come. He is an excellent piano accompanist.

Twenty-six years ago in Girard, Pa., which is said to be near Erie, Mr. Munn was born. His mother now lives at Erie, but Mr. Munn came to Buffalo three years ago. His ambition is to become a composer. Some day he will go to Europe and study, but that is another story.

If he is putting on an organ recital on a Sunday afternoon, we will say, and has six minutes more to go till his time is up, he will go right on with the piece he is playing, improvising as he goes, keeping so close to the nature of the production that he was playing that only one who knows the piece of music and is an expert can tell where the regular production leaves off and where the improvisation begins.

"Bob" Munn is tall, slender and dark. His hair is black as midnight and his upper lip is sometimes marked (yes, marked is the word) by a discreet mustache.

If some of the feminine fans, blonds, perhaps, knew Bob Munn as the studio folks do, they would be all headed towards Buffalo. For Mr. Munn is practically the only unattached male about the WGR studio up on the sky-line floor of the Hotel Statler.

## Better Programs Is Problem for Confab

U. S. Experts Busy on Plans for Third Airwave Conference

WASHINGTON, D. C.—Experts of the Radio section of the department of commerce are working on tentative plans for the third Radio conference, which it is expected will be called soon by Secretary of Commerce Hoover.

While no announcement has been made at the time of writing it is believed now that the conference cannot be held before July. It is probable that the improvement in broadcasting programs will be discussed along with the reallocation of wave lengths and other problems now confronting Radiophans.

## WDAR Generator Gives Way to Battery; Stronger

PHILADELPHIA.—Station WDAR, Lit Brothers, here, has changed its source of power from motor generators to storage batteries. The results obtained in increased strength and clearness of signals are reported excellent.

Cincinnati Gets Call WFBW  
CINCINNATI, O.—The new broadcast station at the Alms Hotel has been licensed as WFBW by the government. The first official program was given recently. WFBW is on the air Wednesday, Saturday and Sunday evenings of each week. Exact hours have not yet been agreed upon with the other two stations.

Kolin Hager, WGY  
ROMANTICALLY inclined maidens of a past generation addressed love notes to the matinee star. With the advent of the movies, the letters went to the screen star of fine features and attractive form. Today the maidens, charmed by voice alone, address their perfumed notes to Radio announcers.

"K. H." is chief announcer at WGY and is in charge of the studio. He is 29 years old, and the last four years of his age have been spent as a married man. As an aid to identification it might be added that he is five feet ten inches tall and has brown hair and blue eyes.

Mr. Hager's musical education began shortly after he left the cradle. He was boy soprano soloist at All Saints Cathedral, Albany, N. Y., for eight years.

During his high school and college education he studied French, German and Italian with the idea of going into light opera. This idea matured, for after the armistice was signed he sang a leading part in the light opera, "The Isle of Azuvere," which toured France and Germany.

Mr. Hager's ambition is to keep WGY at the top in the broadcasting of diversified programs and it is his earnest endeavor to promote the educational feature in broadcasting. His pet peeves are the Radio speaker, who has little to say and takes a long time to say it; the singer who cannot be convinced that he or she sings badly; the would-be Radio humorist who never gets any further than trying to be funny.

## AERIALS TANGLED IN LEGAL MESHES

Tenants of Fashionable Apartments Accused of Stretching Wires Too Low Over Roof

WASHINGTON, D. C.—Radio was brought before the police courts of the District of Columbia for the first time recently when a score of tenants in one of the fashionable apartment houses here were given preliminary hearings on charges of violation of the new building regulations which require antennas to be at least seven feet above the roof. The offenders agreed to raise the aeriels to the required height, and the court decided to non-prosecute the charges.

The network of low wires, it was charged, would make it exceedingly dangerous for firemen who might be forced to fight a blaze from the roof top.

## SPECIAL PROGRAMS TO PUBLIC SCHOOLS

SPEECHES HEARD BY ALL SIMULTANEOUSLY

Receivers and Loud Speakers Deliver Words of Counsellors to Every Oakland School at Once

OAKLAND, CALIF.—If the experiments now being made by the Oakland public schools are successful, a single speaker may inspire and instruct hundreds of teachers and classes assembled under normal conditions in public schools scattered over a wide area in city and country. This is to be accomplished by a broadcast station transmitting especially for public schools.

Instead of traveling from one school to another, counselling instructors of the Oakland public schools now speak at the studio of KGO, the Pacific coast station of the General Electric company, on Tuesdays and Thursdays at 10:20 a. m., Pacific time. Radio receivers and loud speakers installed in twenty schools in the city then reproduce what is said.

Musical Numbers Give Stimulus  
Teachers and pupils assemble in classrooms in the regular manner, with not more than two classes in any one place.

The broadcast program is developed by a special committee working under the direction of Dr. Virgil Dickson of the Oakland public schools. Musical numbers are placed between speakers on the program as a stimulus for the minds of teacher and student listeners. Only eighth and ninth grade classes have been used in experiments thus far made. Eventually all grades may be included.

That parents are taking an active interest in the experiments is shown by a report from one school showing that forty-seven mothers had telephoned that they were listening and were enjoying the programs.

## Prison Chapel Gets Set to Carry Sermons to Inmates

BIRMINGHAM, ALA.—The county board of revenue of Jefferson county has decided to install a receiving outfit in the chapel at the county jail for the benefit of the prisoners. The Bureau class of the First Baptist church made the request of the members of the board of revenue that a Radio outfit be installed.

### NOMINATION CERTIFICATE

#### Announcers' Contest

Radio Digest First Annual GOLD CUP AWARD

GOLD CUP AWARD Editor, Radio Digest,  
510 N. Dearborn St., Chicago, Ill.

Dear Sir:

I nominate .....

Station .....

Broadcasting Station

Signed .....

Address .....

Town .....

State .....

# 14 CITIES, 18 PLANTS LINKED FOR POLITICS

## REPUBLICAN CONFAB WILL BE ON AIR WIDELY

Complete Happenings at Cleveland Public Auditorium Are Divulged to Radiophans of Country

By F. A. Price

CLEVELAND.—Proceedings of the Republican National Convention, to have been opened June 10 in the Public Auditorium here, will be heard in their entirety throughout the length and breadth of the United States by means of transmission over land lines of the American Telephone & Telegraph company and broadcasting from powerful stations located in twelve or more important centers of the country.

Though last minute changes may be made, at the time of writing, broadcasting was to be done from the following cities: Providence, R. I., New York, Washington, Buffalo, Pittsburgh, Chicago, Minneapolis, Omaha, Davenport, Kansas City, St. Louis, Ft. Worth, Atlanta and Cleveland. It is also quite possible that KDKA, the Pittsburgh station having convention service, will relay on a low wave length to its sister station, KFXX, at Hastings, Nebraska, and this latter station will broadcast to an immense western territory.

### Stations Linked for Broadcast

According to plans outlined by local convention officials, the specific cities and stations interested in the service were to be:

Providence, R. I., Outlet Co., WJAR; Pittsburgh, Pa., Westinghouse Co., KDKA; New York, American Tel. & Tel. Co., WEAF; Washington, D. C., Chesapeake & Potomac Tel. & Tel. Co., WCAP; Buffalo, N. Y., Federal Tel. & Tel. Co., WGR; Chicago, Ill., Sears-Roebuck, WLS, Chicago Tribune, WGN, Daily News, WMAQ; Minneapolis-St. Paul, Minn., WLAG; Omaha, Nebr., Woodmen of the World, WOAW; Davenport, Iowa, Palmer School of Chiropractic, WOC; Kansas City, Mo., Kansas City Star, WDAF; St. Louis, Mo., St. Louis Post-Dispatch, KSD; Ft. Worth, Texas, Ft. Worth Star Telegram, WFAF; Atlanta, Ga., Atlanta Journal, WSB; Cleveland, Ohio, Union Trust Co., WJAX, Willard Storage Battery Co., WTAM, Radiovox Co., WHK.

At Cleveland, and at Chicago, three stations will probably divide the broadcasting into three shifts, and this division of the long daily periods may be effected in other cities having more than one station.

### When Broadcasting Will Take Place

The convention, according to plans, was to be called to order daily at 11:00 a. m., and the proceedings broadcast with practically no intermission until the sessions end late each afternoon or evening, as the

# GOLDEN TROPHY FOR ANNOUNCER AWARD



Above photo shows the Radio Digest's First Annual Gold Cup which will be awarded to the world's most popular announcer. This will be decided by the Radio public at large by popular vote.

case may be. It was also planned to have speeches and addresses broadcast by prominent Republicans.

Chauncey M. Depew and "Uncle Joe" Cannon are mentioned among other notables who will speak in behalf of the "Grand Old Party." It may be mentioned that "Uncle Joe" is quite a Radiophan himself. Jas. D. Preston, of the Senate Press Gallery, was to be "Radio Observer" of the convention.

In short, every Radiophan in the United States within crystal or tube set range of the big broadcasting stations of the country is enabled to hear all that transpires at this first really public convention—really public in the sense that the speeches and applause, the shouts and tumult of exciting moments will be unconfined by the four walls of the building but will be carried on the intangible ether waves all over the country.

### Stations Pay Cost of Service

The total cost of the service is said to be in the neighborhood of \$3,500, borne by the broadcasting stations having the service. The individual amounts paid by the stations will be directly proportional to their distance from Cleveland, in much the same manner that the cost of a long distance telephone call depends upon the distance covered in setting up the connection.

It may be said that the telephone company, with full appreciation of the public service given by the broadcasting stations, has made its rates very reasonable, particularly in view of the extremely long daily periods for which its circuits are withdrawn from remunerative commercial use and placed at the disposal of the stations.

# 'TIS SPRING! HIRED HAND WRITES HIT

## WBAP's Announcer Agrees to Take All Bouquets, Bricks; Blames His Turning Fancy

FORT WORTH.—"Wuxtry, wuxtry, the one and only Hired Hand announcer at Station WBAP has went and done it." Great excitement prevails in the vicinity of this well-known station for the great announcer of all times has written a song.

He has absolutely no legitimate reason on earth for doing this, but youth must be served and you know that in the spring a young man's fancy, etc., etc. Anyhow, he has written a song and it is called, "Hired Hand Radio Bawl." Nice catchy air 'n' everything.

All bouquets, brickbats, slams and bangs should be directed at the Hired Hand personally. He'll take 'em all and still come up smiling. Don't forget, if you want to make a hit, on get hit for that matter, send your future biscuit-cooker a copy of his song, for after all it's said and done, it certainly is alleged to be good.

# WEAF Quits Class D; Resumes "B" Rating

## License Used for Experiments Dropped Without Explanation

NEW YORK.—WEAF, the New York station of the American Telephone and Telegraph company, has abandoned its class D license.

The license was obtained for experimental purposes by WEAF from the Radio section of the department of commerce. No reason was given for the abandonment of the license and the station has gone back to class B. The only two stations now operating on class D licenses are WGY and KDKA at Schenectady and East Pittsburgh, respectively.

# Florida Hears Arnold, Pa.

ARNOLD, PA.—It has been reported that Station WCBU, located here, has been heard in Florida. This is about 1,000 miles distant from the station. Owing to the fact that the plant uses but fifty watts output, the range is considered remarkable.



# The 24 day wonder

## A Wonder in Sales and a Wonder in Performance

Never has any Radio Receiving Set made such a record in the appreciation accorded it by the public.

Thousands of homes have been made happy by this little Crosley Model 21. In twenty-four days from its first appearance it was selling at the rate of 1,000 per day and hundreds of letters expressing appreciation of its excellent performance assured us that it was a favorite.

One of its two tubes is the noted Armstrong regenerative detector with the hook-up made popular in the Crosley Type V. Added to this is one tube of Audio Frequency Amplification giving loud speaker volume on local stations at all times and on distant stations under fair receiving conditions. Otherwise, best phones should be used for distant reception.

This Crosley two tube marvel has been a surprise in the Radio World and has proven the biggest seller on the market today.

There is a Crosley priced for every home

- CROSLY MODEL V—our noted one tube receiver famous for distant reception.....\$16.00
- CROSLY MODEL VI—two tube receiver incorporating radio frequency amplification..... 24.00
- CROSLY TYPE 3-B—a three tube regenerative set noted for excellent performance..... 32.00
- CROSLY MODEL X-J—a four tube receiver with radio and audio frequency amplification 55.00
- CROSLY MODEL X-L—a complete, with loud speaker, built like a piece of furniture.....120.00

Between these are priced the Super Y1, the Super X-J, the J-C Console and others.

All Crosley Regenerative Sets are Licensed Under Armstrong Patent No. 1,113,149

Before you buy see the Crosley line For sale by good dealers everywhere

**THE CROSLY RADIO CORPORATION**  
Powel Crosley, Jr., President  
Formerly THE PRECISION EQUIPMENT CO. AND CROSLY MANUFACTURING CO.  
6492 Alfred St. Cincinnati, Ohio  
CROSLY OWNS AND OPERATES BROADCASTING STATION WLW

# Thrills from Radio

No. 21 of a Series Featuring Experiences of "ALL-AMERICAN" Users

## I Get California Stations Almost Every Night Now

By J. B. Fattig, Pataskala, Ohio.

"Using a single circuit hook-up in my home-made set, with a 5-11 and a 3-1 All-American Audio Frequency Transformer, in three months I have heard 132 stations.

"These include Canada, Boston, Dartmouth, Cuba, Porto Rico. Am getting California stations almost every night now. My home is fifteen miles east of Columbus, Ohio.

"I think All-Americans are fine."

And from Pocatello, Idaho, Roy Pinkham writes: "Using an All-American 10-1 transformer in one stage, I am having fine luck. Pick

up PWX at Havana, Cuba." Le Roy Borg of Chicago advises he uses two All-Americans in his set: "I've got California, Vancouver, New York and Springfield, Mass., and Havana. I highly recommend All-Americans and think they are the best on the market."

Thank you, gentlemen. Experiences like yours, multiplied hundreds of thousands of times all over the country, have made All-Americans the largest selling transformers.

**SPECIAL OFFER** Just out! New All-American booklet, "Hook-Ups and Bids"—32 pages of up-in-the-minute radio information. Tells you how to hear farther and better. Send 10c coin or stamps. Worth a dollar.



All-American Audio Frequency Transformers. Come in three sizes: 3-1, \$4.50; 5-11, \$6.11; \$4.75. The best—no necessity to pay more.

All the better dealers sell the "ALL-AMERICAN" **RAULAND MFG. CO., 2640 Coyne St., CHICAGO** PIONEERS IN THE INDUSTRY

Audio and Radio Frequency; Power Amplifying (input and output)



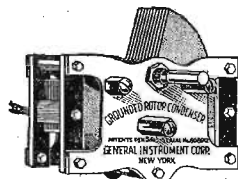
Over three-quarter million in use. Standard on the better sets

# ALL-AMERICAN AMPLIFYING TRANSFORMERS

Largest Selling Transformers in the World

# HEAR THE DIFFERENCE!

LABORATORIES USE THE LOW LOSS GENERAL INSTRUMENT CORPORATION GROUNDED ROTOR CONDENSER



They prefer it because actual tests have proved that dielectric losses have been practically eliminated. This makes it possible for your receiving set to surprise you with a new power.

Based on Greater Selectivity, More Distance and a Remarkable Increase in Volume

Replace Your Old Condenser with the New Low Loss Grounded Rotor Condenser and

## HEAR THE DIFFERENCE

Type	Minimum	Maximum	Price
Type 46X 11 Plate	5 MMEFD.	.0025 MFD.	\$4.50
Type 46A 13 Plate	6 MMEFD.	.003 MFD.	4.50
Type 46D 21 Plate	9 MMEFD.	.005 MFD.	5.00
Type 46F 43 Plate	15 MMEFD.	.001 MFD.	5.50

AT YOUR DEALER

Otherwise send purchase price direct to us and you will be supplied.

# GENERAL INSTRUMENT CORP.

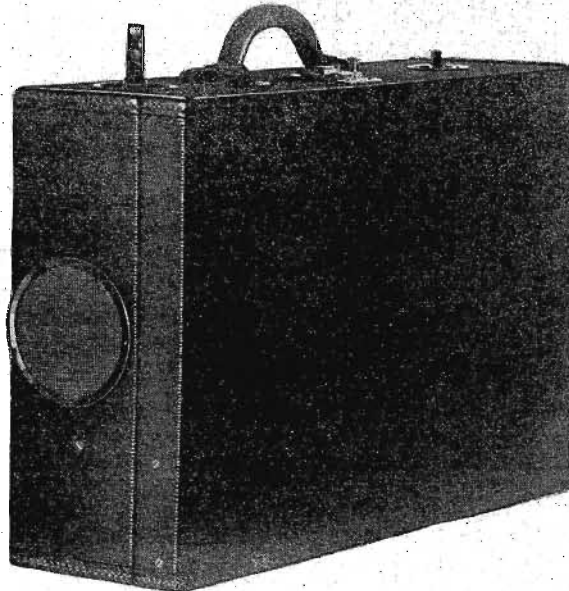
423 Broome Street NEW YORK CITY



# OPERATING AND TROUBLE SHOOTING

## For the Owner of a Zenith Portable Receiver

**O**PERATING and Trouble Shooting" is a Radio Digest feature whose purpose is to study the late models of various standard receiving sets and to show the newly initiated broadcast listener, who has purchased such a set, how he can operate it to get the best there is in it and how he can overcome minor difficulties which may be causing some trouble. On page 7 this week the Zenith Portable Receiver is described. Radiophans with other sets will also find these articles worth while reading, particularly the notes on trouble finding.



opened up for operation. It's simply set in a vertical position, as shown, and rotated as required by the directional qualities of the loop. The tuning controls consist of a variable condenser and potentiometer and rheostat and a battery switch, all located on the top of the suitcase. The dials or knobs are sufficiently countersunk into this top board so as not to be in the way or prevent carrying of the case.

### Tuning Operation

Naturally, the first step is to pull out the battery switch for lighting the tube filaments. The rheostat should be set about one-half way, further re-adjustments will probably not be necessary after the remainder of the tuning has been completed. The real tuning control is concentrated in the potentiometer and the variable condenser. The potentiometer should be set at about the half-way point and the variable condenser control slowly rotated from maximum to minimum. Upon hearing reception the control should be very gradually shifted until position of maximum volume is obtained. The potentiometer adjustment should then be moved from one side to the other until its position corresponds to strongest and clearest volume. As stated above, the final adjustment is in resetting the rheostat for any improvement.

If no reception is heard when turning the condenser the first time the next step would be to turn the potentiometer first to one side and rotating the condenser control and then to the opposite side. Satisfactory operation of receiver is evinced by the purring sound from the loud speaker aperture in the set. The jack hole on the side opposite the loud speaker aperture permits plugging in of a head set where more critical tuning for long distance work is desired.

(Operation of the Doremadyne five-tube set will be given in the next issue. This is a large home set that operates with regular outside aerial and ground connections.—Editor's Note.)

**T**HIS Zenith portable fully lives up to its name, in a sense that it is really portable, covering all parts necessary for reception. As an illustration, the entire outfit, as shown, can be carried in the hands with the set in operation, no wires trailing or outside connections being necessary. The loop aerial is an integral part of the cover of the suitcase. All batteries are installed inside. The loud speaker is a built-in unit

of the case. The circuit has three stages of Radio frequency, detector and two stages of audio frequency, using six 199 tubes. The filament current is taken care of by 3 dry cell units. The plate current is furnished by four small 22½-volt batteries. A small flashlight battery takes care of the grid biasing. Six tube sockets are mounted on a cushion suspension strip so that no microphonic tendencies of the tubes are produced. The suitcase doesn't have to be

## Electron Flow in the Operation of Tubes

**T**HE addition of a third electrode called the "grid," between filament and plate, in the vacuum tube makes it possible to increase or decrease the current between plate and filament over wide limits. It is obvious that the electrons traveling from filament to plate must pass through the wires forming the grid. If the grid is given a potential which is negative with respect to the filament, the grid will repel the electrons, but many of them will still pass through and reach the plate, because of their high velocity, inasmuch as the positive plate potential still attracts them to some extent. If the grid potential is made still more negative, the plate current will diminish until finally it may be stopped entirely.

If, however, the grid is given a positive potential instead of negative, electrons will be attracted to the grid as well as to the plate and more electrons will now be drawn toward the plate than would otherwise pass, so that the plate current increases. The charge on the grid partially neutralizes the effect of the space charge. A limit to the magnitude of the plate current will finally be reached, when the space charge caused by the large number of negative electrons in the tube fully

counteracts the influence of the positive charges on the grid and the plate. The attainment of the limiting or saturation value of the plate current is assisted by the absorption of more electrons into the grid if its positive potential is increased. This absorption gives rise to a relatively small current in the grid circuit. The total electron flow is the sum of the plate current and the grid current. As the potential of the grid becomes more positive, more electrons will be absorbed by the grid.

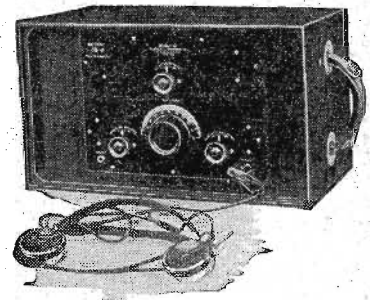
The current in the plate circuit depends very markedly upon the potential of the space between plate and filament. Electrons which have just left the filament and are moving away from it, give a "space charge," as it is called, to the vacuum space in the vicinity of the filament and will limit the flow of electrons between filament and plate. The influence of this space charge may be controlled by varying the potential of the grid. If the grid is made positive, it will tend to neutralize the effect of the electronic space charge which is negative and the result will be an increase in the flow of electrons from filament to plate. If the grid is made negative, it adds to the effect of the electrons in the space, and decreases the flow of electrons in the plate circuit. Thus, if the temperature of the filament is kept constant, and the potential applied to the plate is kept constant, the current in the plate circuit

may be varied also by varying the potential of the grid.—Peter J. M. Clute, Schenectady, N. Y.

### Improved Catswhisker

A strip of tinfoil 1 inch in length and 3/8-inch in width is cut into prongs re-

sembling the teeth of a hair-comb. The strip is rolled into a small tube or cylinder, and placed in the catswhisker support of the crystal detector. With the "teeth" spread apart and resting on the crystal it makes an improvement over the ordinary whisker.



## National Recognition Given Federal "All Year Receiver"

**A** MONTH has barely passed since the first announcement of the Federal No. 102 Special Set—and yet letters are pouring in from every nook and corner, proclaiming the No. 102 Set the most exceptional development in present day radio receiving. Some mention its tone, some its selectivity, some its great distance range—but all speak of its unusual value as an "All Year Receiver."

You must see the Federal No. 102 Special Set to get any idea of its unusual advantages. If you do not know the Federal dealer in your neighborhood, write us for his name.

FEDERAL TELEPHONE & TELEGRAPH CO.  
Buffalo, N. Y.



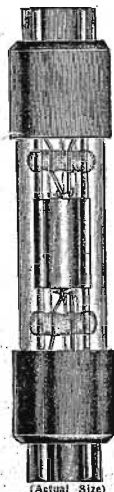
# Federal

Standard RADIO Products

Boston, New York, Philadelphia, Chicago, Pittsburgh  
San Francisco, Bridgeburg, Canada, London, England



Look for this sign



(Actual Size)

## The Long-life tube!

Since their inception, radio vacuum tubes have been fragile. To knock or drop one incurred the expense of a new tube. But now there are

## Myers Tubes

PRACTICALLY UNBREAKABLE

—so protected by their unique design that they have been dropped on the floor without injury. But their sturdiness is only one feature. They are the most perfect detectors and amplifiers obtainable. Smaller capacity and no bunched leads mean less interference—more clarity and greater amplification. Actual tests, all over the world, have proved their supremacy.

Two types—**DRY BATTERY** and **UNIVERSAL** (for storage battery).

AT YOUR DEALER'S—or send price and be supplied postpaid. See words "Made in Canada" on each tube.

**\$5** EACH Complete with clips ready to mount; no extra equipment required.

**E. B. Myers Co., Ltd.**  
Radio Vacuum Tubes  
240 CRAIG ST., W.  
Montreal, Canada

AN EVENING AT HOME WITH THE LISTENER IN

(SEE INSTRUCTIONS FOR USE BELOW)

Table with columns for Station and City, Met., and days of the week (Monday to Sunday) listing broadcast times for various stations.

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods listed...

Claims Receiving Record WILMETTE, ILL.—A resident of this town claims what he believes is a record for receiving. He has heard a total of 236 broadcasting stations...

STATIONS IN ORDER OF WAVE LENGTHS USED

Table listing radio stations in order of wave lengths used, with columns for Meters, Call, and Station Name.

Germans Can't Get This Patent Back

Schloemilch-Von Bronk Rights Belong to U. S. Navy.—R.C.A. Seen Behind House Bill

Senator Phipps on KLZ CHICAGO.—The report in the issue of May 24, that Senator Phipps broadcast his views in regards to the tax from Station KFAF, should have read Station KLZ.

WASHINGTON.—Patents bought by the U. S. Navy from the Alien Property custodian during the war will remain in the hands of the Navy and cannot be turned back to their German owners...

Advertisement for Uncle Sam Master Tuning Coil, featuring a tuning coil diagram and text: 'Broadcasting at once Tuned In Without Interference with the UNCLE SAM MASTER TUNING COIL'.

Although a great deal of fuss has been made about whether the motion picture companies would have press rights at the Olympic games, no mention yet has been made about broadcasting results.

UNCLE SAM ELECTRIC CO. Plainfield, New Jersey

"TAKING NEW YORK BY STORM" THE RADIO SENSATION OF 1924!

Advertisement for Monodial radio receiver, featuring the text: 'MONODIAL One dial to tune—three circuit tuner KGO OAKLAND, CALIF., FROM NEW YORK'.

Advertisement for Coto Coil Co. featuring an image of a coil and text: 'Coto "Built First to Last" VERY MUCH BETTER THAN YOUR ADVERTISING CLAIMED'.

Advertisement for Yorkville Radio Co. featuring text: 'Original Monodial Coil and Blue Print \$2.50 for three tube set... Complete parts for a three tube set, including drilled panel, original Monodial and \$17.95 Blue Print...'.



# 30 Minute A-B-C Lessons for Radio Beginners

## Chapter XIII—The Radio Detective

By P. E. Edelman

**I**N THIS series of articles the story of Radio is told in so simple a manner that the uninitiated can follow theory and practice whether or not he knows anything about electricity or its application to broadcasting and reception. The series consists of twenty-five chapters, of which the five next will be:

Chapter XIV—Tuning In.  
Chapter XV—Working Through Interference.  
Chapter XVI—The Power Voice of Radio.  
Chapter XVII—Reproducers, The Finishing Touch of Radio.  
Chapter XVIII—The Hero Circuits of Radio.

**D**ETECTING Radio waves requires a device called a detector, which really is a rectifier or means for converting alternating Radio frequency current into direct flowing current. Notice the term "direct flowing" differs from the word "direct" as the latter implies a con-

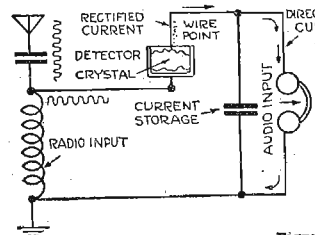


Figure 124

tinuous flow. The output current from a detector is uni-directional but not steady, as it comprises a series of rectified half cycles which must be smoothed out into a steady current fluctuation by means of a condenser or inductance in the circuit to which it is connected.

### What a Detector Does

Detectors are of various types but the kinds in most use today are the crystal rectifier and electron tube rectifier. A crystal detector consists of a metal wire or mineral contacting with a crystalline mineral material, and has the property of letting electric current flow much easier in one direction through it than reversely. A common form is the lead sulphide called galena as found in mines or made from lead and sulphur in the laboratory. Galena crystals are cubical and certain varieties operate better than others. The metal point touching the galena may be a fine silver or gold wire or plain copper, and is sometimes known in the Radio trade as a "cat whisker."

A detector comprises the crystal, its holder, the wire point or "cat whisker," and some means for adjusting the pressure and position of the wire on the crystal. The sensitivity of a crystal depends on the smallest amount of energy which it can rectify as well as its ability to rectify all the Radio energy supplied to it. When two crystals, such as zincite and hornite are used, considerable pressure can be applied to make a more stable detector. There are many mineral and chemical compounds which can be used.

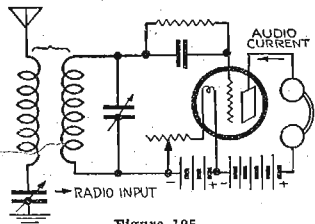


Figure 125

Sometimes the detector is made in permanent form instead of with adjustable contact. When a permanent combination stops its rectifying action it has to be renewed.

A crystal detector requires no local energy from a battery and operates directly on the Radio frequency input as illustrated in Figure 124. The Radio frequency current flowing in the tuned aerial circuit can flow through the detector crystal, but, with perfect rectification, one half cycle only passes. A condenser is used to collect the direct flowing half cycles from the detector output, and a direct flowing current from this condenser reproduces the original voice current pulsations into the audio output or headphones.

The reason why the range of a crystal set is limited is that it actually operates

on the amount of incoming energy received. In the case of a vacuum tube detector, the incoming energy only needs to control local energy input from a battery.

### Vacuum Tube Detector

The two electrode vacuum tube is little used today and its action is much the same as in the case of a crystal detector. In the three electrode detector tube, aside from rectification there is an energy boosting effect, and in general use of vacuum tubes, the detector action is accomplished by a boost in energy value, or amplification.

Figure 126 shows a simple audion or vacuum tube circuit in which the incoming Radio frequency energy is partially rectified and partially amplified by repeating into the plate circuit.

There are two general types of vacuum tubes, one highly evacuated (hard) and the other containing some residual gas (soft). The latter are the more sensitive because they can be operated at critical conditions in which a tiny change on the grid means a large change in plate cur-

as illustrated by Figure 127, at the bend in the characteristic performance curve, the best result is obtained. That is the purpose of the vernier control on the

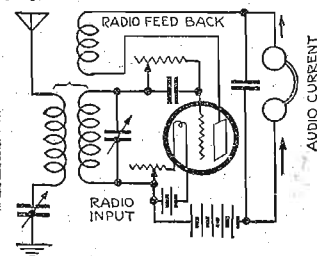


Figure 126

filament rheostat and why also variable grid leaks and, other times, a potentiometer is used, thus obtaining operation on the most favorable detecting portion of the characteristic curve.

### Other Types of Detectors

The softion tube is a rectifier in which the beneficial ionization effect of the element sodium increases greatly the sharpness with which the plate current changes with a slight change of grid potential. This makes for a more sensitive detector action independent from regeneration. Regeneration is really an amplification effect.

Four element tubes are really combined amplifiers and detectors. In any case, the true detector action of the tube determining its sensitivity is the smallest value of Radio current it can operate on and its ability to rectify all of the Radio current input.

### Combinations with Crystal Detector

When imperfect rectification results from use of a hard tube as a detector, it

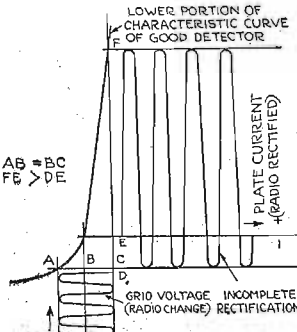


Figure 127

is sometimes an advantage to combine this action with a detector or rectifier of the crystal type. Nowadays this is usually done in a reflex type of circuit so that the tube acts principally as an amplifier, with the separate crystal detector doing most of the rectification.

(We are beginning to learn that a great deal depends on proper tuning. You cannot revolve the dials most any way and get good reception. The right combination is necessary and many who think

they have it are a long way from the best. The next article in this series has to do with the proper tuning. Read it and be informed.—Editor's Note.)

### Wire Holder for Coil Winding

The steel clip shown in Figure 1 may be purchased from a stationary store and is known as a banker's clip. These make good clips for holding the wire on a coil in the winding process and while twisting it to make taps. Use two of the clips as shown and the twist can be easily made and the tap soldered in a neat manner.

If the well-known Radio clip does not fit your screw shank, or if you cannot press it down on account of the screw head interfering cut it with a pair of snips as shown by the dotted line in

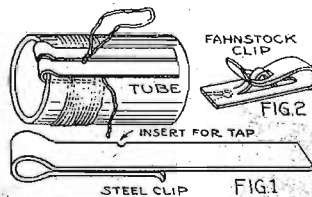
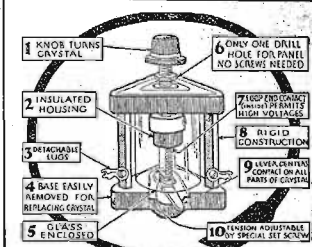


Figure 2. If the cut is made right it will fit most any screw, or it can be easily slipped under a screw that is already partly driven.—Ferdinand G. Long, Brooklyn, N. Y.

### How to Revive Tubes

If the B battery voltage is accidentally applied to the vacuum tube and the filament of the tubes do not burn out they are made inactive unless a plan is made to "brake" them. This consists of leaving them lighted in the sockets for a half hour or so without the B battery connected. This generally restores them to normal working condition.



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**Double Adjustable Crystal Detector**

At last the experimenter who has searched for the ideal crystal can now depend upon a perfect detector. The new Freshman Double Adjustable Crystal Detector has met every requirement of the ideal unit. It affords uninterrupted, noiseless, distortionless reception, yielding extraordinary volume with entire absence of squeals and howls often introduced by vacuum tube detectors.

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Freshman Double Adjustable Crystal Detector for panel or base set complete ..... **\$1.50**

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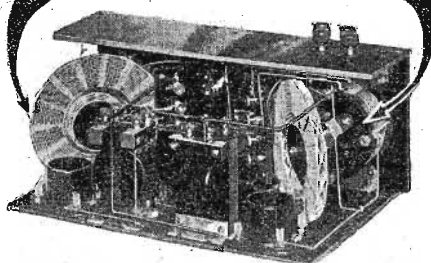
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# Smoothing Out and Reducing Static Trouble

## Summer Reception May be Made More Pleasant

By I. R. Tannehill

**T**HE majority of static eliminators make their appearance in the winter season when there is little such interference to be overcome. When the real reason of atmospheric arrives these so-called eliminators disappear. This is probably due to the fact that the inventor discovers to his chagrin that the eliminator is of no value when pitted against the terrific, hissing, crashing discharges of the summer season.

There is then nothing much left for the listener to do, since those devices which are of some value are because of their cost and complexity of construction, beyond his resources.

Practically all listeners are willing and anxious to make any sort of experiment that offers any promise of success in this regard. For this reason only and not with any positive statements as to what may be expected, the writer ventures to offer the following to be of some possible use in reducing the static annoyance.

The methods outlined here will result in some diminution of the volume of reception and the head phones will in many cases be necessarily substituted for the loud speaker.

### Receiver Silent in Operation

For the same reason—probable diminution of volume—it is essential that the receiver be absolutely silent in operation. In the winter season the broadcast programs are received with considerable intensity, sufficient to mask slight receiver defects which result in hissing and scratching sounds. Along with the increased intensity of static interference with coming summer, broadcast reception seems to weaken. This is probably due to two causes: The conditions which give rise to atmospherics are also unfavorable to transmission; the heavy crashes of static in the receiver so irritate and numb the auditory nerves that they are temporarily insensitive to the intermittent snatches of music or speech. This latter view is corroborated by the fact that the listener usually finds that retreating some distance from the loud speaker or removing the phones a little distance from the ears serves to increase the ration of broadcast reception to static.

For these and other reasons it is exceedingly important that the receiver be silent in operation. When this has been accomplished and the receiver is at maximum efficiency, the listener is in a position to pick up with some satisfaction the diminished energy yielded by selective and smoothing devices.

It is well known that high capacities are used successfully in transmitting circuits to smooth out the generator interference and in the same manner capacities in the receiving circuit absorb some of the harshness of the static discharges.

### Condenser and Coil in Aerial Circuit

To begin with, a very selective receiver is essential. Even with circuits ordinarily considered selective, the use of a separate antenna coil shunted by a condenser for tuning is quite useful. This coil should be connected directly between the antenna and ground, shunted by a variable condenser of capacity .00025 or .0005 mfd., the proper number of turns to the coil to be determined by experiment, probably about 40 to 50.

With a receiver silent in operation it is surprising the distance to which this separate coil may be moved from the receiver and still an appreciable amount of energy transferred to the receiver. The farther the coil is removed the more the static interference is reduced, but the broadcast reception is likewise diminished. The crashes of static are, however, apparently less frequent. There is a limit to which this selectivity may be increased. At a certain point in the process the static is no longer perceptibly diminished—this is because the windings of the receiver, the transformers, tuning coils, etc., themselves pick up a certain amount of the static directly which is not affected by the coupling. Therefore shielding is useful, but in any event the coils should be a distance where improvement is no longer possible and probably in most instances: returned about one-third the distance to the receiver tuning coil. At this point the volume of reception should be fairly good though considerably diminished.

The static crashes should appear somewhat less frequent because of this increased selectivity, though still annoy-

ing and of a harsh, hissing character, extremely disagreeable.

### Telephone By-Pass

The second consideration is a good telephone by-pass of not less than .001 mfd. capacity. If audio frequency transformers are used, this fixed condenser should by-pass the primary of the transformer.

Across the secondary of the first audio frequency transformer place a fixed condenser of capacity somewhat between .0005 mfd. and .005 mfd., this to be determined by experiment. Capacities at and above .005 mfd. may result in almost complete suppression of reception. Good fixed condensers should be used, there being little excuse for the paper wrapped fixed condensers, as good mica condensers are reasonable in price. The secondaries of the subsequent audio frequency transformers, if any, should also be shunted by fixed condensers.

It will be found that the higher the condenser capacity, the more completely will the extremely harsh and hissing sound of the static crash be eliminated.

### Grid Leaks Required

Leaks across the terminals of the transformers, made with a soft lead pencil, may also improve reception. It is important in any circuit in the static season that sufficient grid leakage be provided from the grid to filament of each tube as this serves to carry off the static charge which may otherwise result in temporary choking of the grid circuit and result in ragged reception, another static annoyance which is thus partially eliminated.

The condensers across the transformers not only smooth out and absorb the static shock, like shock absorbers on an automobile, but they remove much of the shock and numbing effect upon the ear, thus leaving the nerves sensitive to the intermission in which music or speech is being received.

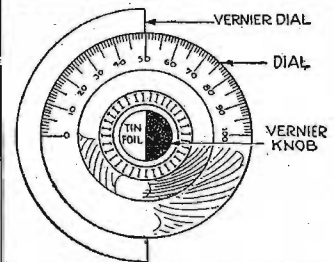
This method of attack has several advantages. In the automobile analogy, we do not attempt to remove the rough places from the road; we drive in such a way as to avoid the bumps and provide shock absorbers to make riding agreeable. Similarly, we use an extremely selective coupling to dodge the static bumps as

much as possible and then provide leaks and capacities to absorb and remove the charges and render them less irritating to the nerves, thus leaving frequent intermissions in which the nerves are sensitive to the improved reception. A certain amount of atmospheric interference will inevitably reach the receiver, but we drain it off and absorb it as quickly as possible, instead of leaving it to numb the nerves and choke the circuit until another shock makes it continuous. When we view a motion picture we are not aware that the interruptions are taking place as the separate images are impressed upon the screen. In the same manner, we may provide intermissions in the static interference so that their constant recurrence leaves upon the ear the impression of an almost continuous program.

These are by no means intended as positive statements. The reader may try these experiments and decide for himself whether there is improvement.

### Vernier Indicator

Procure a piece of tin-foil the size of the vernier knob and cut it in two across the center, glue one-half on the knob in



the same position as the vernier plate, then whatever the position of the vernier, the silvered face of the knob will indicate the exact position of vernier plate.—Emory E. Phelps, Rockville, Conn.

# LONDON, England, on 3 TUBES

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## THE NEW DE LUXE AMBASSADOR

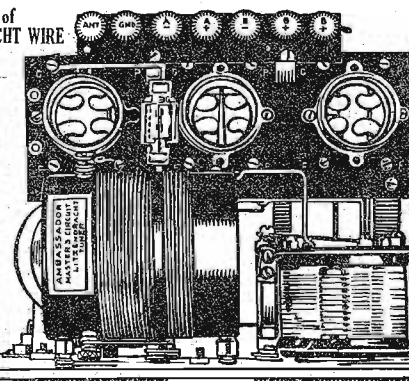
COMPLETE SET ready to wire just like the picture shows . . . . . \$25.95 C.O.D. No Deposit

Operated before an invited committee, fifty stations were calibrated between points 10 and 89 on the condenser dial; nine between points 14 and 20; eleven between 41 and 48; all with ease of control and freedom from objectionable noise. Then night after night these same stations were picked up on the same condenser points. Another test for speed in tuning heard 49 sign off from Cuba to Los Angeles in 8½ hours.

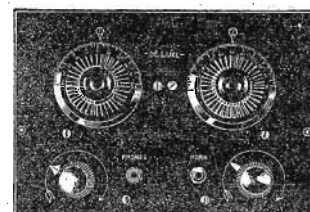
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**Thursday:** CKAC, KDKA, KPI, KPAC, KPNE, KPFG, KGO, KGW, KHI, KJS, KPO, KSD, KYW, WBAP, WBBR, WBZ, WCAE, WCB, WCX, WDAF, WDAW, WEA, WEAQ, WFAA, WFI, WGI, WGY, WHAS, WHB, WHN, WIP, WJAX, WJZ, WKAQ, WLAG, WLS, WMAQ, WMC, WOA, WOC, WOR, WOS, WPAL, WSB, WTAS, WWJ.

**Friday:** CKAC, KDKA, KPI, KPAC, KPNE, KPOA, KQV, KGW, KPO, KQV, KSD, KYW, WBAP, WBAW, WBZ, WCAE, WCAP, WCX, WDAF, WDAW, WEA, WEAQ, WFAA, WFI, WGAZ, WGI, WHAS, WHB, WHK, WHN, WIP, WJY, WJZ, WKAQ, WLAG, WLS, WMAQ, WMC, WOA, WOC, WOR, WOS, WPAL, WSB, WTAS, WWJ.

### Thursday, June 12

(Continued from page 11)

**Mink** accompanist; 4:30-5:30, **Children's Fair-** hotel orchestra; 5:30-6:30, children's hour 40-45, "The House of the Future," radio orchestra; 6:30-7:30, **Children's Fair-** hotel orchestra; 8-9, Theodore J. Irwin, organist; 9-10, **Extra Wilson**, soprano; **Norman Simon**, pianist; **Festo G. Agave**, violinist; **Alfred Brown's** Vocal Trio band.

**KQV, Pittsburgh, Pa.** (Eastern, Daylight, 270), 11-11:30 a. m. music; 1-1:30 p. m. luncheon music; 3:45-4:15, matinee music; 5-5:30, Daylight Tunes; 5:30-6:30, **Music for the kiddies**; 6:30-7:30, **Music for the kiddies**; 7:30-8:30, dinner concert, **Congress Hotel**; 8-8:30, "Twenty Minutes of Good Reading," **Rev. C. J. Bennett**; 8:30-9:30, **Children's Fair**; 9:30-10:30, **Children's Fair**; 10:30-11:30, **Children's Fair**; 11:30-12:30, **Children's Fair**.

**WAF, Fort Worth, Texas** (Central, 476), 9:30-10:15 p. m. **Banqueters' Band** concert, masters of Texas music; 10:15-11:30, **Children's Fair**; 11:30-12:30, **Children's Fair**.

**WBAP, Columbia, Mo.** (Eastern, 300), 12 m., religious concert, **Rev. Andrew W. Blackwood**, pastor in-charge; **Frederick** quartet; sacred music; 1:30-2:30, **Children's Fair**; 2:30-3:30, **Children's Fair**; 3:30-4:30, **Children's Fair**; 4:30-5:30, **Children's Fair**; 5:30-6:30, **Children's Fair**; 6:30-7:30, **Children's Fair**; 7:30-8:30, **Children's Fair**; 8:30-9:30, **Children's Fair**; 9:30-10:30, **Children's Fair**; 10:30-11:30, **Children's Fair**; 11:30-12:30, **Children's Fair**.

**WBZ, Springfield, Mass.** (Eastern, Daylight, 337), 6-7 p. m., dinner; 7-8, **Children's Fair**; 8-9, **Children's Fair**; 9-10, **Children's Fair**; 10-11, **Children's Fair**; 11-12, **Children's Fair**.

**WCAE, Pittsburgh, Pa.** (Eastern, Daylight, 462), 4:30 p. m., **Children's Fair**; 5-5:30, **Children's Fair**; 5:30-6:30, **Children's Fair**; 6:30-7:30, **Children's Fair**; 7:30-8:30, **Children's Fair**; 8:30-9:30, **Children's Fair**; 9:30-10:30, **Children's Fair**; 10:30-11:30, **Children's Fair**; 11:30-12:30, **Children's Fair**.

**WCBZ, Zion, Ill.** (Central, 345), 8 p. m., **Brass quartet**; 8:30-9:30, **Children's Fair**; 9:30-10:30, **Children's Fair**; 10:30-11:30, **Children's Fair**; 11:30-12:30, **Children's Fair**.



Victor Arden, clever manipulator of the Ivories, is one member of the popular team of Ohmon and Arden. Tune in Sunday for WEAF. Margaret Blakeslee (right), the "Dancing Queen" of WGR, is the headliner Thursday, p. m., June 12.

### Friday, June 13

**WDAF, Philadelphia, Pa.** (Eastern, Daylight, 365), 11:45 a. m., daily almanac; 12:05 p. m., organ recital, **Stanley Decker**; 12:30, **Aracelia Gale** concert; 2:30, **Aracelia Gale** concert; 3:30, **Aracelia Gale** concert; 4:30, **Aracelia Gale** concert; 5:30, **Aracelia Gale** concert; 6:30, **Aracelia Gale** concert; 7:30, **Aracelia Gale** concert; 8:30, **Aracelia Gale** concert; 9:30, **Aracelia Gale** concert; 10:30, **Aracelia Gale** concert; 11:30, **Aracelia Gale** concert; 12:30, **Aracelia Gale** concert.

**WGR, Buffalo, N. Y.** (Eastern, Daylight, 492), 11:45-12:15 a. m., talk, **Garden Magazine**; 5:30-6:30, **Children's Fair**; 6:30-7:30, **Children's Fair**; 7:30-8:30, **Children's Fair**; 8:30-9:30, **Children's Fair**; 9:30-10:30, **Children's Fair**; 10:30-11:30, **Children's Fair**; 11:30-12:30, **Children's Fair**.

**WHA, Madison, Wis.** (Central, 360), 1:30 p. m., garden talk, **Colfax Ohio State university faculty**; 1:45, **Colfax Ohio State university faculty**; 2:00, **Colfax Ohio State university faculty**; 2:15, **Colfax Ohio State university faculty**; 2:30, **Colfax Ohio State university faculty**; 2:45, **Colfax Ohio State university faculty**; 3:00, **Colfax Ohio State university faculty**; 3:15, **Colfax Ohio State university faculty**; 3:30, **Colfax Ohio State university faculty**; 3:45, **Colfax Ohio State university faculty**; 4:00, **Colfax Ohio State university faculty**; 4:15, **Colfax Ohio State university faculty**; 4:30, **Colfax Ohio State university faculty**; 4:45, **Colfax Ohio State university faculty**; 5:00, **Colfax Ohio State university faculty**; 5:15, **Colfax Ohio State university faculty**; 5:30, **Colfax Ohio State university faculty**; 5:45, **Colfax Ohio State university faculty**; 6:00, **Colfax Ohio State university faculty**; 6:15, **Colfax Ohio State university faculty**; 6:30, **Colfax Ohio State university faculty**; 6:45, **Colfax Ohio State university faculty**; 7:00, **Colfax Ohio State university faculty**; 7:15, **Colfax Ohio State university faculty**; 7:30, **Colfax Ohio State university faculty**; 7:45, **Colfax Ohio State university faculty**; 8:00, **Colfax Ohio State university faculty**; 8:15, **Colfax Ohio State university faculty**; 8:30, **Colfax Ohio State university faculty**; 8:45, **Colfax Ohio State university faculty**; 9:00, **Colfax Ohio State university faculty**; 9:15, **Colfax Ohio State university faculty**; 9:30, **Colfax Ohio State university faculty**; 9:45, **Colfax Ohio State university faculty**; 10:00, **Colfax Ohio State university faculty**; 10:15, **Colfax Ohio State university faculty**; 10:30, **Colfax Ohio State university faculty**; 10:45, **Colfax Ohio State university faculty**; 11:00, **Colfax Ohio State university faculty**; 11:15, **Colfax Ohio State university faculty**; 11:30, **Colfax Ohio State university faculty**; 11:45, **Colfax Ohio State university faculty**; 12:00, **Colfax Ohio State university faculty**.

**WHA, Madison, Wis.** (Central, 360), 7:30 p. m., "Northwestern Historical League Contest and Its Meaning," **W. W. West**; 8:00, **W. W. West**; 8:30, **W. W. West**; 9:00, **W. W. West**; 9:30, **W. W. West**; 10:00, **W. W. West**; 10:30, **W. W. West**; 11:00, **W. W. West**; 11:30, **W. W. West**; 12:00, **W. W. West**.

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### DANCING

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**W. W. West**; 8:00, **W. W. West**; 8:30, **W. W. West**; 9:00, **W. W. West**; 9:30, **W. W. West**; 10:00, **W. W. West**; 10:30, **W. W. West**; 11:00, **W. W. West**; 11:30, **W. W. West**; 12:00, **W. W. West**.

**W. W. West**; 8:00, **W. W. West**; 8:30, **W. W. West**; 9:00, **W. W. West**; 9:30, **W. W. West**; 10:00, **W. W. West**; 10:30, **W. W. West**; 11:00, **W. W. West**; 11:30, **W. W. West**; 12:00, **W. W. West**.

**W. W. West**; 8:00, **W. W. West**; 8:30, **W. W. West**; 9:00, **W. W. West**; 9:30, **W. W. West**; 10:00, **W. W. West**; 10:30, **W. W. West**; 11:00, **W. W. West**; 11:30, **W. W. West**; 12:00, **W. W. West**.

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AIR FROM PITTSBURGH SATURDAY, JUNE 14

Where to Hear Talks

TALKS, instructive, serious, humorous and even frivolous, are broadcast daily and below are listed the stations.

- Wednesday: KFAC, KFOA, KGO, KGW, KHJ, KPO, KQV, KYW, WBAH, WBEB, WBZ, WCX, WDAF, WDBA, WDEA, WGI, WHA, WLB, WLR, WMAQ, WMO, WPA, WPC, WWC, WWC.
Thursday: KDKA, KYW, WAAW, WAAV, WBEB, WBZ, WCAE, WDAF, WDBA, WEA, WEA, WFAA, WGI, WHAS, WHB, WIP, WJAZ, WJZ, WMAQ, WMO, WPA, WPC, WWC, WWC.
Friday: KFOA, KGW, KHJ, KYW, WAAW, WBEB, WCAE, WDAF, WDBA, WEA, WEA, WFAA, WGI, WHAS, WHB, WIP, WJAZ, WJZ, WMAQ, WMO, WPA, WPC, WWC, WWC.

- WCAE, Pittsburgh, Pa. (Eastern, Daylight, 462), 3 p. m.,...
WFL, Philadelphia, Pa. (Eastern, Daylight, 395), 1 p. m.,...
WGI, Medford Hillside, Mass. (Eastern, Daylight, 360), 7 p. m.,...
WGR, Buffalo, N. Y. (Eastern, Daylight, 319), 12:30-1 p. m.,...
WGS, Schenectady, N. Y. (Eastern, 380), 8:30 p. m.,...
WHA, Louisville, Ky. (Central, 411), 4:5 p. m.,...
WHB, Kansas City, Mo. (Central, 411), 2-3 p. m.,...
WHN, New York, N. Y. (Eastern, Daylight, 360), 10-11 p. m.,...
WIP, Philadelphia, Pa. (Eastern, Daylight, 509), 1:00 p. m.,...
WJZ, Newark, N. J. (Eastern, Daylight, 405), 2:30 p. m.,...
WMA, Minneapolis-St. Paul, Minn. (Central, 417), 10:45-11:15 a. m.,...
WMAQ, Chicago, Ill. (Central, Daylight, 447), 8:30 p. m.,...
WMO, Memphis, Tenn. (Central, 500), 8:30 p. m.,...
WOW, Omaha, Neb. (Central, 526), 8 p. m.,...
WPA, Davenport, Iowa (Central, 484), 12 m.,...
WOO, Philadelphia, Pa. (Eastern, Daylight, 509), 11 a. m.,...
WOW, Newark, N. J. (Eastern, Daylight, 405), 7:30-8:30 p. m.,...
WPS, Washington, D. C. (Eastern, 463), 6 p. m.,...
WRA, Cleveland, Ohio (Eastern, 390), WEAM Dance orchestra, Ev Jones, director; J. E. Morris, tenor.
WRF, Detroit, Mich. (Eastern, 517), 8 p. m., setting-up exercises, Ed Horton, m. m., Detroit News orchestra; 7, Detroit News orchestra.

Marian Brewer (left), a member of the WGY Opera Company, will be heard over this station June 12. Matilda Brooks (above), winner of the world's first Radio Beauty contest, will give a unique song recital Monday, June 16, at 10:30 p. m. Young and Carl.



- 6-30, sport hour, "Surf Riding in Minnesota," John McGovern; 7:30-8:15, film lectures, "Man as an Agricultural Aid, Dr. F. E. Foulk"; "Like Insurance 3-4, Mutual Insurances"; 8:15, business messages; 9:30, musical program.
WLS, Chicago, Ill. (Central, Daylight, 345), 1-2 p. m.,...
WMAQ, Chicago, Ill. (Central, Daylight, 447), 8:30 p. m.,...
WMO, Memphis, Tenn. (Central, 500), 8:30 p. m.,...
WOW, Omaha, Neb. (Central, 526), 8:30 p. m.,...
WPA, Davenport, Iowa (Central, 484), 12 m.,...
WRA, Cleveland, Ohio (Eastern, 390), WEAM Dance orchestra, Ev Jones, director; J. E. Morris, tenor.
WRF, Detroit, Mich. (Eastern, 517), 8 p. m., setting-up exercises, Ed Horton, m. m., Detroit News orchestra; 7, Detroit News orchestra; 7:30, Detroit News orchestra; 8:30, special orchestra; 8:30, special orchestra; 8:30, special orchestra; 8:30, special orchestra.

Saturday, June 14

- WFL, Philadelphia, Pa. (Eastern, Daylight, 395), 1 p. m.,...
WGI, Medford Hillside, Mass. (Eastern, Daylight, 360), 7 p. m.,...
WGR, Buffalo, N. Y. (Eastern, Daylight, 319), 12:30-1 p. m.,...
WGS, Schenectady, N. Y. (Eastern, 380), 8:30 p. m.,...
WHA, Louisville, Ky. (Central, 411), 4:5 p. m.,...
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WRF, Detroit, Mich. (Eastern, 517), 8 p. m., setting-up exercises, Ed Horton, m. m., Detroit News orchestra; 7, Detroit News orchestra; 7:30, Detroit News orchestra; 8:30, special orchestra; 8:30, special orchestra; 8:30, special orchestra; 8:30, special orchestra.

Monday, June 16

(Continued from page 13)

WBAN, Minneapolis, Minn. (Central, 417), 12:30-1:30 p. m. Dick Lewis' trio and soloist; 9:30-11:30 p. m. L. V. Peterson, tenor; Henry Besseman, accompanist; Arthur Fazio, violinist.

TABLE FOR MAKING TIME TRANSITIONS

Table with 12 columns representing Eastern Daylight Saving Time (1-12) and 12 rows representing Eastern, Central, Mountain, Pacific, and other time zones.

HOW TO USE. If a station is giving a program at 8 o'clock Mountain daylight saving time and you wish to find what this is equivalent to in Eastern time, find 8 o'clock in the third or Mountain daylight saving row. Then immediately above it in the same vertical column will be found the figure 9 in the Eastern time row. This indicates that the program would be heard at 9 o'clock Eastern time.

WIP, Philadelphia, Pa. (Eastern, Daylight, 509), 9 p. m. Cameo trio; 6:00, 81 James hotel orchestra; 7:00, Duke Wirt's bedtime doxies.

WAAW, Omaha, Neb. (Central, 350), 8-9 p. m. St. Louis Lutheran church choir. WBAF, Fort Worth, Texas (Central, 476), 9:30-10:15 p. m. concert, Jackson family French harp artists.

Tuesday, June 17

WBB, Atlanta, Ga. (Central, 429), 8-9 p. m. Lewis Grand Vaudeville theater featuring Georgia Serradars orchestra; 10:45, Ritz Harmony sop.

Where to Hear Dramas

DRAMAS, humorous, serious, musical comedies and even operettas are broadcast during the week. Below are the stations and dates.

- Wednesday: KDKA, opera, "The Violin Maker of Cremona"; WLW, one act play, "The String of the Samisen." Friday: WGY, "The Boss." WGY Players. Saturday: KGO, "Nothing But the Truth." KGO Players.

CORRECTION IN CIRCUIT

On page 15 of the May 31 issue, the diagram showing the circuit for the "Talking and Singing Sultans" was found to have a mistake in the next issue we will show the circuit as it should be with all corrections made.

Variable Condenser Data

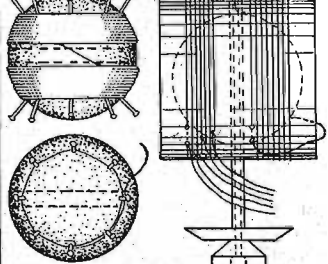
Sir Oliver Lodge formed the first tuned Radio circuit when he connected a condenser to an inductance, and the step helped Radio advance from the laboratory to be of commercial service.

A condenser having .001 mfd. capacity is usually used in tuning low resistance antenna circuits, in a loop receiving circuit, in a wavemeter and in a Radio filter.

A condenser in series with the antenna decreases the wave length and the smaller the capacity the greater will be the cut in wave length. If 600-meter commercial code stations interfere with reception of broadcasting stations, the series condenser will help to eliminate the dots and dashes if the antenna is not too large.

Novel Reinartz Coil

Materials needed for making this coil are 1 3/4-inch cork ball; 1 tube, 3/4-inch, 3/4-inch outside diameter, by 3/4 inches



long; 1 ordinary lead pencil; 1 binding post, or 4-ounce d.c.c., or s.c.c. wire, No. 22, 24, or 26 gauge.

Find a diametrical center on the cork ball which is to be the rotor, and from this center make a circle of 1 inch radius. On the exactly opposite spot repeat this operation. Then, in one circle, force four 1/4 inch wire nails into the ball. Place them at equal distances by quartering. Between these insert four or more other nails. Secure an end of the wire to one nail, leaving 6 inches free, and begin by winding one turn against the nails, another turn against the first, and so on until 15 turns have been wound on.

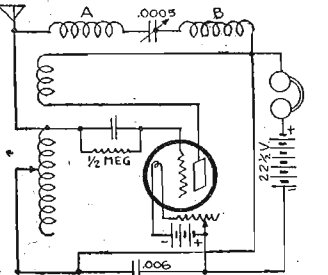
Secure the wire firmly, while as many nails as were put in the first circle are put in the second. Proceed as before and, when 15 more turns have been wound, leave 6 inches free and connect the other end to end of the first winding. With a large needle it is not difficult to thread the 6-inch leads through the ball to the center and bring out through bare space. Near these drills a hole a little smaller than an ordinary lead pencil, but take care not to come in contact with the wires.

Put this half of the pencil through the stator and rotor and after connecting the two nearest leads of rotor and stator, thread the other lead of rotor through hole in pencil and bring out through the groove. Then connect to binding post in the 1/2-inch space. Put other half of pencil through, and shaft will be complete. Where the craser has been, a 1/4-inch dial will fit nicely.

Various improvements may be made if one wishes to go to the extra work. Brass or copper plates may be fastened on the stator tube for shaft to turn on. The shaft may be hollow brass rod instead of a pencil, if desired. The coupler may also be mounted on a base. Other improvements may be made if the builder sees fit.—Henry Cox, Youngstown, Ohio.

Flewelling Set

The accompanying illustration shows an excellent Flewelling set. Tuning on it is extremely sharp. I live but a few miles from New York stations and I can tune any of them out at will. It is a



very good DX set and when properly operated it will give enough volume to operate a loud speaker. It can be used equally well with or without a ground. Coils A and B are the rotor and stator respectively of a split variometer.—D. V. Kane, Brooklyn, N. Y.

# Compact Nine-Tube Super-Heterodyne Set

## Part II—Panel Drilling and Parts Assembly

By Harry Abbott

THE equipment on the baseboard, as shown in Figure 2, is mounted in four rows and, looking at the diagram, reading from left to right: in the front row; the oscillator coupler, the second audio transformer and the first audio transformer; in the second row, the first detector, the oscillator, the second audio, the first audio and the second detector sockets; in the third row, the tuned coupler and the first, second, third and fourth long wave amplifier tube sockets.

This all sounds like a good deal, and is, but since a super-heterodyne receiver is the only set that will give one long distance loud speaker range on a loop and satisfactory selectivity that is necessary. It is a pleasure to get this apparatus nicely mounted and wired; the cutting, fitting and placing of the shielding is the unpleasant part and there is considerable grief attached to it. It is necessary though because of the compactness secured.

We now come to actual construction of the set. The panel should be 1/4-inch bakelite, formica, condensite or hard rubber and to measure 24 inches by 8 inches. Starting at the bottom are two holes near the center of the left edge 5/8-inch apart; these are for the binding posts to which the loop or secondary terminals of a variocoupler are attached. Near this edge, and about 1 inch from top and bottom, are two more holes for the shields. The hole in the upper left corner is for a screw which fastens the panel to the cabinet. The five holes across the bottom are for attaching the panel to the baseboard by means of flat-head wood screws.

The four groups of holes to the left of the center are for condensers, grid leak and potentiometer. If instruments of any other makes than those shown in the illustrations are used, consider only the shaft holes and make the shaft holes of your templates coincide with the shaft holes of my layout. I mentioned earlier that some readers might like to use a fifth rheostat; it can be placed between the grid leak and potentiometer and in line with them. The two holes on a vertical line just to right of the center are for shields.

### Holes Necessary in Panel

The groups of holes toward the right hand end of the panel are labeled with the exception of the jack and binding post holes. From left to right the three 7/16-inch holes near the bottom are second stage audio, first stage audio and detector. Along the right edge are six holes on a vertical line to take the six binding posts for battery connections. Reading down from the top, Number 1 is plus 45 for the detector plates; Number 2 is the plus 90 of the Radio frequency amplifiers; Number 3 is the plus A and minus 45; Number 4 is the minus A, plus C, the minus of the B used on the Radio frequency amplifiers and the minus of the B used on the audio amplifiers; Number 5 is the minus C; Number 6 is the plus 90 of the audio frequency amplifiers.

The same suggestion applies to this half of the panel as to the left half; if you do not use the instruments I used, take only the shaft holes and center your templates on them. The hole in the upper right corner is for attaching the panel to the cabinet with a flat-head wood screw.

### Assembling the Parts

This set may be assembled in two parts; the panel as an assembly, the baseboard as another. If instruments, no matter what the make, are centered as shown in the panel and baseboard layouts, the two assemblies will go together without trouble. At this point the question comes up of shielding the panel. I did not shield mine but while this omission seems to result in no ill effects and I am not bothered with hand capacity, several good reasons have been pointed out by friends why this would be advisable. Among these reasons are the fact that waves from long wave stations can go through the panel and be heard, and that static on longer wave lengths will also affect my set. If the reader desires to make a shield for the panel, the panel layout can be used for centering holes but the holes themselves should be large enough to clear any metal parts of instruments which are "live"; that is, in the circuit. Drawings for all other shields are given.

Passing now to the baseboard layout, which is Figure 2, it will be seen that not only are the locations of instruments given but the placing of shields as well. The baseboard should be made of laminated board containing five thin strips the grain of which alternate in direction. The dimensions are 23 11/16-inches by 13 inches which will make the set somewhat deeper than usual but much shorter than would be the case if all nine tubes were put in a row. In Figure 2 locations are given so that any make apparatus may be used. It will be found that all long

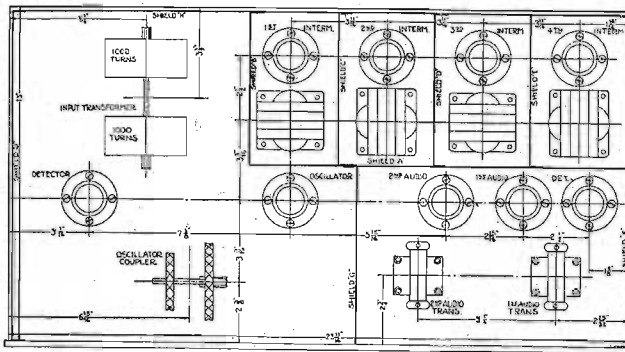


Figure 2.

wave transformers are pretty much the same in size, which fact applies to the tube sockets.

Since I preferred the 199 and 299 class tubes my drawing shows sockets of that size but there is ample leeway if one prefers to put in the larger tubes and sockets. The front row of sockets is moved forward slightly, the rear row slightly back and storage battery tube sockets will go in nicely. Another difficulty that some might encounter occurred to me as I left plenty of room around the oscillator coupler should any readers be unable to secure one like mine.

Should you be unable to get one of the diamond wave type, use one you have. Either a 90 degree or 180 degree coupler will do, or some makes of variometers can be utilized. Remove turns from the center of the stator until 20 are left at each end. One set of 20 turns is the grid coil, the other set, is the plate coil. Remove all but 15 turns on the rotor as a "pick-up" coil. Three honeycomb or

duo-lateral coils mounted on a wooden rod will do as well. A 35-turn coil for the grid circuit in the middle, a 25-turn on one end for the plate and a 20-turn for "pick-up." The rod on which these slide should be parallel to the panel.

### Coils Used

The input transformer is placed at right angles to the coupler toward the rear of the panel. Any of four types of coils—honeycomb, crisscross-wound, curkoidal-wound or straight closely wound coils—seemed to work equally well in my set, with compactness favoring the crisscross no-air-cell type and sharpness favoring the curkoidal-wound variety. Each of the two coils used contains 1,000 turns and each is shunted with a .00025 condenser for most of the iron core long wave transformers available, whose peak efficiencies are 7,000 to 8,200 meters. One type operates on a longer wave and larger condensers must shunt the input transformers. The two coils should be arranged that they may be brought nearer

together or farther apart. Once set, they are left alone.

At this time there is no complete data on the manufacture of good wave iron core transformers although I happen to know that one maker puts 1,000 turns in the primary, 2,700 on the secondary and inserts an iron core measuring 3/8-inch by 1/2-inch made up of very thin, varnished laminations. The wire is crisscross wound by machine, the primary is about 3/8-inch wide, the secondary about 1/2-inch wide and they are slipped on the 2 1/2-inch long core. Try making them if you want to but I'd advise buying them. They are set alternately at right angles to another directly in front of the tube sockets.

### Manner of Construction

In constructing this outfit, begin at the rheostat end of the panel and put on the filament battery binding posts, the rheostats and the switch. Do all the wiring possible in connecting these units of the filament circuit. Then mount the grid leak between the rheostats and the binding posts, also the three jacks, but leave their wiring until after the panel and baseboard are brought together. Then go to the opposite end of the panel and put on the two loop binding posts and the tuning condenser and connect them. The first grid leak, the potentiometer and the oscillator condenser can also be put on, but very little wiring can be done on them as yet.

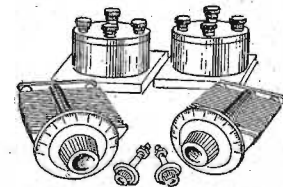
Proceeding now to the baseboard, first set all the parts on the board without screwing them down. Centering the sockets is easy as one has only to look down through the socket and get the (Continued on page 20)

### Long Distance Receiver

RESULTS SAME AS SUPER-HET.

## 7 to 9 Tube, With the New ROFFY No. 3

Circuit, using 4 Type 199 dry cell tubes, WITH LOUD SPEAKER. Only 2 controls; simple and inexpensive to operate. Eliminates great deal of static.



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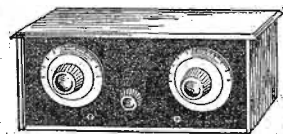
- 2 Roffy Hetro-Trans. No. 3
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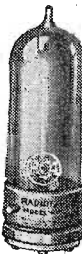
Greatest all-around efficiency over ANY circuit yet devised. No previous experience needed to wire up this set, owing to its extreme simplicity.



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Radiotron UV-199 for detection or amplification \$5.00

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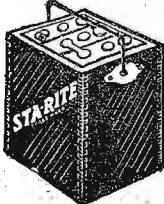
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24 V.		6 Volt 120 "	12.10
		6 Volt 150 "	14.00
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STA-RITE BATTERY CO. LOUISVILLE, KY.

Department 5

# Radio Digest

PROGRAMS  
Illustrated

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## New Outdoor Sport

Static Overcome by Use of Loop

THE possibilities of Radio as an outdoor sport are at last being realized. The rapid growth of the new art brought with it some mistakes. The biggest mistake was to let the idea get into the public mind that Radio couldn't be used in summer on account of static.

This of course is not true. It were so, the broadcasting stations would shut down. But you don't see any of them doing so! If it were true, people wouldn't go on building sets of the reflex type at the present rate.

The fact is that the conquest of static by the use of the loop antenna, the improvement of broadcasting, and the advent of portable sets which are really portable have now made it possible to enjoy Radio in the good old summer time as much as at other times of the year.

"What is vacation without a Radio?" has every prospect of becoming a slogan of nation-wide truth and application.

Summertime, too, is a good time to revamp an old set and have it ready for the busy days of fall when there is not so much time to experiment.

In a word, the year-around use of Radio now has a sound basis. The loop and the use of low-loss condensers in sets like the reflex made good results certain. Broadcasting stations in summer are increasing their sending power. When the summer days are longest, making it harder to broadcast over great distances, several of the more important stations have interconnected systems which covers the distance.

The attractions which Radio will have to offer this summer will be better than ever. Not only will the number and variety of programs be greater, but for the first time in history the proceedings of the nominating conventions of both political parties will be broadcast, and the subsequent campaigns for the election of a President will bring the drama and thrills of the contest to every set-owner.

## Right Legislation Needed

Old Law Obsolete for Present Day Requirements

SEVERAL million Radiophans have reason to wish that congress would find time, amid its multifarious investigations, to do a little legislative job that everyone knows needs doing.

Radio operations have been conducted under a law enacted in 1912, when wireless transmission was in a primitive form and Radio telephony was practically unknown. Such control as is now exercised over Radio comes mainly from extra-legal powers given Secretary Hoover by general consent of Radio interests. In the last session a sound regulative measure was introduced, but failed of passage. A new measure had been introduced which is calculated to reduce interference to a minimum and develop an orderly system of communication.

The bill would require all transmitting stations and operators to be licensed by the department of commerce, would provide for allocation of wave lengths and would authorize the president to close or control stations in time of war or other emergency. Owners of receiving sets would not be affected, except to have conditions for reception improved for them.

The present and ever growing magnitude of the Radio industry and its popular following deserve to have this measure taken seriously by congress.

## One Way to Aid Entombed Miners

Test Pave Way for Mine Communication

COMPACT Radio receiving and sending sets promise to become an indispensable part of the coal miner's equipment. Engineers of the Interior Department are about to solve, through Radio, the problem of communication, from a sending station to the entombed men, which would be of some value because of the psychological advantage to the men in knowing the progress of their relief and because the latter might be directed to places where rescue would be easier.

## RADIO INDI-GEST

### Me und Myer's Tube

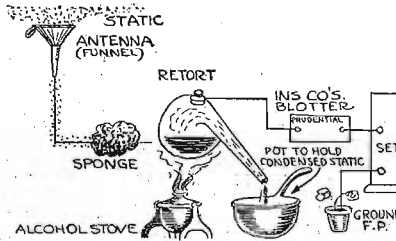
It vas vonce in New Amsterdam, dot place I can't forget,  
No matter how I try und try, I still tink of it yet;  
I tink of it und Myers, mine bosom friend vas he;  
If you vill hear mine story, den you'll remember me.  
Vore da dikos hold back da vater, und da vind mills  
spot da land.  
Lives mine old friend Oscar Myers mit his Radiola  
Grand.  
Ven by night it's nice und quiet und you do not hear a  
Peep.  
He starts his Radio and plays until he falls asleep.  
But hear me, all da peoples tink dot Myers is a boob,  
But he is not so dumb at all, because he has a tube  
Vot goes into his Radio, und he can get such stuff  
Dot no von else can get at all, und dot is good genuf.  
Dot little tube vot Myers got, can sing und talk und  
play!  
Last week it sang in Cherman, und French da oder day.  
It speaks and tells you stories every morning, night  
und noon.  
Und in da night dere's special stories for da sleeping  
room.  
Mine goodness, it's remarkable dot such a little ting  
Could speak just like da peoples, play da moozie and  
oan sing;  
It seems almost oxclusive, but I know chnst vot I  
know  
Because I heard it mine own self. You see I know it's so.  
BURT B. BARSOOK.

### Schopenhauer, Wasn't It?

Dear Indi: Friend Wife, in attempt to describe a creation seen recently in a milliner's window, spoke of it as resembling a basket-weave variometer with external ribs. Looked up said kelly and the description fitted to perfection. Who says the ladies take no interest?  
PAPRIKA.

### Won't the Announcers' Prize Do?

Dear Indi: You herewith have the pleasure of reading a letter from the greatest name in Radio—one who shall go down in history's pages as the greatest electrical wizard of the age. Why? Because, while scientists and engineers have been wracking their brains for years to overcome static, I, who know nothing about Radio, have invented a static eliminator that is the "cat's whiskers." Being by nature a philanthropist, I



am giving this invention free to the world. It is guaranteed to work, as my 12-year-old son, who knows all about Radio, says so.

The Anderson Static Separator works on the theory that static comes only with dampness in the air. In order, then, to do away with static it is necessary to dry the signals before they are detected. That is what the S. S. does, as the sketch shows.

For this free gift the only stipulation I make is that you propose me for the Nobel prize of 1924. Scientifically yours,  
W. ANDERSON.

### A Sweet Scented Joke

Dear Indi: A peculiar sense of humor caused someone to insert in one of the Cologne papers the statement that one of the biggest department stores had installed a receiving set (which is forbidden in Germany), and extending an invitation to all people to come down and listen in for nothing. When the many infuriated visitors went to the office of the newspaper to complain, they found it closely shuttered.  
LONDON BOBBY.

### Mrs. Partington Speaks Out

Dear Indi: Mizz Partington says the Senate has been making threats that they are going to use the people's money to build themselves a Broadcasting Station, as it won't cost them nothing, and they would make this one taxes free.

She thinks all the listeners should get a big petition signed, objecting to this insult, and send it to Secretary Hoover, so he won't give the Senate license to perform this outrage on us.

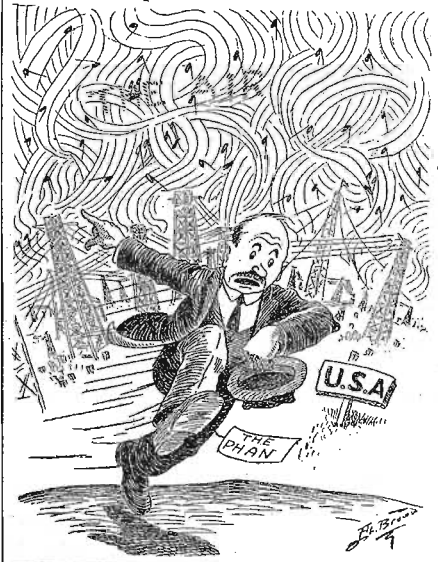
She says they probably think they could use it for a stump speaker to get votes, if they can get someone to invent a Hook-up for an automatic hand-shaker for our sets, but she says if they do go on the air she's going to bait her wave trap so as to catch 'em and throw 'em out before they get into her set, as she don't find them either amusing nor entertaining.  
SIGNING OFF.



### Report 'Oboe Reception to the Police

Dear Indi: I've just been listening in to the St. Louis Symphony Orchestra on my set—built according to the specifications given by Miss Terry Mann in your column last week, but with the variometer tapped every 1/4 turn—and I find I can tune out everything except the oboes. I think I will split the variometer—with an axe. Then could I tune out the oboes also? Ex-statically.  
C. B. ATTERY.

## Help! Give Them Air



## Condensed

By DIELECTRIC

Amateur Radio operators are seeking at all times to establish new records in transmission and reception and while most of the outstanding achievements in this field have been credited to our own amateurs, reports come from other countries of notable successes. One of these concerns the recent tests made by Argentine amateurs. Nearly a dozen calls from North American stations were picked up by several of our southern fans and the Argentine Station CB8 was in communication for two hours with Station 2AC in New Zealand. That was pretty good work.

The Post Master General of England has been advised to build a broadcasting plant in conjunction with the new post office station at Rugby, in the hopes of it providing the means of linking that country with ours. In so far as experiments with English reception of American broadcasting are concerned they have been a success. Considerable difficulty has been experienced when we have tried to tune the British stations, up to the present at least. However, the English are looking to a time when telephone subscribers in both countries may be connected by means of Radiophony. Perhaps this may be possible at certain times.

To the indefatigable efforts in research by such men as Senator Marconi do we owe the marvelous advance in the science of Radiophony. This great Italian genius goes off alone to work out his theories concerning electromagnetic waves to return with an astonishing discovery—"beam" transmission. He announced some time ago that Radio impulses could be sent in a given direction, but had not then determined how far such transmission would carry. Judging from the announcement by Premier Bruce in the House of Representatives in Australia, Marconi has concluded that a "beam" of electric waves may be directed in a predetermined course and carry an indefinite distance. Fuller announcement is to come.

Last year listeners in greeted the approach of summer with dismay, for it seemed to mean the interruption of their Radio enjoyment. Portable sets were a novel and unconvincing substitute for the good old reliable living room brand. This year campers will feel ashamed to receive callers unless they can offer current Radio programs brought in through their portable sets. Not only have these been designed to work in your tent, houseboat or other vacation haunt, but to fit in as part of the regular equipment on your auto—insuring some entertainment whenever you see fit to park the car en route. No one travels Radioless now.

One evening last month while sitting before the dials I tuned in a station broadcasting a violin solo. The miserable intonation, entire lack of musical understanding of the classical number being mutilated made me feel how seldom it is that violin playing of a high order goes out through the ether. The following night Zimbalist entertained those present at the National Electric Light convention held in Atlantic City with some really beautiful playing. Radio listeners also had the rare privilege of hearing his art, as the session was broadcast.

While to the layman musical concerts heard via Radio are more or less educational, to the musical director they are both that and inspirational. We don't think, as a rule, of the possibility of orchestra leaders listening to the broadcasting of the playing of other orchestras, yet that very thing is often done. So popular a leader as Vincent Lopez has more than one fellow-leader tuned to his musicians playing, when the opportunity is afforded. New ideas are had by this easy and sure way.



# How to Install a Radio Set in Your Automobile

## Part VI—Studebaker Installation and Suit Case Assembly

By Harry J. Marx

**N**OW all you Radiophans with Studebaker big sixes, special sixes and all kinds of sixes listen in and take notice. Make up your portable Radio set and get all ready to install it in your seven, nine or eleven passenger touring cars. The youngsters and grown-up folks are all looking forward to those rides in the automobile, but don't be behind times and forget to provide Radio entertainment on your trips.

A fellow doesn't throw out his chest nowadays anymore just because he has an automobile. If you can't brag about having a Radio set installed you're a long way behind times. So better get busy and ready to brag that they've got nothing on you because your car is one of the up to date models with a Radio set all ready for the passengers to listen in.

### Plenty of Room for Set

The latest Studebaker models have plenty of room, which makes installation a simple matter without discomforting any of the passengers. Smooth riding qualities of the car make tuning of the set simplicity in itself and the using of reception with the choice of outdoor tuning are all guaranteed to chase away the biggest grouch that summer time discomforts occasionally create.

Just glance at the ample space underneath the dash board. A set of those dash boards where the lower edge is a wonderful straight line and almost any Radio set will slide into place just as if it were made to fit it. Two angles fastened to the dash board hooked on to the top of the set and you are ready to connect up.

The car provides the storage battery for lighting the tube filaments and the accessory box attached to the rear of the set will easily accommodate four small 22½ units to take care of your plate battery requirements.

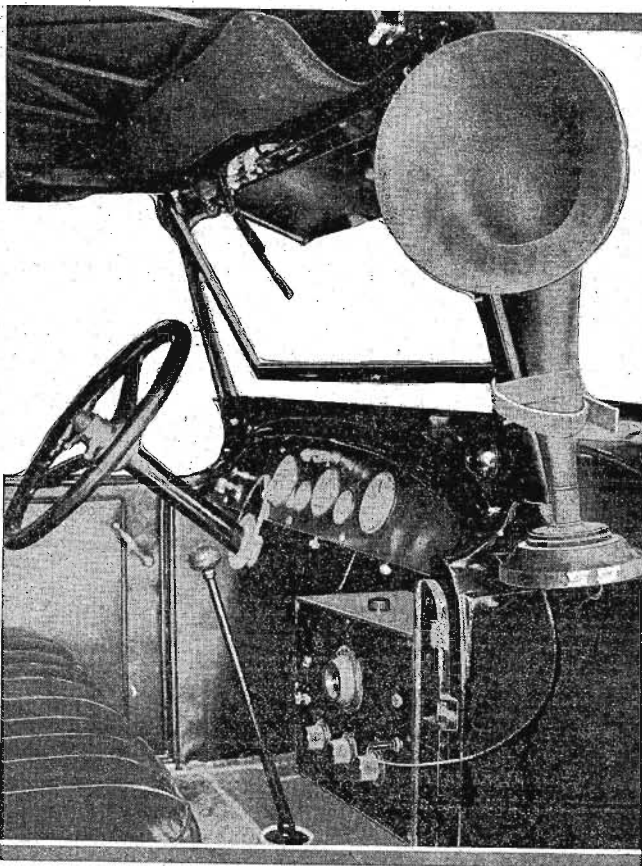
A loud speaker? Oh, yes, that just straps on to the upright strip of your windshield. One of those cloth army straps will do the stunt very nicely. Just point the horn toward the rear seat. The cord will be plenty long enough to plug in on the set.

Use one of those four-wire top cover aerials described in Part 5 of this series and the body of the car will give you a counterpoise ground effect and you are all set to tune in.

What circuit shall you use? There are numerous ones. Either use the automobile set that is being described in this series, or in the next issue, we are giving three-circuit variations that will be found very satisfactory for this type of receiver. The set used in the illustration is a modification of the original reflex de luxe that was described last fall. It happens to be one of those fancy sets, mahogany panel, walnut cabinet, but it sure does look well in the old Studebaker.

### Suit Case Installation

In the last article you got all of the details of the cabinet to be used for special automobile installation. This time the suit case installation is taken care of in a triple illustration showing a front and rear view of the assembled set and also a picture of the set all completed in the suitcase. The space left in the original suitcase is ample to take care of the batteries, the A-batteries and a very small loud speaker, a folding loop aerial and a head set. The weight of the whole is not too much to inconvenience carrying, provided the distance



doesn't run over too many miles. I'd hate to carry it ten blocks.

### Wiring

The wiring of this set, because of its compactness, requires some ingenuity. The author found it to be simplest to remove the two tuning units and then make all connections to the battery terminal to jack, to switch and to rheostats

and also running to the three sockets and two audio transformers. The front top panel is kept off until last. Then the two tuning units are inserted and their wiring added. Then complete all remaining connections, including the four flexible

leads, to be connected to the binding posts on this front cover panel.

### C Battery

The C battery is one of the small 4½-volt flashlight units that will just slide into place in between the two audio frequency transformers. Some flexible leads were used for connections and the battery then held into position by means of a few turns of tape around the battery and two transformers. Not only does this C battery economize on the B battery drain, but will be found decidedly beneficial in clearing up reception.

### The Tuning Operation

The tuning operation will be found the same whether an outside or loop antenna is used. The small back switch in the upper left hand corner of the front panel when thrown to the left, cuts out the secondary coil and shunts the condenser directly across the loop. Now, in loop aerial use in some wave length ranges, it will be found that this switch can be turned to the right so that both the loop and the secondary of the first tuning unit are connected in parallel. Contrary to expectations, this will be found to also give very satisfactory results in reception. The action being that two inductances in parallel will permit regular efficiency over a lower wave length range.

The original set uses a soft detector tube which makes the rheostat setting somewhat critical, but gives decidedly better results. Of course, in this case, only a 22½-volt tap is used for the detector plate circuit. When an A tube is used the rheostat setting is not at all critical, and it will be necessary to increase the detector plate voltage to 45 volts. Naturally, the amplifier rheostat is not critical. In tuning, the rotor knobs in front of the two dials should be set for maximum coupling in each. Both dials must be adjusted simultaneously. If properly assembled and good apparatus is used, the set is decidedly selective, because of the fairly critical adjustment of these two condensers. If, in the adjustment, of either one of these condensers the tubes have the tendency to spill over into violent oscillation, loosen up the coupling by turning the small knob on

(Continued on page 18)

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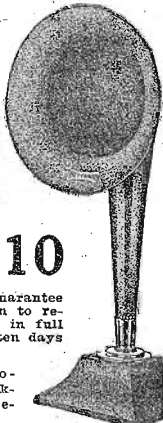
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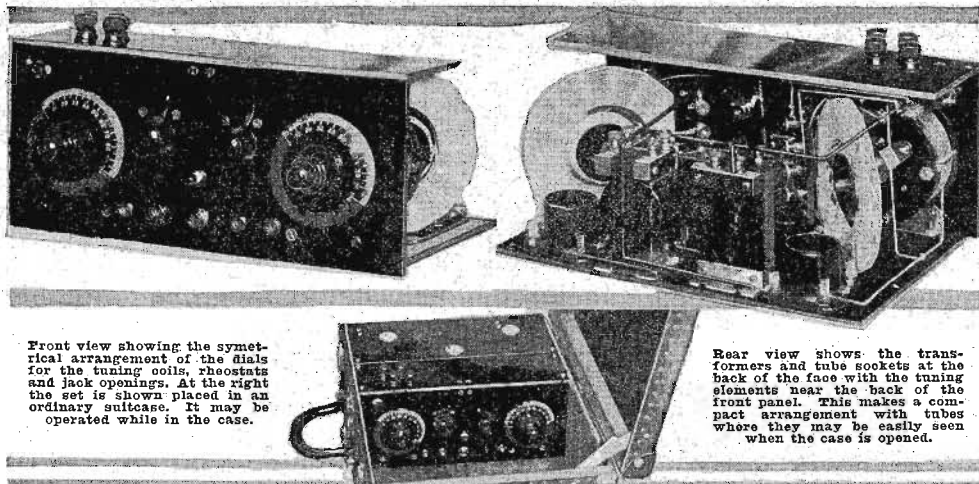
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Front view showing the symmetrical arrangement of the coils for the tuning coils, rheostats and jack openings. At the right the set is shown placed in an ordinary suitcase. It may be operated while in the case.

Rear view shows the transformers and tube sockets at the back of the case with the tuning elements near the back of the front panel. This makes a compact arrangement with tubes where they may be easily seen when the case is opened.

**PORTABLE AUTO SET**

(Continued from page 17)

each condenser, especially the one on the right side, which will immediately stop the oscillation tendency, but if turned too far will decidedly diminish the strength and volume of reception. It is advisable, however, to keep this weaker coupling until the station has been properly tuned in with the condenser until maximum volume is obtained to the point just above spilling over. After reception has been tuned in it will be found it is best to readjust the detector rheostat to the position of maximum reception.

**Loop Detail**

The loop used in the original set is a folding type measuring 12 inches to a side with the four arms hinged at the center so as to fold together, making an over-all length of about 12 inches. It consists of 18 turns of wire spaced 1/4-inch apart. The directional qualities of the loop of this type are not as marked as with the larger size. The reception, however, was found to be quite satisfactory.

(Rupmobile installation together with portable set hook-ups will be the subject for the next installment. The hook-ups are especially for the user of automobile sets.—Editor's Note.)

**Review of Books**

**Vacuum Tube Receiver.** By O. F. Hessler. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blueprint. Price, 75 cents.

**How to Retail Radio.** A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, \$1.00.

**Home Radio—How to Make It.** By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

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

**Radio Reception.** By Harry J. Marx, Technical Editor Radio Digest Illustrated, and Adrian Van Nulding. A simple treatise on Radio reception. Beginning with

the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special attention given to practical tuning. Price, \$2.00.

**Elements of Radio Communication.** By Elroy W. Stone. A splendid, well connected, complete, accurate and up-to-date discussion of every phase of Radio telegraphy and Radiotelephony. Written in simple language. The subject is presented from the physical rather than from the mathematical standpoint, avoiding the use of higher mathematics. Price, \$2.50.

**Within the Atom.** By John Mills. May be read by the Radiophon with interest for it deals with that infinite particle as associated with electrons, and all chemical and all electrical phenomena. Price, \$2.00.

**Experimental Wireless Stations.** By P. E. Edelman. Simple directions are given in this book for making Radio equipment for the transmission of messages over long distances. Price, \$3.

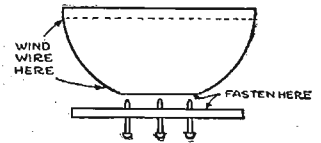
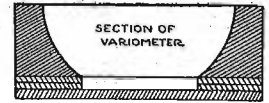
**The Radio Amateur's Handbook.** By A. Frederick Collins. A new revised edition of this book is just out. It is a complete authentic and informative work on Radio. Fully illustrated. Price, \$2.50.

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

**Ideas for the Radio Experimenter's Laboratory.** By M. B. Sleeper. This book tells in a simple way the how and why of Radio apparatus. Comprehensive data are given on such necessary laboratory instruments as the oscillator, wavemeter, direction finder, Radio compass, vacuum tube, characteristic measuring set and detailed advice given on the winding of various kinds of standard inductance coils. Price, 75 cents.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to

are fastened to the stator. Pour in a mixture of plaster of paris and let it set. Remove the plaster and you will have a form that looks like a bowl. Remove the portion shown in black with a coarse file and smooth with sandpaper. Fasten a small piece of cardboard to the plaster



and the form is ready for winding the coil.

Wind the coils up to about 1/4 inch of the top and give them a coat of water glass or oil cement. Give it time for drying; then remove the cardboard. Tap the plaster lightly while pressing on the upper coils of the wire. When removed, coat the inside of the variometer with cement and press the formed coil into it. The other half is made in the same manner. Watch your winding to keep it in the right direction.—Russell C. Hansen, Milwaukee, Wis.

you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 510 N. Dearborn St., Chicago, Ill.

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Procure some cardboard and cut squares the same size as the outside measurement of the stator block, and cut holes in them the same size as the smaller hole in the block. Build up these squares of cardboard until they are 1/4 inch thick. These

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# Arrangement of Four Aerial Scheme

## Multiple Aerial Gives Good Direction Effect

With the arrangement of aeri- als shown in the illustration I get excellent results. These are four aeri- als each pointing in a different direction from the others.

A small switch is mounted near the

## WORKSHOP KINKS EARN A DOLLAR—

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

RADIO KINKS DEPARTMENT,  
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window, and the aerial post on the set is connected to the blade of this switch. There are four switch points marked N., S., E., & W., and the aerial pointing to the north goes to the point marked N., etc.

With this arrangement I received more distant stations than when the aerial pointed in one direction was used.—Harold Flower, Brooklyn, N. Y.

## Swinging Aerials

An aerial that is permitted to swing will produce jerky and uncertain signals. The tighter the wire is stretched the better it is for receiving clear signals. Always solder the lead-in wire from the aerial.

## Revising Polarity of Phones

It is sometimes an advantage to reverse the polarity of the phones. Some phones will work much better with the current running through them in one direction.

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**RED-HEADS** are guaranteed radio phones. You run no risk when you buy them. Money back if, after 7 days' trial, you're not satisfied that they're the best receivers on the market at the price. Why not act right now and get a pair? It'll mean getting the maximum from broadcasting from the day you put them into use.



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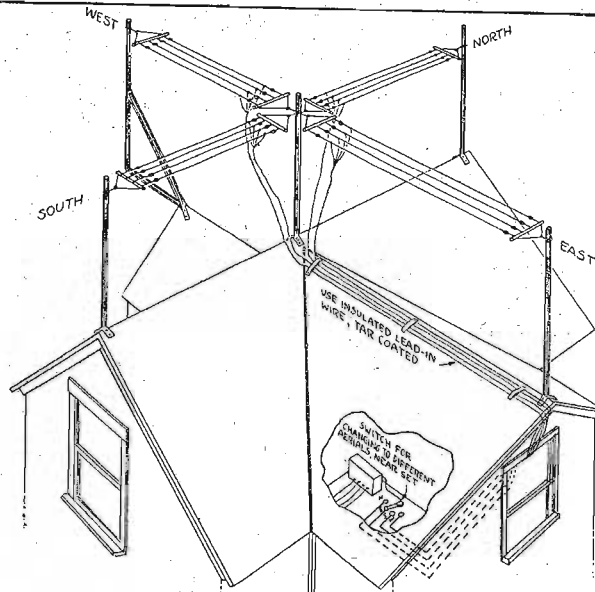
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## FIVE SUPPORTS HOLD WIRES



Each one of the four aeri- als may be tried out in turn to find which is best for bringing in the desired signal. They make the set more selective and produce the loudest reception that can be obtained.

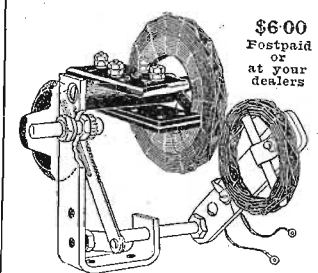
## Sponge Rubber Mounts For the Tube Sockets

The vacuum tubes now on the market are rather delicate instruments and are subject to microphonic noises unless mounted correctly. This is easily accomplished by fastening the sockets on sponge rubber.

But the mistake the fans make in doing this is to leave a lot of rubber in the center of the socket, which makes connection to the tube prongs. This causes a high resistance path for the Radio frequency currents and lowers the efficiency of the set to a great extent. Be sure to remove the rubber in the center of the socket.

When experimenting with various hook-ups, make up about a dozen leads of various lengths with snap connections.

## HETERODYNE Pfanstiehl Oscillator



\$6.00 Postpaid or at your dealers

It corrects the usual cause of failure by adjusting the strength of the oscillations to that of the incoming signal.

Pfanstiehl Radio Service Co.  
Highland Park, Ill.  
Chicago: 1001 W. Washington St. Haymarket 6010

**TELEDYNE KIT**  
1-Special tuning coil and 1-Special R. E. comp. (Wound with green silk wire on BAKELITE tubing; complete with brackets, etc.) \$6.39

**COCKADAY PARTS**  
COILS—Green silk wire on BAKELITE tubing  
LAVITE resistances, 4800-ohms.....\$ 3.19  
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1" dia. 4.38  
Bradley-Ohm (No. 19, No. 25 or No. 30) 1.58  
COMO duplex audio transformers (per pair) 0.29

**ULTRADYNE KIT**  
Consists of 1-type "A" Ultraformer, 3-type "B" Ultraformer, 1 tuning coil, and 1 set of coils on BAKELITE tubing..... 20.58  
Set of 3 Ultraformers separate..... 10.76

**ERLA REFLEX PARTS**  
ERLA reflex or audio transformer..... 3.89  
ERLA "SELEKTOPFORMER"..... 3.89  
ERLA Crystal Detector..... .79  
RATHBUN condenser, 11-Pl. 2.39  
23-Pl. 2.79

**"KNOCK-OUT" KIT**  
Consists of 1-T1 and 1-T2 special sound transformers mounted on condensers (coils wound silk on BAKELITE tubing)..... \$6.79  
Transformer coils separate each..... 22.24

BURGESS or EVEREADY large 2 1/2-V "B" Battery..... 1.89  
BATTERY  
"SUPERDYNE" Special couplet and plate in- duct..... 4.89  
0.25; 3/16"..... .02  
"Gold Seal" Homecharger, \$13.22 Valley..... 13.85  
C. E. TUNGAR charger, 2-Amp. 14.37  
5-Amp. 22.39

**HAMMARLUND CONDENSERS**  
Plain, 11-Pl. \$3.75 23-Pl. \$4.10 43-Pl. \$5.64  
Vernier, 11-Pl. \$4.62 23-Pl. \$5.04 43-Pl. \$6.88

Prices F.O.B. St. Louis, Mo., Cash or C.O.D.  
SEND STAMP FOR OUR LIST OF 1000 BARGAINS  
**SIMPLEX RADIO SALES CO.**  
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**B-METAL**  
"AS GOOD AS B-METAL"

Signs and advertisements bearing the above words only serve to impress you with the real fact that our B-METAL Loud Talking Crystals have become the recognized standard in the radio crystal field.

Imitations of our B-METAL have appeared and have become so bold as to copy our literature and our packages, but if you will kindly look on the individual box cover for our full name as signed at the foot of this advertisement you are sure of getting genuine B-METAL Talking Crystals.

It is impossible in any B-METAL quality and it is a simple matter to determine it by comparison with others sold as such, but lacking our firm name on the box.

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This Kellogg Radio Kit saves time and money—Say the Radio Bugs.

Everything complete for assembling two stages of audio frequency amplification. The panel is drilled for three tuning units, which together with this No. 501 Kit will complete a radio set using your favorite hook-up, or most any other that you may desire to try. This universal panel makes the changing of from one circuit to another an easy matter. Every piece is standard Kellogg radio equipment and guaranteed.

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Le Ton d'argent



Guaranteed BY MAIL ONLY \$2.39 Postpaid

## QUARTER AMPERE AMPLIFIER-DETECTOR RADIO TUBE

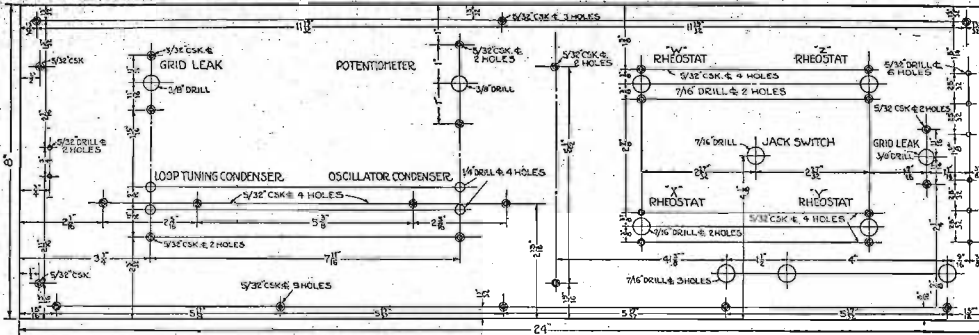
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(All postage prepaid)  
The "Goode" Two-o-One A Tube amplifies or detects. It is a quarter ampere, six volts, standard base silvered tube.  
Send express or postal money order or New York draft to—

The Goode Tube Corporation  
Incorporated  
EVANSVILLE INDIANA



### NINE-TUBE SUPER

(Continued from page 15)

Little centering mark in the middle of the opening. Now, move the panel, with its mounted units, against the front edge of the baseboard and see that the units on each do not touch. Mine cleared each other very well but due to differences in construction those you use may require a slight shifting to right or left on the baseboard. The rear row will need no attention and should not be changed from the layout shown as otherwise the shields will not slip into place. When sure the front row is correctly placed, screw down the nine tube sockets and complete as much of the wiring of the filament circuit as may be done on the board. In wiring all parts on this baseboard keep an eye on the layout and keep as low as possible all wires which must pass under shields and put spaghetti tubing on all wires.

Some experimenters bend their bus wire so that the spaghetti rests on the board but a slight clearance of 1/16-inch might be better. After the filament wiring, connect up the four tubes and four transformers comprising the intermediate amplifier at the rear of the baseboard. The long wire connecting the grid return posts of the first three should be in front of the transformers, while the wire connecting the four plus B posts is between transformers and sockets. At the right hand end of the board this plus B wire is extended just beyond the edge of the board, bent at right angles, covered with spaghetti and brought up outside of the

shield F to the second binding post from the top on the panel. The panel is not yet attached to the base so at this stage merely allow enough wire and leave it. Now wire the detector and audio frequency tube sockets to the audio frequency transformers and, as before, leave enough wire to attach to the binding posts on the panel.

(In conclusion the next article will give details of the cabinet for housing the set

### Super Heterodyne

Immediate Delivery Attractive Discounts  
 Brassion Kit No. R. 100, Complete, \$36.50  
 Contains—3 Intermediate R. F. Transformers, each ..... \$6.50  
 1 Special Transfer Coupler..... 7.50  
 1 Special Oscillator Coupler..... 5.00  
 1 Antenna Coupler..... 4.50  
 Book of Instructions with Test Bl. Price 1.00  
 All American R100—75—30 K. C. 10,000 M. Transformers..... \$9.00  
 Acme 30 K. C.—10,000 M. Transformers..... 5.00  
 Elco Oscillator Coupler..... 7.00  
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 Complete Stock of FADA Kits and Sets  
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 It shows recent developments and improvements in parts and the kind you must use if you want the best in Radio. Send for this book today.

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Quality Unsurpassed—For every known "Hook-Up"  
 ALL GOOD DEALERS SELL THEM  
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 Variable Condensers

Sharpen up your tuning, get greater volume out of your receiver by using the new FADA "low-loss" variable condensers. The low power factor and low equivalent series resistance proves their superiority. More efficient than many so-called precision condensers and have a capacity ratio of 40 to 1 compared to the usual 30 to 1. Two sizes—No. 142-A (18 plate .0063 in.) \$3.00 and No. 141-A (25 plate .0065 in.) \$3.50. Your dealer sells them.

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 1581 Jerome Ave., New York City

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C-301	2.50	Marconi	2.50
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Your dealer has these tubes. They list at \$5.

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in a very attractive manner.—Editor's Note.)

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WE HAVE DREAMED AND ADVERTISED

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Advertised in the Mining World for samples of ore that we might test in order to discover what we were looking for, with the result that we have discovered—STAR-ITE, the finest crystal in the radio world today and an absolute sensation. It is cheap at \$1.00 and is sold with the double guarantee of the maker and retailer that it must satisfy the purchaser.

With the advent of STAR-ITE we have not ceased our search for something even better. BUT WE HAVE BEEN SATISFIED THAT IN STAR-ITE we have made a real find, and have secured a very large supply of this wonderful material.

**Star Crystal Co.**  
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**Workman Radio Service**  
 "THE ACCENT IS ON SERVICE"  
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\$2.00 R. C. 11 plate	\$1.05
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2.75 R. C. 43 plate	1.65

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If you must make your connections exceptionally tight on the B batteries, don't make the mistake of using a pair of pliers on the nuts. Many people follow this practice, but it should be avoided, as in nine out of ten cases some of the connections are loosened or else broken off entirely. If you must have the wires to these batteries good and tight, solder them. This can be done without trouble, providing a very hot iron is used. Don't hold the latter on the binding posts too long, as this will tend to melt the insulating material which surrounds the little screws.

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Panel Size	Imitation Walnut	Genuine Walnut
10x12	\$3.51	\$ 6.28
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7x18 1/2	4.21	7.30
7x24 1/2	6.52	11.30
7x28 1/2	8.78	14.50
7x28 1/2	9.00	15.50
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7x28 1/2	9.14	13.64

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Will not warp or crack. Made of No. 1 wood finished in either Mahogany or Walnut, bright or rubbed finish.

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**Special 2-Volt Radio Storage Battery, \$3.75**  
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**6-Volt, 60 Amp. Radio Storage Battery, 7.00**  
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We ask for no deposit. Simply send name and address and alyvia wanted. Battery will be shipped the day we receive your order by Express C. O. D., subject to your examination on arrival. Our guarantee accompanies each battery. Wearlow 5% discount for cash in full with order. You cannot lose! Act quick. Send your order today—NOW.

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 1421 South Washburn Ave.  
 Dept. 5 Chicago, Ill.

# What Does "Modulated Wave" Mean to You?

## Relation of "Carrier" to Sharp Tuning Ability

By R. H. Langley

THE wave in space which brings us the broadest music or voice is known as a modulated high frequency electromagnetic wave. Let us examine this rather imposing expression and see what it actually means.

The voice or music which we wish to transmit varies in frequency from about 30 cycles per second to about 400 cycles per second. An electromagnetic wave could be created at these frequencies. But it is found that it would travel only slightly further than the sound waves themselves. There would therefore be very little to be gained by changing the sound wave into an electromagnetic wave of the same frequencies.

### Distances Traveled

It is found that a high frequency electromagnetic wave will travel to enormous distances. The term high frequency in this case means frequencies from about 30,000 cycles per second to about 3,000,000 cycles per second. It will be seen at once that these frequencies are of an entirely different order than the voice and music frequencies. Roughly, they are 1,000 times as great or stating the fact in another way, 1,000 cycles of the high or Radio frequencies will occur during one cycle of the voice or audio frequency.

The modulated wave is a combination of the audio and the Radio frequency. The Radio frequency part of the wave is spoken of as the carrier because it is used to carry the audio frequency. The Radio frequency is modulated by the audio frequency, and we ordinarily think of the audio frequencies as existing in the complete wave as a change in amplitude or intensity of the Radio frequency. The successive cycles of the carrier frequency vary in intensity or strength in accordance with the audio frequency.

When we say that the wave is electromagnetic, we mean that it consists of two parts. One part is a magnetic field, exactly like that given by the familiar horseshoe magnet. The other part is an electric field, exactly like the one that can be obtained by rubbing a piece of glass with a cork, by which the glass will then pick up small bits of paper. In the wave, there are two fields, electric and magnetic,

move through space together, at the velocity of light, or 186,000 miles per second.

The process by which Radio frequency is modulated at the audio frequency is relatively simple. A vacuum tube oscillator is used. As long as the plate voltage on this oscillating tube is held constant, the resulting wave has constant amplitude or intensity and is not modulated. In order to modulate the wave, the plate voltage is varied up and down in accordance with the audio frequency, and the amplitude of the resulting wave in space varies in the same way.

### Components of Wave are Three

Now, it is found that this wave of changing intensity is exactly equal to the sum of three constant frequencies, that is, three frequencies whose amplitude does not change. One of these is, of course, the carrier frequency at which the transmitting tube is oscillating. The second frequency is the sum of the carrier and the voice frequency, and the third is the difference between them. These sum and difference frequencies are known as the side bands. With a receiver that is sufficiently selective, we can tune to any one of these three frequencies and detect it. Remember that each of these frequencies is constant, and that it is only their sum which varies in amplitude. It is easy to see why the sum does change in intensity, because, since the three frequencies are slightly different, they cannot stay in step with each other, or, as we say, in phase with each other, and will consequently tend to help each other at certain times, and at other times will act against each other, and reduce the amplitude or intensity of the combination.

### Instantaneous Frequency Changes

No two successive cycles of the modulated wave are alike in amplitude. But are they alike in frequency? Before we can answer this question, we must say

what we mean by frequency. When this word is applied to something that repeats itself exactly time after time, it has a very definite meaning. The frequency is the number of these exactly similar cycles that occur in one second. But when the cycles are constantly changing, we can only say that the frequency at any instant is the number of cycles which would occur in one second if all the succeeding cycles were exactly like the one occurring at that instant. In a modulated wave, therefore, we must think of the frequency as constantly changing in its instantaneous value.

The limits between which the frequency of a modulated wave changes are the sum and difference frequencies which we have called the side bands. Let us take a numeric example now, and see how this all works out.

### Cycles Per Second

Let us say that the carrier or Radio frequency which we wish to use is 800,000 cycles per second. This corresponds roughly to a wave length of 380 meters, that is, the peaks of the wave as it travels through space will be 380 meters, or about a quarter of a mile apart.

Let us say that the voice frequency at the instant we are considering is 1000 cycles per second. This corresponds roughly to high C on the piano.

The modulated wave, then, has a nominal frequency of 800,000 and its amplitude varies up and down 1000 times per second in accordance with the voice frequency.

The side bands would be the sum and the difference of these two frequencies, that is, 801,000 cycles per second and 799,000 cycles per second, the instantaneous value of the frequency of the modulated wave will vary between these two

frequencies as limits. It is seen at once that if a receiver is to respond to this modulated wave, it must not tune so sharply as to give a different intensity to the different frequencies in this band. If it amplifies the 800,000 cycle part of the wave 100 times, when tuned to it, it must give practically the same amplification up to 801,000 cycles and down to 799,000 cycles.

Musical notes contain frequencies as high as 4,000 or 4,500 cycles per second. The receiver must therefore have a band of uniform response 8,000 or 9,000 cycles wide. It need not, however, have a band any wider than this. This is the limit to which the selectivity of a broadcast receiver can be carried, and to which it should be carried, if we are to be able to choose between broadcasting stations at will. Each station uses a different nominal frequency, and these nominal frequencies are 10,000 cycles apart, so that as the waves vary up and down 4,000 or 4,500 cycles each side of the nominal frequency, they will not overlap each other.

Until the advent of the super-heterodyne receiver, nothing even approaching the degree of selectivity just described could be obtained. Thus it was that we often heard two and three stations at the same time, and were unable to eliminate a powerful nearby station and listen to more distant ones. In the super-heterodyne receiver, however, we can obtain this remarkable degree of sharpness of tuning. We can separate stations that differ by less than one per cent in frequency and yet not distort the music by cutting off the side bands.

Built up to a high Standard  
Not down to a low price

## CARTER

Vernier Control Rheostat



Original exclusive Carter design. Gives vernier tuning from zero to full strength—enabling you to carry the audio frequency of the modulated wave as a change in amplitude or intensity of the Radio frequency. The successive cycles of the carrier frequency vary in intensity or strength in accordance with the audio frequency.

6 ohms \$1.50  
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Tube for Tube—the Most Powerful Circuits Ever Built. Write for free Bulletin No. 16

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A TWITCHELL AUXILIARY TUNER

connected to your instrument will positively eliminate all local interferences and enable you to bring in distant stations at any time. They are in successful use within 400 feet of large broadcasting stations. They also enable you to receive on longer wave length than you can get without it.

Copyrighted diagram \$ .50  
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### RAJAH SOLDERLESS SNAP TERMINALS

For AERIAL, GROUND & BATTERY CONNECTIONS



Instantaneous in Operation—Positive Contact

Just push removable part, attached to wire, on the base and it snaps into place. Double bronze spring clip insures perfect connection.

To remove, just pull it off, no screws to bother with; no springs to bruise the fingers.

Patent Pending

A positive electrical connection in ten seconds, without solder or tools, that cannot pull out or shake loose and is as easy to remove as it is to assemble to the cable.

These studs secured by No. 8-32 screws and will fit all "B" batteries with screw posts.

Rajah Snap Terminals allow instantaneous change in plate voltage with a secure connection, better than any switch.

No other kind of radio set who has seen or used a Rajah Snap Terminal will ever use any other style of binding post.

Price, Snap Terminal and Base Stud, complete as illustrated, each 20c.

These studs are sold separately as they can be used wherever a change of connection is desired, thus permitting a quick change of lead in and battery wires from one set to another.

Base studs with screw and washer, each 5c.

Special Introductory Offer: 1 Dozen Snap Terminals and Base Studs complete by mail prepaid, \$2.00.

If your Dealer can not supply you, order direct and we will mail prepaid.

Dealers get in line at once for the best-selling radio device you ever saw.

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Saves You 50%

Famous Guaranteed Quality and Service—Backed by Years of Successful Manufacture and Thousands of Satisfied Users.

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6-Volt 12 Plate, 14.25	6-Volt 80 Amps, 10.50
6-Volt 13 Plate, 16.25	6-Volt 100 Amps, 12.50
12-Volt 7 Plate, 17.00	6-Volt 120 Amps, 14.50
	6-Volt 140 Amps, 16.00

Special 2-Volt Storage Battery for W. D. II and 12 tubes will run 200 hours on one charge. Rechargeable. \$5.00.



Special 4-Volt Storage Battery for U.V. 199 tubes. Same features as 2 Volt. \$9.00.

Shipment express C.O.D. subject to examination. Discount for cash in full with order.

2-Vr. Guarantee Band in Writing With Each World Storage Battery

proves satisfactory World performance. Mail this ad with your name and address and we will ship a battery day after tomorrow. Free with each battery purchased. Write today.

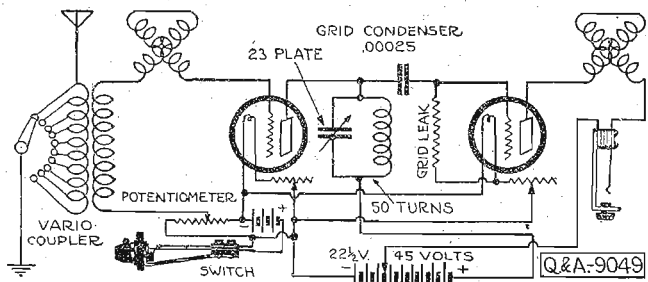
World Battery Company  
Dept. L, 60 E. Roosevelt Rd.  
CHICAGO

# Questions and Answers

## R. F. and Regeneration

(9048) CEB, Pittsburgh, Penna.  
I am a subscriber of the Radio Digest and have tried a good many hook-ups, but don't seem to get any results with them. Of course I get local good, but cannot get outside stations.  
I have one variocoupler, two vari-



ometers, one 23-plate condenser with vernier, one 23-plate condenser, one Radio frequency transformer, one audio transformer, one grid leak condenser, three sockets, 3 rheostats, one potentiometer, one switch, 6 volt A battery wet, 2-45 volt B batteries, aerial 75 feet long, 2 strands 30 feet high with no other wires near, ground to water pipe.

Also, I have three Cunningham tubes. A.—We regret to note your experience in operating circuits offered by Radio Digest and since they are on the whole effective types with demonstrable records we are of the opinion that the lack of tuning skill is probably your biggest trouble.

We are presenting herewith a diagram of a superior circuit conforming to the apparatus of your specifications.

## Regenoflex

(8275) J.L.P. Wallace, Idaho.  
Some one has coined a word that has started a great deal of argument as to its true meaning, and inasmuch as it is supposed to be connected with Radio you would be in the position to give me the definition.

The source of all the trouble is the word Regenoflex. A.—In asking for the origination of the word Regenoflex you impose a great responsibility on a mere technical editor when you ask him to define new names coined in the desperate effort to describe the new circuit hydrophobes. Undoubtedly great and ardent liberties are taken with our perfectly good English and any attempt to gather them into any semblance of meaning which is comprehensive and illuminating doth make us mad. I guess we'll just have to let it go at that. Presumably the author is trying to convey a combination of the regenerative and reflex principles.

## WE NEED CASH

Large Radio Stock at a Sacrifice. Subject to Prior Sale. Write for a List with Prices. Address R. D. 15, Radio Digest, 510 North Dearborn Street, Chicago.

**SALESMAN**, Sell coal in Carload Lots, side or main line. Experienced Unnecessary. Earn week's pay in an hour. Liberal drawing account arrangement. Washington Coal Company, 900 Coal Exchange Building, Chicago.

**PATENTS** Procured. Send sketch or model today for examination, report and advice. No charge for preliminary advice. Write for free Booklet and blank form on which to disclose your idea. Highest references. Promptly assured. Clarence A. O'Brien, Registered Patent Lawyer, 2001 Security Bank Building, Directly across the street from Patent Office, Washington, D. C.

**INSIDE AERIAL**

11 FEET LONG  
Separable  
Lightweight  
Suspend  
\$7  
COMPLETE  
POSTPAID

NO DANGER from LIGHTNING  
Or 35, if four set owners' addresses are sent to us.  
Details about Killing Noise in Radio Sets FREE  
INTER-STATE SIGNAL CO., DEPT. 1, COLUMBUS, OHIO

## Don't You Get Tired

of only hearing LOCAL stations on your Crystal Set? There's music on your aerial every night from stations far away. If you want to hear without buying a tube set, WRITE ME TODAY.

**LEON LAMBERT**  
601 South Volusia  
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Thank Your Favorite Station—Request Your Favorite Selection

YOUR OWN Name and Address Printed FREE on Every Card

"Thank You" cards are all clear, Standard with extra blank space for use. Be in style. Low introductory price. 25¢ per card. 50¢ per 100. \$2.50 per 1000. POSTPAID. Order today.

**MONEY REFUNDED if Not Satisfied**  
Good quality cards—High grade printer. You will be DELIGHTED.  
Send order with check or money order today—NOW.

**RADIO PRINTERS, Dept. A3**  
Mondak, Illinois

## Neurodyne and Supers

(8284) JFD, Boligee, Ala.  
Would thank the editor to recommend 3 or 4 good neurodyne sets he considers best. Also would ask if he considers the super-heterodyne better than the neurodyne.

A.—The spirit of our service does not

include a recommendation of manufacturer receivers or apparatus. A comparison of the super-heterodyne and neurodyne principles of Radio communication gives preference to the former

**WESTERN ELEC. SILVER JACK**  
Price \$1.25  
Dealers Write  
**ARAGON RADIO COMPANY**  
6 E. Lake St. Chicago  
Sole Distributor

**PEERLESS RADIO**

349 FULTON STREET  
BROOKLYN, N. Y.

Send for our new CATALOGUE No. "B" (just off the press).  
The greatest radio bargain list in the country.  
Don't buy anywhere before getting our prices.

**SUPERDYNE**

**ORIGINAL GLOBE COILS**  
(Single Mounting)

Wound with silk wire on bakelite to correct specifications. \$6.25  
C. O. D. Parcel Post.

Complete 4-Tube Set, K. D. \$35.00  
Panels Drilled, Fitted.

**GLOBE RADIO EQUIPMENT**  
217 W. 125TH ST., NEW YORK CITY

**SAMSON TUBE**

201 A Type 1/4 Amp. 5 V.

Is ideal for DX Reception. In volume and Clearness is second to none.

Tested and approved by high Radio Authorities.  
Mail Orders Filled with Money-Back Guarantee.

Dealers and Jobbers write for proposition

**PHOENIX TUBE COMPANY**  
23 East 26th Street  
NEW YORK CITY Dept. D

in the matter of receiving range, although at the same time admitting that skillful operation is essential to realization of maximum efficiency. The neurodyne principle affords excellent results on a minimum number of tubes for circuits which are to be considered as approaching the laboratory class.

## C Battery and Reflex

(8909) J.L. Omaha, Nebr.  
Would you kindly advise me if it would be of any advantage to connect a C battery to Erla 3-tube reflex and, if so, how? Have read in one of your papers that C batteries make for better and purer amplification and also help to conserve B

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All high grade standard sets and supplies.

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Standard Radio Sets and Supplies  
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**ULTRADYNE TRANSFORMERS**

1 Input Transformer and 3 Intermediate Transformers \$20.00

Tuning, Oscillating Coils. \$ 4.00 per pair

Full instructions and Blue Prints furnished with each Kit. Absolutely guaranteed. These transformers are suitable for any Super-Heterodyne circuit. Put up in handsome kit display box. Special discount to dealers. Prompt delivery. Write for special circular.

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**What About It?**

Isn't it about time to stop experimenting with multiple control circuits and build one that, combining ease of assembly and operation, loudness, clarity and selectivity of signals, as well as beautiful appearance, is excelled by none?

**THE ELGIN SUPER-REINARTZ RADIO RECEIVING SETS**

Embodies all the advantages of the well known Elgin Reinject (the set which was largely responsible for the popularity of this wonderful circuit) and many others. It is much louder, more selective, requires no storage battery, and can be used with excellent results on a short or long aerial.

It has brought in 240 England, and California stations two thousand miles from Elgin, clearly and without interference on a loud speaker with only one tube, and that while our powerful local station was broadcasting three miles away.

Could you ask for more?

Send 2-cent stamp for circular giving one, two and three bulb hook-ups of this remarkable circuit.

**ELGIN RADIO SUPPLY CO.**  
207 East Chicago Street ELGIN, ILLINOIS

Great radio sensation coming

**SHAMROCK-HARKNESS REFLEX**

(Licensed-registered manufacturer)

Two tubes operate loud speaker — with wonderful clarity, selectivity and volume.

Watch for further announcement  
**SHAMROCK MANUFACTURING CO.**  
Dept. 31, Market St. Newark, N. J.

**SHAMROCK**  
FOR SELECTIVE TUNING

batteries. Kindly answer through your question department. A.—In our experience the use of C batteries are advantageous only in audio frequency amplifier stages. We would not recommend their use as advisable in a reflex circuit in which tubes are functioning also as Radio frequency amplifiers.

**S. & H. "B" BATTERY**  
"Will Keep Your Set Alive!"

Is "NOISELESS," increases volume and range with maximum efficiency. Made of the finest material to give extra service. Are not two days old when they're sent to you.

22.5 V. Variable. Large 400m Small \$1.00 \$1.60 \$1.00  
15 V. Variable. Large Medium Small \$2.50 \$2.75

Sold With a Money-Back Guarantee — Money Orders or C. O. D. — We pay Postage

**S. & H. BATTERY SUPPLY CO.**  
61 Nevins St. Dept. (D) Brooklyn, N. Y.

**Bankrupt Stock**

Cunningham Regenerative one tube long range sets \$9.00 Each

Prepaid while they last  
Formerly sold at \$32.50  
No Circulars. Order from This Ad.

**S. A. TWITCHELL**  
1925 Western Av., Minneapolis, Minn.

**Anchor Radio Lightning Protector**

For removing static charges & discharges from outdoor Radio Receiving Antenna  
RADIO RECEPTOR CO. 59 BANK ST. NEW YORK

Magnus Electric Co., 451 Greenwich St., N. Y. C.

**STOP & SAVE MAGNAVOX**

R3 OR M1 \$21.95

**OTHER BARGAINS**

\$ 95.00	A2C Magnavox, 21 in. Horn	\$ 64.45
12.00	Nathaniel Baldwin Phones	7.45
4.00	M. C. O. E. 2000 Ohm Phones	2.45
35.00	Tuska 224 Receiver	18.45
75.00	Tuska 225 Receiver	39.45
150.00	Freez Elisha W. Neurodyne	118.45
120.00	FADA 160 Neurodyne	94.45
286.00	RCA Super Heterodyne, 242.50	
35.00	RCA III 2-Tube Receiver	29.45
18.50	Crosley 51 2-Tube Set	14.95

CASH MUST ACCOMPANY ORDERS OF C. O. D. SHIPMENTS WILL BE MADE IF 25% OF AMOUNT IS REMITTED. DEALERS, GET ON OUR MAILING LIST IT PAYS.

**THE RADIO EXCHANGE**  
511 Seventh St. : : SIOUX CITY, IOWA

**Perfection Coil Antenna**

Eliminates the Outside Aerial

**PERFECT RECEPTION**  
NO ROOF ACROBATICS  
REDUCES STATIC AND INTERFERENCE  
INCREASES SELECTIVITY

Just stretch it across a Room

At your Dealer's or Direct  
Price \$2.00  
Postpaid

**Perfection Radio Mfg. Co.**  
24th and Race Streets PHILADELPHIA

Radiophone Broad-casting Stations Corrected Every Week-Part II

FIND MISTAKES AND YOU'LL GET DOLLAR

ONE DOLLAR will be paid to the Radiophone reader of Radio Digest submitting the most errors in any one station's listing in the Directory of Radiophone Stations...

(Note-The second part of the schedule list appears below. The first appeared two weeks ago.)

KFNH, Springfield, Mo. 236 meters. 20 watts. State Teachers' College.
KFNJ, Washington, D. C. 231 meters. 50 watts. Young Men's Christian Association.
KFNK, Peabody, Ark. 240 meters. 10 watts. Peabody Radio Service.
KFNH, Wallace, Idaho. 234 meters. 10 watts. First Christian Church.

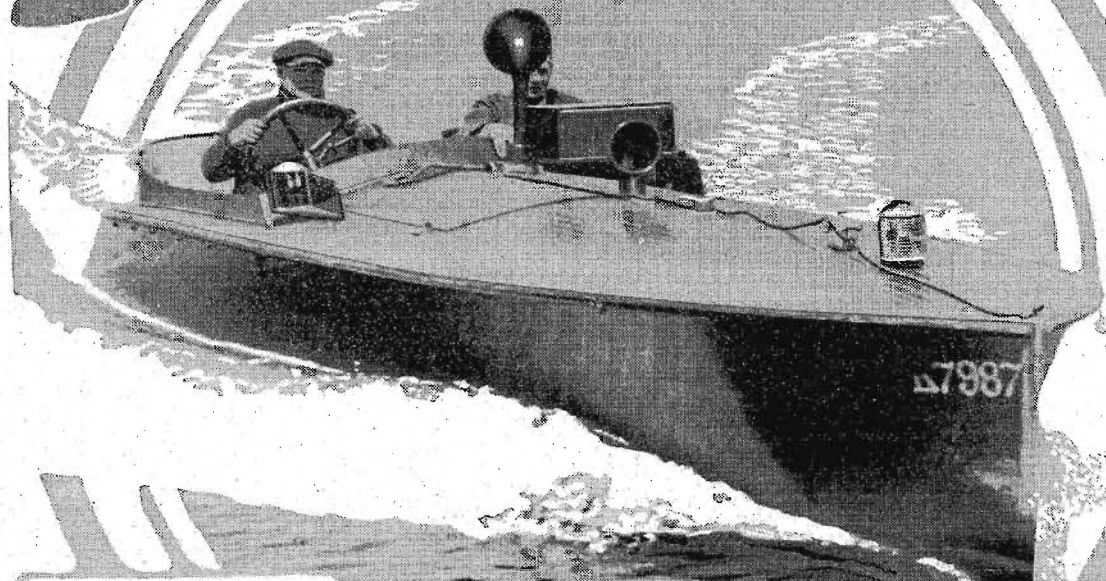
KGG, Portland, Ore. 360 meters. 50 watts. Hallock & Hallock.
KGI, Los Angeles, Calif. 232 meters. 100 watts. KGI.
KGO, Oakland, Calif. 212 meters. 100 watts. Gen. Elec. Co.
KGP, New Orleans, La. 230 meters. 500 watts. Morton & White.

music, entertainment, lectures. Eastern daylight saving.
WAAW, Omaha, Neb. 360 meters. 500 watts. Omaha Radio Service.
WAB, Los Angeles, Calif. 232 meters. 100 watts. WAB.
WABE, Harrisburg, Pa. 286 meters. 10 watts. Harrisburg.
WABD, Dayton, O. 283 meters. 10 watts. Parker High School.

WBT, Charlotte, N. C. 360 meters. 500 watts. Southern Commercial.
WBU, Chicago, Ill. 230 meters. 100 watts. WBU.
WBZ, Springfield, Mass. 337 meters. 1000 watts. Westinghouse Electric & Mfg. Co.
WBAA, Boston, Mass. 230 meters. 100 watts. WBAA.

WCAE, Pittsburgh, Pa. 462 meters. 500 watts. Kaufmann & Bear Co.
WCAE, Columbus, O. 236 meters. 100 watts. WCAE.
WCAE, New Orleans, La. 286 meters. 50 watts. WCAE.
WCAE, Louisville, Ky. 236 meters. 100 watts. WCAE.

# Radio Illustrated



To be up to the minute, a Radio just had to be installed on this new speed boat. In spite of the roar of the motor, concerts are received loud enough to be heard through the loud speaker. (Fotograms)



A pipe and a Radio go well together. A crystal on the bowl gives the music and tobacco in the bowl gives the smoke. (United)



This bathing beauty always takes the Radio to the beach with her. (Atlantic)

Good  
Sine  
RADIO