

New Regenerative Loop for Simplest Super-Het; Making Battery Charger; How to Match Tubes to Improve Set Operation; Trouble Shooting Neutrodyne

# Radio Digest

EVERY WEEK **Illustrated** PROGRAMS **TEN CENTS**

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

Vol. XI

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By Radio Digest Publishing Co.

SATURDAY, DECEMBER 20, 1924

No. 11

## ONE THOUSAND IN GOLD

### GOLD AWARD SET SOUGHT BY RADIO DIGEST TO AID SCIENCE

Valuable Prizes Await Radiophans Who Submit Original Receiver Designs—Contest Open to All—Closes Saturday, Jan. 17, at Midnight

One thousand dollars in gold for the sets containing the most important contributions to the Radio art submitted to Radio Digest!

That, in brief, is the attractive offer this publication makes to its readers after a careful study of the situation as it stands today. The Gold Award is being offered to further stimulate the development of this already rapidly progressing science, to bring new minds, new ideas into the field.

The contest to decide which shall be the Radio Digest Gold Award Set, is formally opened with this issue and will be closed Saturday, January 17, at midnight.

During the four weeks included in this period some engineer, amateur, experimenter or Radiophan will submit a receiver that will be judged the first prize Gold Award Set and its entrant will receive \$500.00 in gold. Besides there will be \$250.00 for second, \$100.00 for third (Continued on page 2)



Left, Dorothy Mackaill, noted motion picture actress, who appeared recently before the microphone at Station KFI, Anthony's Night. Lois Wilson, another picture star, whose popularity never seems to wane regardless of the more meteoric climbs and falls of her sister stars. She appears often at Station KFX, Hollywood.



### RECORDS PASSING OF STAR BY RADIO

Four Electrode Amplifying Tube Automatically Registers Time Taken During Its Travel

PARIS, France.—To make a star leave some sort of mark at the instant when it passes over the meridian of an equatorial telescope is the latest development of the famous experiments of M. Jannast on the amplification of starlight into sound by the use of a four electrode Radio amplifying tube.

Last summer this remarkable French scientist succeeded in making a passing star register by sound the split second of time in which it passed over the meridian.

### Changes Wave Length Without Leaving Air

Station KFGZ Takes Listeners from 286 to 270 Meters

BERRIEN SPRINGS, Mich.—When orders were received by KFGZ, "The Radio Lighthouse" to alter its wave length to 270 meters, Chief Engineer John E. Fetzer conceived a brilliant idea.

The announcer called the attention to the fact that during the program the wave length would be changed. During the next solo, the engineer reduced the wave length, taking the listeners down with him from 286 meters to 270.

Results, the telephone lines were jammed with calls and for the next few days the office received by mail many comments on the unique change.

# TEST PLANS PROVE TO BE INCOMPLETE

## SOUTHERN AND WESTERN STATIONS LEFT OUT

Additional List of Stations Shows Inability to Get Across—Very Few Americans Heard

CHICAGO.—Following close on the results of the transatlantic tests, comes word from various points as to the interference caused by amateurs and broadcast stations in the South and West. The popular question seemed to be, "Why didn't the stations in the South and West co-operate with the others in trying to get across?"

This can only be answered by the persons who conducted these tests. All in all, it was conducted along rather unorganized lines. Every station in the country, regardless of its location, should have been invited to participate. This would then leave the air free for one hour, so that it would be possible for everyone throughout the country to hear the European stations, if at all possible.

**Tests Not as Successful as Hoped**  
Considering the fact that the majority of stations in the Middle West and East were off the air, the reports from Europe indicate that either the sets used on the Continent were far inferior to the ones used in this country, or else the broadcast stations here were not getting out as well as they should. The former is probably the trouble.

When future tests are held, the management should try to incorporate every station in their plans so that there will be no fault-finding from any quarter.

The following is a list of stations and listeners who heard European stations in addition to those published last week.

**KFGZ, Bennet Missionary College, Berrien Springs, Mich.**

"The department of commerce put us on 270 meters temporarily during the tests which handicapped our chances for getting across."

**WBAV, Emer and Hopkins, Columbus, O.**

"We have no information whether or not our station was heard across. The most successful listener in Columbus is H. W. Webb, who heard Newcastle, Cardiff, Aberdeen and Lyons. All of these stations being verified."

**WJZ, Westinghouse Electric and Mfg. Co.**

"Cablegrams from British Isles report almost unanimously fruitless reception of American broadcast stations. We were heard distinctly during entire week with sufficient volume to permit rebroadcasting by British company."

"Our success was not at all surprising because for two months prior to tests, fan mail from Europe demonstrated that this station was reaching the Continent consistently."

**WQJ, Calumet-Rainbo Station, Chicago**

"We have received a cablegram from Station P.T.T. Paris, acknowledging having heard our program. Several listeners reported to this station that they heard the Paris station tell of hearing WQJ, with exceptional clarity and volume."

"Up to the present time, this is the only station in the middle west, that has been heard on the Continent. The same evening, the program was heard in Honolulu, T. H., by Robert Wahl."—Station WQJ.

### ONE THOUSAND IN GOLD

(Continued from page 1)

and six prizes of \$25.00 each. Everyone, whether he be a subscriber or not, is entitled to enter the contest. All will be on an equal footing. The same rules (on this page), will apply to every entrant.

Everyone, whether he be a subscriber or not, is entitled to enter the contest. All will be on an equal footing. The same rules (on this page) will apply to every entrant.

All that is needed is to send to Radio Digest a set that embodies an original circuit which functions better than equivalent circuits now in use.

Ability as an author or writer does not count.

Freak sets, such as those built on finger rings, in dolls or miniature houses, in hats and pencils, etc., are not desired and will not be considered.

#### Suggestions for Entrants

There are thousands of improvements still to come from reflexing, heterodyning, super-regeneration, link circuits, tuned impedance, crystal detectors, regeneration, resistance coupling, reduction of losses and even from loops.

If you are getting more out of your tubes, or are separating stations, but several meters apart in some new way of which the Radio world does not yet know, tell us about it. Your entire receiver does not have to be new. You may be using a standard detector and

## \$1,000 GOLD AWARD SET CONTEST RULES

1. This contest opens at once and will close on Saturday, January 17, 1925, at midnight. All sets received up to that time will be entered.
2. The thousand dollars in gold will be divided into the following prizes: First, \$500.00; Second, \$250.00; Third, \$100.00; Fourth to Ninth, inclusive, \$25.00 each. In the event of a tie, the full amount of the prize for, will be awarded to each tying contestant.
3. Contest is open to all Radio-phans, whether or not subscribers to Radio Digest Illustrated.
4. A neatly drawn hook-up diagram and short description (200 words) of the salient features of the set should be enclosed in separate letter advising set is being shipped. Entrants do not need to be authors or writers.
5. Sets must be sent insured pre-paid express or insured parcel post. All sets, including winners, will be returned insured collect to entrants.
6. Radio Digest is not to be held responsible for breakage or loss in transit. Pack sets carefully. Mark boxes and containers with name and address of sender. Tubes and batteries need not be sent unless matched tubes are essential to operation.
7. Freak or novelty sets are not desired. Sets enclosed in or

- built around dolls, finger rings, hats, etc., will not be considered.
8. Sets desired are those based on an original circuit or part of circuit that functions better than circuits commonly in use. Originality is one of the prime considerations.
9. Entrants who are not awarded prizes, but whose sets are considered worthy of constructional description in Radio Digest, will be paid at regular manuscript rates.
10. Entrants must guarantee to Radio Digest exclusive publication rights of all descriptions of their sets. The exclusive publication rights will be in force for all sets winning or picked for later description in Radio Digest.
11. Judges not interested in manufacturing will be selected by Radio Digest to make the awards. The award of prizes will be based on: Selectivity, range, volume, quality of reproduction, simplicity of operation, constructional feasibility, economy of construction, minimum re-radiation, universality, practicability.
12. Ship sets and address correspondence to the Gold Award Set Editor, Radio Digest Illustrated, 510 North Dearborn street, Chicago, Ill. All controversies will be decided by the Gold Award Set Editor, whose decision will be final.

audio amplifier, but the Radio frequency section is different and better. Your coils and condensers may be so coupled around a tube that its efficiency is doubled over that usually obtained.

#### Selectivity Essential

Selectivity is a big feature; cutting through the high power locals to get what you want when you want it, on the loud speaker. Compactness will be a point in your favor, if not carried to the point

where construction is made too difficult or efficiency is apt to be lowered.

Chargers, devices for operating from the lighting current, wave traps, antennas, etc., while important additions to the advance of Radio, should not be sent in as entries in the contest. Send in a short description of such apparatus to the technical editor. If he can use an article on it, he will pay you liberally for the manuscript containing full details.

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## Looking Ahead

The Surprise Circuit of the Year is divulged in the next issue. It is radically different, but based on sound principles; powerful in volume, yet selective as a "super." C. E. Brush, its inventor, will explain it so that all can understand. This article will be followed in succeeding issues by a series on the construction of this remarkable set, as clearly written as that on the Ryan super-heterodyne.

Overall Neutralization and the "X" Wire will be discussed by Jacques Fournier. Explanatory diagrams, and circuits showing the actual use of the third neutrodon, will make clear this little known but extremely desirable improvement in the popular neutrodyne.

Antennas Cannot Be Purchased as Kits but must be erected to fit local conditions. J. E. Owen goes into this so thoroughly next week that the newcomer following his pointers can put up an aerial which is 100 per cent efficient.

Formulas Are Eliminated in Tube Matching by the use of a chart which accompanies the next article by D. C. Wilkerson. Many experimenters can construct a tube tester but run into trouble on the calculations. This article and chart make tube testing and matching easy.

Crosley WLW, Cincinnati's Well-Known Representative, will be divulged by word and picture next issue, when Webb G. Welborne tells interesting sidelights behind the scenes there.

## Newsstands Don't Always Have One Left

WHEN YOU WANT

# Radio Digest

YOU WANT IT!  
BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

## SEND IN THE BLANK TODAY

Publisher Radio Digest, 510 N. Dearborn St., Chicago, Illinois.

Please send enclosed check M. O. for Five Dollars (\$5.00, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

Hansen "BIRD-CAGE" Radios



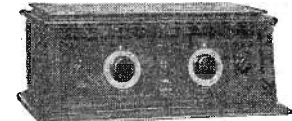
4-Tube Receiver  
**NIGHTINGALE** .....\$32.50  
A wonderful little set.

4-Tube Cabinet Receiver.  
**BLUEBIRD** .....\$57.50  
Easy to tune—long distance—selective.

4-Tube Receiver.  
**WARBLER** .....\$90.00  
A very high grade receiver—very selective.

**AMERICAN CREST**.....\$150.00  
This we believe to be the best 6-Tube loop set on the market.

We Announce the  
**5 TUBE RECEIVER**  
**GOLDFINCH** .....\$75.00



Bronze panel and Gold dials—Beautiful Mahogany Cabinet with space for B Batteries. This set looks and performs like a Million Dollars. We cannot offer anything better.

For further descriptions Write for New Catalogue Dealers and Jobbers—Our line is interesting and profitable.



## The Finest Gift of All

CHRISTMAS presents to radiophans are easily selected. Every radiophan will be overjoyed in receiving MECO Tubes. No finer gift can be imagined.

You give more than a gift—greater volume and clear, distinct receptive tone. MECO Tubes receive the approval of all. Genuine MECO Tubes have MECO stamped on the base. Accept no other.

Made in 3 volt and 5 volt sizes with small or large base. Your dealer has MECO Tubes or can get them for you from recognized radio jobbers.

Metropolitan Electric Co.  
Des Moines, Iowa



# NEW STATION OPENS WITH NOTED STAFF

## LOCATED IN HOT SPRINGS PARK, ARKANSAS

Will Open and Close Programs with Familiar Air, "Arkansaw Traveller"—Broadcast Every Night

HOT SPRINGS, Ark.—"This is Station KTHS, the Nation's Health Resort, Hot Springs National Park, Arkansas."

Radiophans will be introduced with this announcement to Arkansas' first Class B station when the 500-watt transmitter of the New Arlington Hotel, the \$3,000,000 hostelry to replace the famous Arlington which burned, goes on the air at 8:30 o'clock December 20.

This will be the informal opening, the grand opening and christening party being set for December 31.

The call letters of Arkansas' Radio representative form both a slogan and an invitation, meaning "Kum to Hot Springs," and the call was given by special courtesy of the department of commerce, this being the only "KT" call held.

"Arkansaw Traveller Symbol" Radioland will learn to look for KTHS on the air by the rollicking tune of the "Arkansaw Traveller," which will open and close every program.

Regular concerts are to be offered each night from 8:30 to 10 o'clock, with a specially prepared concert on Sunday night at this hour. The fans will hear as one of the features the famous ten-piece Meyer Davis orchestra of Philadelphia, which has been engaged for the season at the Arlington. Dance concerts will be given three nights a week—on Saturday, Monday and Wednesday nights from 10:30 to 11:30 o'clock.

G. C. Arno, known to the fans as GCA will have charge of the station and will be chief announcer. E. L. Olds will be in charge of the technical operation of KTHS. Both men are from WBAI, Fort Worth, Texas.

Not forgetting the state Radiophans, KTHS will broadcast each Sunday morning, alternately, the services of the First Presbyterian and the First Methodist churches.

# CHANCE TO WIN \$50 BY TUNING IN WGBS

NEW YORK.—Humorously inclined Radiophans can win \$50 every week if clever enough. The money is given by a humor magazine to the person who sends in the best second line to a joke. An announcement of the contest is made every Wednesday night from WGBS, Gimbel brothers, during the "Wit and Half Wit" period of Norman Anthony and George Mitchell, humor editors.

# Great Band Contest for Canadian Cities

## Best Band Decided by Vote Cast by Fans

MONTREAL, Can.—The latest feature on Station CKAC's schedule is that of a huge band contest, open to all cities of the province of Quebec, outside of Montreal itself, for the award of a magnificent silver cup, which will be decided by popular vote cast by listeners in. The conditions of the contest are that a band must have been an organized musical corps for at least four years, and that the members can play at sight. This is required in order to provide nothing but first class concerts and at the same time interest musical critics, listeners in, to take an interest in the competition.

Every Sunday afternoon a band will come to Station CKAC, La Presse, Canada's largest daily newspaper, and entertain critical ears, all eager to cast their votes in favor of the best when the contest has ended.

At these concerts, given by bands of outside cities, the mayor of the city whose band is being featured will deliver a "doom my town" talk, and fans will be influenced by the humor, wit or oratory of the small towns' first gentlemen.

# MORMON CHURCH TO BROADCAST SERMONS

## Radio Business in Utah Jumps as Decision Is Announced

SALT LAKE CITY, Utah.—Heber J. Grant, president, prophet, seer and revelator of the Mormon, or Latter Day Saints, church, is making good use of Radio these days for the purpose of making the world acquainted with the teaching of his church.

Mr. Grant is giving sermons regularly over the Radio now. The other day he told of the founding of the church and its early struggles. The church recently established Radio as a feature of its general conferences which are broadcast now. As a result Radio popularity is growing fast in this section.

BRISTOW, Okla.—K R F U, Oklahoma's new 500-watt Radiocaster will be located here according to the Ethical Radio company, owners of the station.

# NOTED STARS AT STATION WDAF



The Cook sisters, Nello and Lucille, a popular vocal duet, who have won their way to the stage via Radio. Having no previous stage experience, they came to Kansas City and were heard each night over WDAF on its Nighthawk Frolic.

# WBCN, NEW CHICAGO STATION, TAKES AIR

## LARGE NUMBER OF STARS APPEAR ON PROGRAM

### Located on South Side of Chicago—Uses New Type 500-Watt Transmitter

CHICAGO.—Crowded with talent known to Radiophandom, the opening program of Station WBCN, the new 500-watt station located on the South Side of Chicago, which went on the air December 8, was one of the best treats ever offered by a Chicago station.

While the greater part of the bill which started at 8:00 p. m., and ended well after 2 a. m., consisted of artists who have been heard from other stations, few of them have been heard so often that they have lost their novelty.

Included among the artists appearing the opening night were: "Nubs" Allen, Hazel O'Neil, Police Octette, Harmony Girls, Mary Flannery, Axel Christensen and others too numerous to mention. Late in the evening, several announcers from other stations appeared on the scene, and brought artists from their respective stations with them.

# SECTION NEEDS MORE FUNDS FOR OPERATION

## Increased Personnel Necessary for Additional Work

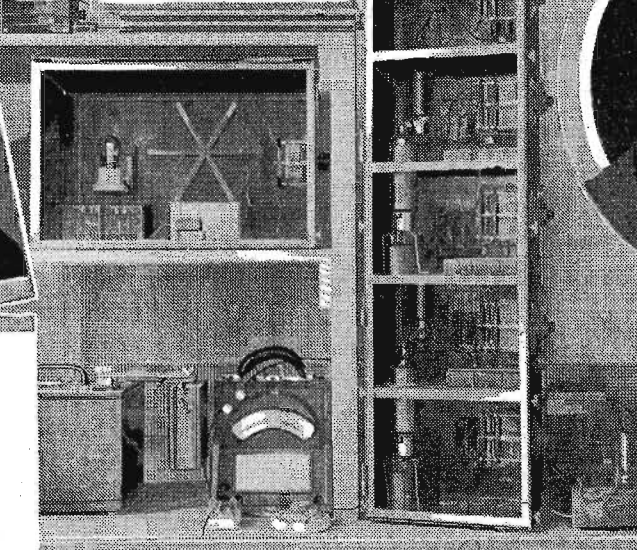
WASHINGTON.—The department of commerce will probably be authorized to expend \$220,525 in the fiscal year 1926 for the enforcement of Radio laws, including station inspection and the licensing of stations and operators, if the figures submitted by the bureau of the budget are not reduced in Congress. The budget submitted by the President on December 1 carried \$15,287 more than the amount allotted for Radio supervision last year, and may permit the employment of a few extra clerks and field inspectors. Increased personnel is necessary due to additional work in connection with the policing of the air. The sum allowed is still far from enough.

A committee in Estonia is preparing regulations for the use of Radio by private persons and business organizations, as well as the operation of broadcasting stations.



Professor N. H. Williams of the University of Michigan, who, with Dr. A. W. Hull of the research laboratory of the General Electric company, conducted a series of experiments during which they listened to the far-famed electron.

Apparatus used in listening to the electron, showing wire cage around units, used to exclude outside electrical disturbances.



Dr. A. W. Hull of the research laboratory of the General Electric company, who has developed the apparatus used to investigate electronic phenomena. For a number of years, scientists have tried to accomplish this work, but with no success until the finish of these experiments.

# Rosaline Greene—Lead of WGY Players



Rosaline Greene, youthful lead of the WGY Players, who has filled numerous roles in this organization successfully. Although only 18 years old, she has created quite a sensation among the critics and followers of the Radio drama.  
 (Read self interview on page seven.)

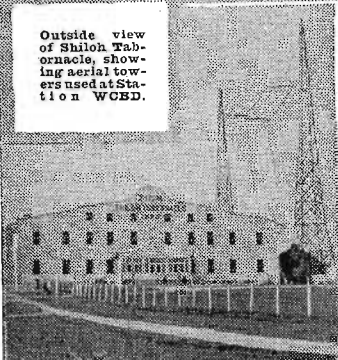
# WCBD—"Where God Rules Man Prospers"



Wilbur Glenn Voliva, general overseer of Christian Catholic Apostolic Church, leaving Station WCBD, which is owned by this sect.



Interior of control room, showing operator at control board. This station will install a high power transmitter, which will soon be heard. It will be one of the first of the 5KW type.



Outside view of Shiloh Tabernacle, showing aerial towers used at Station WCBD.

ON THE shores of Lake Michigan midway between Chicago and Milwaukee two steel antenna towers stand above the city of Zion, founded by the late Dr. John Alexander Dowie. It is the home of Station WCBD.

During the vicissitudes of its existence, this city has had many opportunities for service, but none have been greater than that afforded by employing Radio broadcasting to send forth the Gospel in word and song.

The station occupies the geographical center of the city of Zion, which is laid out with eight boulevards diverging from the center and running to the limits of the city. Visitors are received every day in the year at both the Radio building and Shiloh Tabernacle, and are shown about by courteous guides.

In order to facilitate the broadcasting from Shiloh Tabernacle, which is contiguous to the station, a sound proof control booth for the announcer was placed in the rear of the Tabernacle, where the speaker's platform, choir, band and orchestra leaders and organists can easily be seen. A system of signal lights have been

installed to enable intelligent control of the eight microphones operated from this booth.

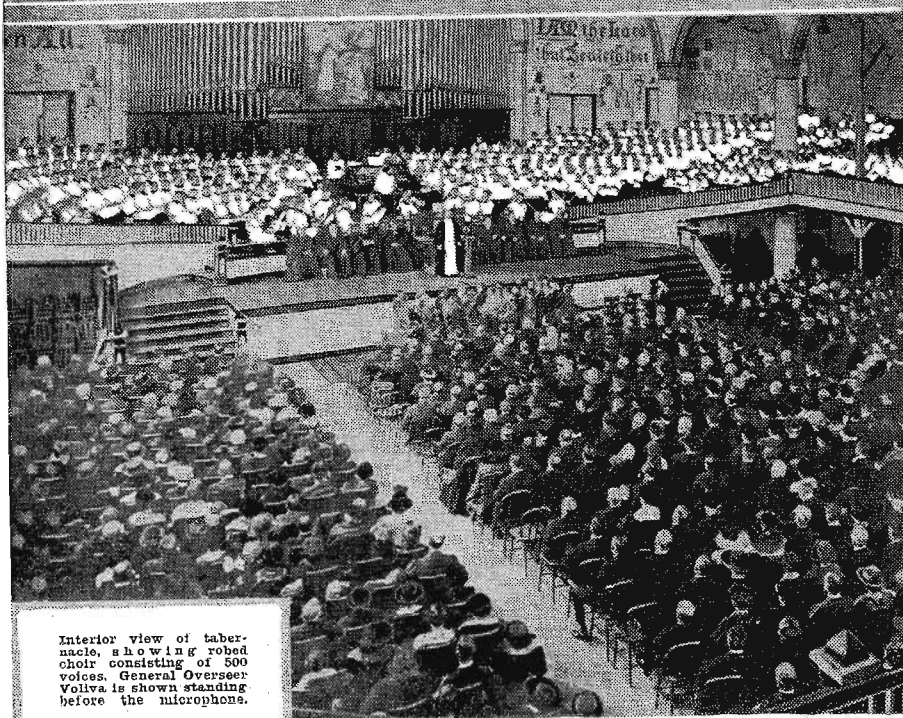
It is quite probable that many persons in the great invisible audience that listen to WCBD do not know of the painstaking care taken to provide the citizens of Zion with musical culture. All branches of music and the theory of composition are taught by a staff of competent teachers. Tuition is free, and at the present time, more than eight hundred students are enrolled.

It is no easy task to prepare programs that will give pleasure to a host of invisible listeners, but WCBD seems to have been singularly successful in so doing—judging by the letters received.

The programs are made up of numbers by the Zion Junior choir of mixed voices of 150 children ranging from 8 to 12 years of age, Zion Male choir of 40 voices, Zion Women's choir of 20 voices, Zion band of 50 pieces, Zion orchestra of 40 pieces, and the Zion White-robed choir of 500 voices. It is said that this choir is the largest that sings regularly every Sunday.

In Roosevelt hall in the State Lake building, Chicago, Illinois, the Sunday services broadcast from Shiloh Tabernacle by WCBD are picked up by a receiver and then by means of a loud speaker the voice of Wilbur Glenn Voliva and the Zion organ recital with all its exquisite modulations penetrate to the most remote corner of the room where some Sundays as many as 300 persons assemble.

That this is but one of the many gatherings of groups who tune in on WCBD when that station is on the air is evidenced by a daily average of 125 letters received from far and near from lonely farms, and lumber camps, from the shut-ins isolated by sickness and from fans in all sections of the country. "In these letters," says J. H. Depew, manager of the station, "we cannot but find encouragement and fresh impulse. They inspire the resolution to make the program broadcast by WCBD even more worthy of the praise which has been showered upon us."



Interior view of tabernacle, showing robed choir consisting of 500 voices. General Overseer Voliva is shown standing before the microphones.



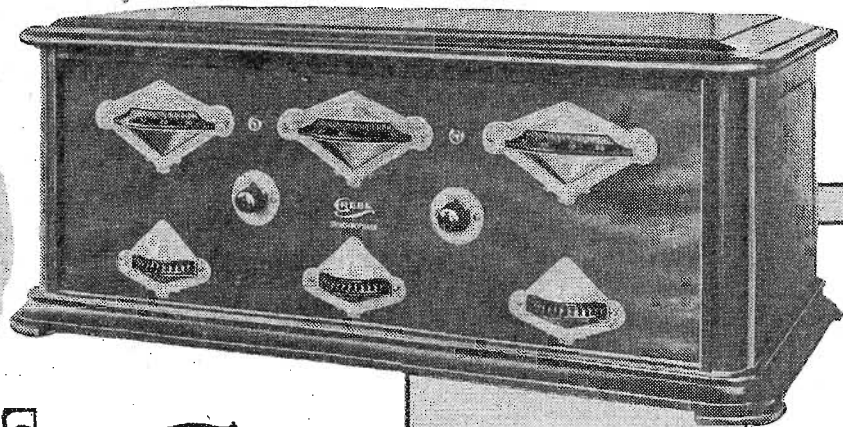
J. H. Depew, manager and chief announcer of Station WCBD, who has made the station what it is today.



"By many words wit is exhausted."  
—Lao Tzu

The Synchronphase needs no extravagant claims.

Doctor Mu



# The GREBE SYNCHROPHASE

TRADE MARK

**T**HE SYNCHROPHASE is a broadcast receiver that will stand as a challenge to the radio industry for a long time to come. Its surpassing craftsmanship is equalled only by its easy, dependable operation.

Greater sensitivity has been gained through two stages of balanced tuned radio frequency—the result of many months of intensive research by the Grebe engineering staff. Extreme selectivity has been obtained by the use of Binocular coils.

The settings for the various broadcast stations are equally spaced over the dials. This is accomplished by S-L-F (straight line frequency) condensers.

A new type of volume control gives an unbroken range of six variations of audio amplification.

Write for literature

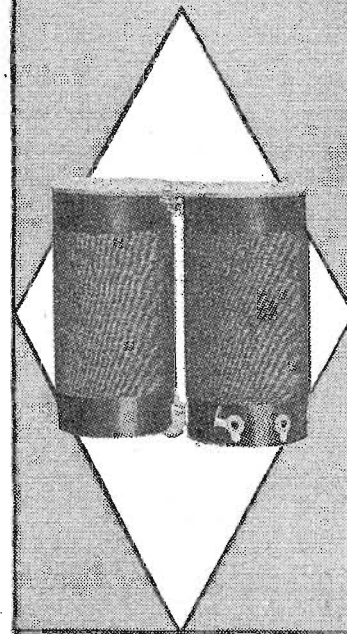
**A. H. GREBE & CO., INC.**

Van Wyck Blvd., Richmond Hill, N.Y.

Western Branch: 443 So. San Pedro St., Los Angeles, Cal.

THIS COMPANY OWNS AND OPERATES STATION WAHG

All Grebe apparatus is covered by patents granted and pending



## Synchronphase Secrets—

No. 1.—The "Binocular" Coil

A truly fieldless coil with which the detector and radio stages are tuned. Unaffected by impulses from undesired local stations, its use is a tremendous factor in the success of the Synchronphase.



TRADE MARK  
REG. U. S. PAT. OFF.

## FANS REFUSE HELP WHEN CALLED UPON

OWNER OF WHB TRIES TO INTEREST RADIO PUBLIC

Floats Three Unsuccessful Attempts to Gain Funds to Pay Entertainers—Still Has Faith

KANSAS CITY, Mo.—Meeting with a rebuff on every side, E. J. Sweeney, owner of Station WHB, tried three times to solve the long mooted question, "Who shall pay for broadcasting?" And three times he has failed.

But, without, Mr. Sweeney has not lost faith in the ever popular Radiophon. "No conclusions unfair to the fan should be drawn from the result of my failure," he says. "I believe that thousands of fans who failed to contribute, intended to help pay for the enterprises. But they just had to put it off until they forgot."

**Publishing Enterprise Fails**  
The first idea that Mr. Sweeney had was to gain contributions from Radiophons by publishing a weekly paper. The proceeds from subscriptions would be used to publish the paper, and the entertainers would be paid out of the profits. Because he received offers amounting to \$1,026, not enough to pay for the entertainers along, which were sent out to interest the people, he returned the money and gave up the plan.

His second idea was a Christmas fund for the shut-ins and orphans. This was not to pay for the entertainers, but its results show how difficult it is to get financial support for even such a beneficial enterprise.

**Fails Third Time**  
His printing for circulars and mailing cost \$2,640. He received \$161.

Undaunted by these failures, Mr. Sweeney then tried what he thought was an excellent plan. It was to have an invisible theater, with the broadcast studio as the stage, and thousands of fans as the audience. The cost of printing for this idea came to \$4,620. He got back \$4,168.

Instead of increasing his revenue so that he could pay for entertainers, Mr. Sweeney has incurred quite an expense from his own pocket.

And he still has faith in the general public!

## Rosaline Greene, Youthful Ingenue Lead with WGY Players, Tells Life

Rosaline Interviews Herself for Radiophon Admirers and Discovers That They Are Helping Her to Aspire to Be Great, Intense, Emotional Actress

A Self Interview by Rosaline Greene, Eighteen-Year-Old Leading Ingenue with WGY Players, of WGY, the General Electric Schenectady Station

(Pictures on Page Four)

**H**ELLO everybody! I suppose you want me to start right in to tell you all about myself—but then, you don't want one of these stereotyped "where born, where educated, favorite sports" interviews, do you? Honestly I'm a normal individual, born, educated, et cetera. Just to orient myself a little more tangibly in your minds, I am now eighteen and a junior at New York State college.

I can't recall exactly when I first began to act. I think it must have been on the day I opened my eyes on this perplexing, radiant planet called earth. Since then, in imagination, I have run the gamut of a thousand lives. First, delicate fairy girls, the key to which lay in that most fascinating book known to every child, "Grimm's Fairy Tales." And then came my tomboy stage, where I romped with the boys through breath-taking cowboy and Indian escapades, fierce adventures on the pirate ship of which I was the fearless, tyrannical leader. We even organized a gang of desperadoes.

**Four Proudest Moments**

The four proudest moments of my life came when I won a high school prize public speaking contest, when it was predicted that I would become a "tragedienne" (after my valedictory at commencement had professedly brought tears to the eyes of my audience), when I had an offer to go into the movies, and when a Broadway producer recently offered me a part in a new production.

Oh, you want to know about college too? During my freshman year at New York university I was associated with the Washington Square Players—now I'm with the Dramatic association of State college. The tragic Irish mother Maurys in "Riders to the Sea," the glory-seeking South Sea maiden in "The Gazing Globe,"

tempestuous suppressed Emelle in "The Conflict," and others, fell to my lot.

Why did I take up Radio drama? Because of an unquenchable desire to go beyond the limits of a college audience to reach the far corners of the world. Could there be more encouraging response to such imaginative craving than to encircle an entire world within the magic ring of ether waves? And besides, think of all the lives these weekly plays allow me to live in condensed time span.

**Her Source of Inspiration**

My audience? It is a world. Although during the actual performance of the play I am confronted by the formidable "mike," I see only the character I am portraying. Of course I get inspiration from beyond.

Do I visualize one particular audience? No. I see the lonely invalid from whom Fate has snatched away social intercourse—materially confined, but imaginatively longing to be part of the stirring world; I see wealthy idlers, critical, seeking diversion from boredom; I see my own American family, be-slipped dad with his pipe, mother beaming on the excited kiddies allowed to stay up after bedtime; factory workers, students, travelers, convicts. Do you see how limitless and varied a Radio audience is?

**Being Real Secret of Attraction**

Each week I conjure most vividly the type of audience which harmonizes best with the atmosphere of the play. Of course here arises a difficulty—that of holding listeners of such diverse tastes. How do we strive to do it? By being real. A truthfully portrayed character is the only one that has any chance of success. We play as sincerely as we can—and then just hope it reaches.

You ask what part I like to play? For lack of any technical specification I must answer, "A type that lives and glows," be it the light, laughing school girl or the suffering woman of the world. Of course I have limitations, but I do aspire to intense emotional roles. After more experience and maturity—oh I do so want to play them!

## TRANSMIT PICTURES BY NEW DISCOVERY

C. FRANCIS JENKINS TELLS PUBLIC HOW IT'S DONE

Radio Corporation of America Sends Photographs Across Atlantic with Own Apparatus—Fair Success

BOSTON, Mass.—Transmitting pictures by Radio was again accomplished successfully recently by C. Francis Jenkins, prominent inventor of Washington, D. C., when he gave a demonstration at the opening of the Boston Radio show. The pictures were sent from Washington by Mr. Jenkins and were reproduced here by his assistant, J. W. Robinson.

The signals, which were received on a photographic film, were sent from the old naval station at Anticostia, D. C., just outside of Washington. This station, with the call letters of NSE, was turned over to Mr. Jenkins for the test.

According to newspaper reports, the Radio Corporation of America has succeeded in transmitting pictures across the ocean by means of Radio. The samples which were submitted for the approval of the public, were far inferior to the pictures sent by the new Jenkins method.

**Jenkins First to Perfect Machine**

Where the R. C. A. method showed the photograph to be blurred by wavy lines, the Jenkins method shows practically an exact reproduction, which is very clear and distinct.

Mr. Jenkins has been working for some time on his new invention, and has repeatedly refused to demonstrate it to the public because it did not come up to his expectations. Only recently has this been accomplished after hours of research and labor.

## WOR Opens N. Y. Studio in Famous Chickering Hall

NEWARK, N. J.—L. Bamberger and company of this city, who own broadcasting station WOR, opened a New York studio in Chickering hall, 27 West 57th street, the evening of December 10. Programs from the new studio are transmitted by wire to the WOR station in Newark for broadcasting. The Newark studio will be maintained also.

# Why it is Better

THE picture tells the story—seven practical, sensible reasons why Federal sockets should be in your "pet" hook-up.

Federal sockets are but another evidence of the care and engineering skill used in designing and making Federal Standard Radio Parts.

There are over 130 standard parts bearing the Federal iron-clad performance guarantee—their use means—"Balanced Circuits" with better performance.

FEDERAL TELEPHONE & TELEGRAPH COMPANY  
BUFFALO, N. Y.

Boston New York Philadelphia Pittsburgh Chicago  
San Francisco Bridgeburg, Canada



# Federal

Standard RADIO Products

Thumb nuts slotted for screw driver—no pliers necessary to tighten.

1/16 inch thick brass nickel plated barrel; screw-anchored to base at two points.

Full 9/16 inch thick, 2 1/4" x 2 1/4" solid bakelite base

One piece binding post molded into base—it cannot turn when thumb-nut is tightened.

Extra heavy phosphor bronze contact springs imbedded in base positively prevent short circuits or radio frequency leakage.

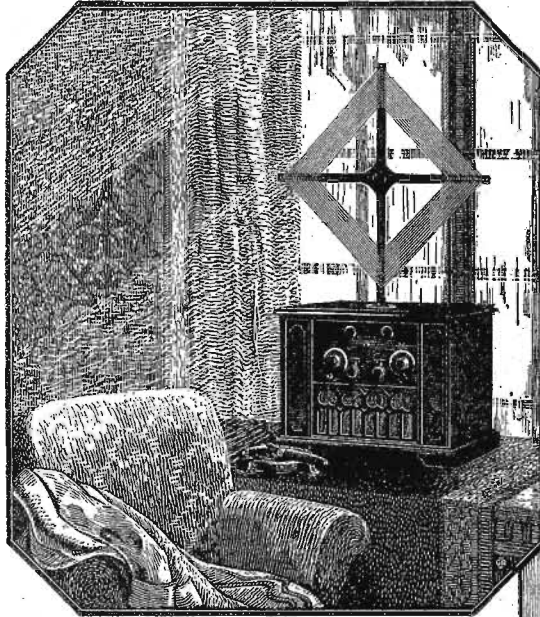
Mounting screws are furnished with each socket. Contact for grounding socket can be made under heads of these screws.

This screw holds only the contact spring securely in place. Not extending through to top of base—an exclusive Federal feature.

Look for this sign

# Which would you choose?

## THIS?—

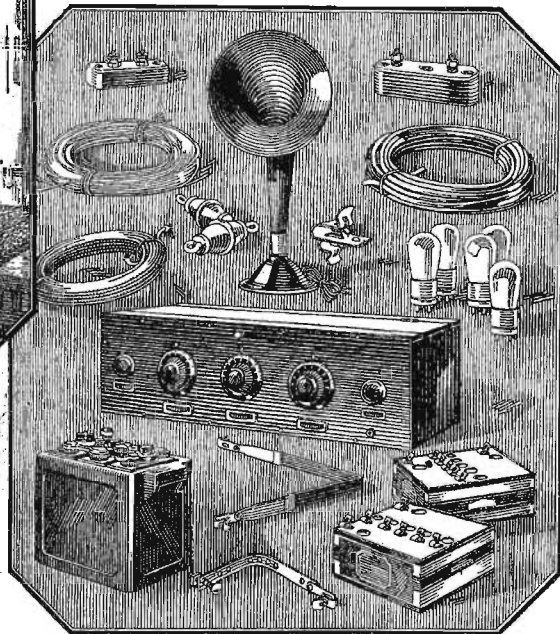


### DE FOREST D-12 RADIOPHONE

Complete in one unit, with everything necessary to use it immediately—all at the one initial cost. Prices according to cabinet finish and batteries.

With dry batteries	
In Fabrikoid cabinet	\$161.20
In Mahogany cabinet	176.20
With storage batteries	
In Fabrikoid cabinet	\$180.00
In Mahogany cabinet	195.00

## OR THIS?



### "ACCESSORIES EXTRA"

Radio instrument	"B" batteries
Antenna wire	Tubes
Connection wires	Ground clamp
Clips	Antenna spring
Lightning arrester	Hammer
Insulators	Nails
Loud speaker	Screws
Window lead-in	Staples
Storage battery	Mechanic's labor
	Your time

Separate price for each of these items

## What "complete self-contained" means as in De Forest

IT is the best of fun, we admit, to hook up a radio set, to string your antenna from tree to house, to connect your ground-wire—at least it is fun if you are mechanically minded.

If you're *not*, and want an instrument which is *ready* to operate when you buy it and which is based on the highest kind of engineering skill, what you want is a De Forest Radiophone. Even if you are mechanically minded—and want an instrument which your family can use and of which you will be proud—De Forest D-12, the leader in the field, is the thing to get. Its tone is clear and natural, almost beyond belief; and it is remarkably selective.

And as for convenience, remember these important things: it is self-contained and complete in one unit—usable within five minutes after it enters your home—easily movable from room to room because it does not need to be attached to either antenna or ground.

When you find the De Forest agent in your vicinity you find a man who knows radio—a man who has given us his word that he will see that every instrument he sells is thoroughly inspected and properly serviced after the sale.

Avail yourself of his help. He desires, as do we, that you should get the fullest enjoyment and satisfaction from your instrument.

DE FOREST RADIO COMPANY, Jersey City, N. J.

Also makers of De Forest Tubes—The "Magic Lamp" of Radio

# DE FOREST RADIOPHONE

REG. U.S. PAT. OFF.

REG. U.S. PAT. OFF.



# KRIS KRINGLE WORKING AT WAHG

## RADIO SANTA CLAUS HOLDS BIG GIFT BAG

### AWARDS MANY VALUABLE PRESENTS TO FANS

List Includes Dozen Complete Synchronphase Receivers, Furnished Bungalow with Lot and Smaller Gifts

RICHMOND HILL, N. Y.—Hang up your stockings on an aerial, or at least an indoor loop, kiddies and grown-ups, for this is to be a real Radio Christmas.



Santa Claus

Such is the edict of the Radio Santa Claus of Station WAHG, A. H. Grebe and company, Inc., who is going to ride the electromagnetic waves with his reindeer.

Thousands of youngsters and older folks will be made happy by this "St. Nick of the Air." All that is required of gift seekers is a letter or postcard addressed to the Radio Santa Claus of WAHG, Richmond Hill, Long Island.

There is no age limit for the letter writers, since the WAHG Santa invites all, whether six, sixteen or sixty, just as long as the heart is young. That's enough for the Radio Kris Kringle.

Thousands of Dollars in Gifts

WAHG Santa's gift pack includes many treasured things. An even dozen synchronphase receiving sets with loud speakers, tubes, storage batteries and loop aerials, lead the list.

Among thousands of dollars worth of other prizes are silk stockings, umbrellas, sweaters, skates, girdles, silk undergarments, vanity cases and purses. Then, in case any men address the WAHG Santa, they may receive cigars, pipes, smoking and chewing tobacco, cognac and even a few silver flasks for the optimists.

Even a bungalow and lot is included in the Radio St. Nick's list. The bungalow will be completely furnished. The house and lot is to emphasize the four primary needs of humanity—food, clothing, shelter and Radio, of course. The gift home will have a Radio receiver in first class working order for long distance.

Santa's Schedules on Air

A 17-year-old miss, known to Radio-plans as "Nancy Clancy," acts as announcer for WAHG's Santa every Monday, Wednesday and Friday evening at 7:40 o'clock, Eastern time, and at 9 o'clock Santa is on the air for the far West audience.

St. Nick appears also on the midnight programs Saturday and Monday at 1 a. m. Eastern time.

So if you believe in Santa Claus, uncap your fountain pen and get busy with a letter or postal card.

## European Notes

Vienna is picking up in Radio popularity. To date this year 15,000 people have subscribed to the Radio-Vienna broadcasting service.

The Marconi company of London has just recently perfected a "ship's orchestra repeater," for use aboard ship. It is similar to the American public address system.

The Radiopol company has obtained a concession to install a broadcaster in Poland.

On the second anniversary of the British Broadcasting company the millionth receiving license was issued by the English postoffice.

Patients in Belfast, Ireland, hospitals will soon enjoy Radio programs from the British Broadcasting company. Special set installations are being made.

A recent Radio exhibition in London at the White City consisted chiefly of home-buit sets. Prof. A. M. Low, who opened the exhibition, prophesied the early perfection of sight by Radio, thus reducing the need for so much travel.

Moscow, Russia, will soon have a 1,000-watt, 1200-meter broadcasting station in operation.

## FATHER OF RADIO IS PAPA OF DAUGHTER

NEW YORK.—Dr. Lee DeForest, eminent scientist and "father of the Radio," was presented by Mrs. DeForest with a seven-pound daughter on a recent Monday afternoon at their home, "Riverlure," Spuyten Duyvil, New York city. This is their second child, the eldest, Eleanor, being five years old. Mrs. DeForest was Miss Mary Mayo, internationally known as an operatic and concert singer.

WMC Now on 506-Meter Wave  
MEMPHIS, Tenn.—WMC, Commercial Appeal here, has changed its wave length to 506 meters in accordance with department of commerce instructions. WMC was formerly 500 meters. This may be changed again soon.

## Old Time Fiddlers' Contest Broadcast at Station KFNF

SHENANDOAH, Ia.—Station KFNF, located in this city, recently had the greatest aggregation of old-time fiddlers ever gathered together in one place. More than forty-five answered the call when it was broadcast, asking old-time fiddlers to come to the station and play. The most popular fiddler will be chosen when the votes which are cast by the listeners are tabulated. After the performance, a supper was served for the fiddlers and their guests.

Station WKAR Increases Power  
DETROIT.—Michigan Agricultural college, East Lansing, Michigan, will take its place among the leading class B broadcasters January 1, when the power of its station will be raised from 100 watts to 500. The call letters will be WKAR and the wave length 235 meters. Musical and educational programs will constitute WKAR's program.

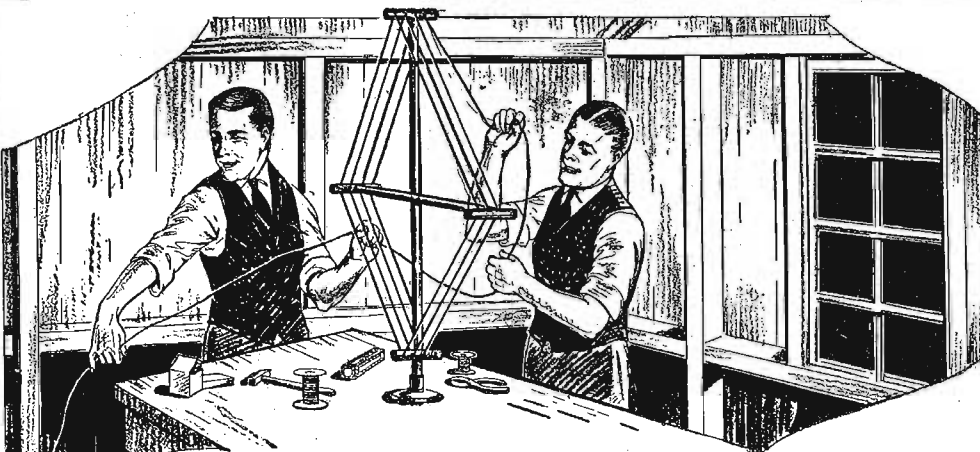
## KGO Plans Many Christmas Treats

### Unusual Program Offered Should Gladden Hearts of Many Music Lovers in West

OAKLAND, Calif.—Christmas week at Station KGO, because of the unusual brilliance of the programs offered, should gladden the hearts of many music lovers in the West.

The "Cricket on the Hearth" will be played before the microphone Tuesday, December 23, by KGO players. Christmas carols will be broadcast Thursday, December 25, by the KGO mixed quartet and instrumental trio.

Saturday evening, December 27, six instrumental and vocal artists of the San Francisco Musical Arts institute will appear before the microphone for the first time.



# The Best Loops are wound with Special wire

A good loop antenna must fulfill two requirements; it must be electrically efficient, and it must be mechanically satisfactory. To combine both requirements is difficult unless a special wire, made especially for loops, is used.

Belden Loop Wire is made of sixty exceedingly fine strands of copper wire twisted with five strands of phosphor bronze wire, enclosed in an insulating covering. The sixty copper strands afford a low resistance circuit for the radio-frequency oscillations of the loop; the

phosphor bronze strands provide the tensile strength that makes Belden Loop Wire non-stretching and non-sagging. Ideal for collapsible loops.

When you build a loop, make one that will give maximum signal strength and still keep snug and tight, after long usage. For special work, use Belden Litz Wire. Our new booklet, "Helpful Hints for Radio Fans," has a lot of good ideas that will help you. Send for it. It's free. Use the handy coupon.

## OTHER BELDEN RADIO PRODUCTS

Ask your dealer to show you Belden hook-up wire, enameled aerial wire, terminals, battery cords, and a dozen other Belden items, sold in distinctive Belden cartons. Build Belden Quality into your radio set.

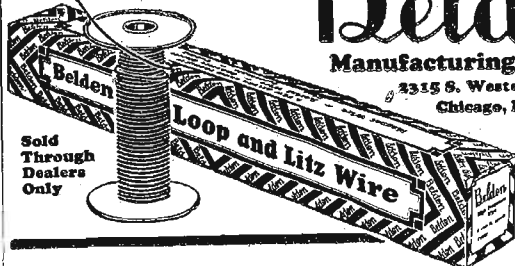
## Free Booklet!



Belden Manufacturing Company  
2315 S. Western Ave., Chicago, Ill.  
I would like to know more about good loops. Send me your latest booklet—Helpful Hints for Radio Fans. Be sure to explain Litz Wire, too.

Name \_\_\_\_\_  
Address \_\_\_\_\_

DEALERS! Attach the coupon to your business letterhead for complete dealer information on the Belden Line of Radio Products.



Sold Through Dealers Only

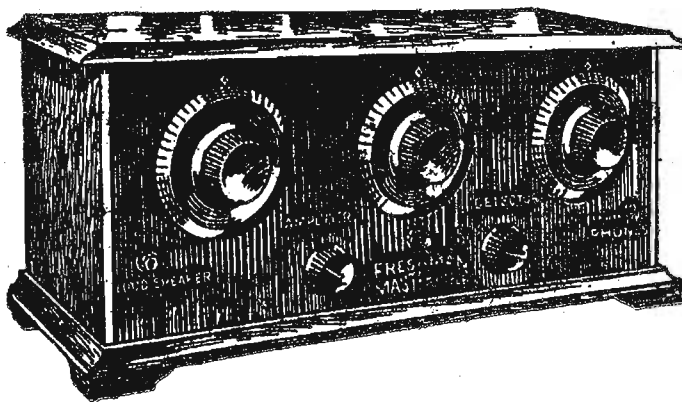
"Masterpiece is a wonder—  
We have tried them all!"  
"California on Loud Speaker  
from Plainfield, N. J."  
"51 Stations in 2 hours."  
"Best set ever put on the market"  
"Beats any set at \$200."  
"Can I be your agent?"  
"It is simply marvelous"

# Thousands of

Unsolicited letters of praise prove conclusively that the Freshman Masterpiece is the equal, if not the superior, of any five tube receiver in the world—regardless of price. The statements above, taken from letters received, give a general idea of the tremendous hold that this remarkable set has obtained.

Made of the finest low loss materials and in a beautiful genuine solid mahogany cabinet, it is attractive enough for the most pretentious room, and at sixty dollars, economical enough for the most modest. Combines every single point essential to the perfect receiver. Real distance reception without that squealing and howling. So selective that once a station is picked up—it can be brought in again on the same points on the dial, whenever you want it. And what's more—

*IT'S THE EASIEST OF ALL SETS TO OPERATE*



# \$60.

THE GREATEST VALUE  
EVER OFFERED IN A  
RADIO RECEIVING SET

## FRESHMAN MASTERPIECE

## 5 TUBE TUNED RADIO FREQUENCY SET

*Ask Your Dealer to Install One in Your Home*

All genuine Freshman Masterpiece Sets have a serial number and trade-mark stenciled on the sub-panel. The Receiver is not guaranteed if number has been removed or tampered with.

**Chas. Freshman Co. Inc.**  
*Radio Condenser Products*  
106 SEVENTH AVENUE, NEW YORK CITY

IF YOU WANT TO BUILD IT YOURSELF, YOU CAN BUY THE FRESHMAN MASTERPIECE KIT. ASK YOUR DEALER.

# General Trouble Shooting and the Neutrodyne

Some of the Most Frequent Difficulties Overcome

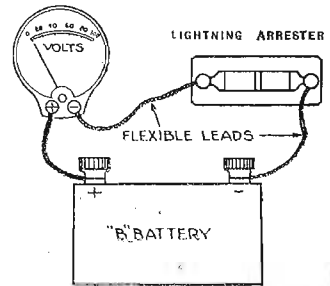
By Charles Manley

THE location and correction of faults in a receiver are greatly simplified if done in a systematic and logical manner. It is not the purpose herein to outline all causes of trouble which may confront the man who builds his own set, but rather to enable the man who has purchased a factory-built set to "find the bug" in his installation, and perhaps in a number of cases to save the mutual inconvenience of having to call upon the manufacturers or their representatives for aid.

In the broadest sense, the trouble in a neutrodyne may usually be listed under one of the following heads: Receiver does not operate, or signals very faint; receiver squeals or oscillates and the receiver tunes broadly. We will endeavor to take up the various causes and correction of these faults in systematic order.

### Checking Against Diagram

First we will assume that all external battery, aerial and ground connections have been properly made, and before proceeding further we will check these against the diagram furnished with set. Some means must also be had of knowing that A and B batteries are in proper condition, for without this information we can establish nothing. Every set owner, then, should have a hydrometer for the



purpose of testing his A battery and a pocket voltmeter reading up to 100 volts to determine the condition of his B battery. A B battery which gives a reading of less than two-thirds of its rated voltage is of little value, and should be discarded.

Now we have come to the actual trouble shooting and shall take up a case where the receiver is inoperative, or signals weak.

### Weak Signals

Defective tubes are the most frequent causes to which trouble of this nature may be attributed, and therefore the first operation is to place the phone plug in the detector jack, removing the audio amplifier tubes from their sockets and interchange them with the tubes in the other sockets in all possible combinations, checking results as to audibility in the head phones. (Or better still, use a couple of new and tested tubes in the Radio frequency and detector sockets, comparing results.) We can now check up on the audio amplifier tubes in like manner, inserting plug in first and second audio jacks in turn and noting volume secured using different tubes.

Another frequent cause of weak signals is traceable to a shorted lightning arrester. This condition can easily be ascertained by connecting the voltmeter and battery in series around the terminals of the lightning arrester, as in the accompanying diagram. A short circuit, of course, producing a voltmeter reading. Another method is to remove the ground wire from the suspected arrester, and listen in for results. The same connection of battery and voltmeter may be used to test all suspected short or open circuits as in the neutralizing coils, or audio transformers.

A neutrodyne, while exceedingly sensitive in some locations and under certain conditions, will not produce satisfying results on out of town stations when using a small indoor antenna. This particularly holds true when the installation is on a lower floor of a large metallic structure. The remedy in this case is obvious.

We have practically covered all troubles of this nature that are external to the set. For the benefit of those who have the mechanical knowledge to look for trouble in the set itself, we may add the following tests:

### Testing Out Sets

It may be possible that one or more tubes do not light even though they are not burned out. In this case it should be determined by pressing on the tubes to see if each one is making proper contact in its socket. If this test indicates that tubes are not making good connection, the

contact prongs of sockets may be bent upward. This is done after disconnecting batteries. Another cause of the failure of the tubes to light is due to the failure of one or more jacks to make contact. To determine this, the set must be taken from cabinet, by removing panel screws, after which the set slides out as a unit. The operation of the jacks should be noted by inserting and withdrawing the plug, and any contacts, the spring tension of which is weak, should be inspected, and carefully bent in shape.

When a neutrodyne oscillates, which condition is manifested by clicks, when the dials are tuned, and by loud squeals which vary in pitch as the dials are turned, it is the impression of the average owner that the set is "out of balance."

This is seldom true, since a carefully built set has a considerable latitude of balance. In an inspection of over two hundred standard neutrodyne receivers in the owner's home, only two cases were found where the sets were out of balance, and these had been tampered with by well meaning friends or "Radio experts," so it is safe to say that your set is probably not out of balance.

The most frequent cause of an oscillating receiver is an aerial lead which runs near to or parallel to the cabinet, or is bunched with the battery or ground wires. This is easily remedied and it is surprising what a vast difference in results such a mere detail may produce. The aerial lead should always be well separated from the set and from all other wires.

Location and weather have a marked effect upon the stability of a neutrodyne. On some days any neutrodyne will show a pronounced tendency towards oscillation, or even may oscillate vigorously. This may frequently be overcome by making a better ground connection or by using a longer aerial. A proper ground connection is always necessary for the successful operation of a neutrodyne receiver, and a poor ground is a frequent cause of oscillation.

### Steel Buildings Cause Trouble

Many instances have been found where this type of set will not operate without oscillation in a steel building when using an indoor aerial about the moulding of a room. In this case it will be found (Continued on page 34)

## Modulation plus Regeneration

# Gazette

**RADIO SECTION**

VOL. XIV-NO. 132-16 PAGES\*\*

### MODULATION PLUS REGENERATION IN NEW MODEL L-2 ULTRADYNE

20 DX Stations logged on August 25th on Loud Speaker using loop aerial at Covington, Ky

WSB Atlanta, Ga.	WFAA Dallas, Tex.
WMC Memphis, Tenn.	WFLA St. Louis, Mo.
WOC Davenport, Ia.	WBT Charlotte, N. C.
WBAP Ft. Worth, Tex.	WKB Milford, Kan.
WNYC New York, N. Y.	WGO Shreveport, La.
WOAW Omaha, Nebr.	KGO Oakland, Calif.
WFAA Dallas, Tex.	KFTM Los Angeles, Calif.
WSAI Cincinnati, O.	KFL Kansas City, Mo.
KFKX St. Louis, Mo.	
WCK Charlotte, N. C.	
WBT Charlotte, N. C.	
WKB Milford, Kan.	
WGO Shreveport, La.	
KGO Oakland, Calif.	
KFTM Los Angeles, Calif.	
KFL Kansas City, Mo.	

Modulation plus regeneration is the keynote of the new Model L-2 Ultradyne Receiver. Regeneration as applied to this new method of radio reception produces greater rectification than ordinary methods of detection—a vital step in radio engineering. This combination produces tremendous amplification when receiving weak signals. Allows the Ultradyne to respond to a very small amount of energy. Signals are amplified thousands of times before they are detected and made audible.

Mr. R. E. Thomas, 509 Coppin Building, Covington, Ky., writes: "The Ultradyne far surpasses any idea that I previously had as to what a radio receiver could do. On the night of August 25th, 1924, I tuned in on my Ultradyne the following stations:

WBZ Springfield, Mass.	WJAB Boston, Mass.
WOR Newark, N. J.	WJAN Providence, R. I.
WGY Schenectady, N. Y.	WLW Cincinnati, O.
WHN New York, N. Y.	KSD St. Louis, Mo.
WCAP Washington, D. C.	WWJ Detroit, Mich.
WEAF New York, N. Y.	WHO Des Moines, Ia.
WOO Philadelphia, Pa.	WTAM Cleveland, O.
KDKA Pittsburgh, Pa.	WHAZ Troy, N. Y.
WCBD Zion, Ill.	WOS Jefferson City, Mo.
WJAR Providence, R. I.	
WGR Buffalo, N. Y.	
WTAS Elgin, Ill.	
WAAM Newark, N. J.	
WABM Saginaw, Mich.	
WNAC Boston, Mass.	
WGAN Providence, R. I.	
WLW Cincinnati, O.	
KSD St. Louis, Mo.	
WWJ Detroit, Mich.	
WHO Des Moines, Ia.	
WTAM Cleveland, O.	
WHAZ Troy, N. Y.	
WOS Jefferson City, Mo.	

"I consider the above reception remarkable as it stands, but considering it was all accomplished on a 24-inch loop, and all but WGO, KFTM and KFL were heard on the loud speaker; it far surpasses anything that I have heretofore experienced.

"As regards selectivity, will say that I am only four or five miles from the powerful WLW station at Cincinnati, operating on 423 meters, and his wave is so powerful that I can receive him on the loud speaker, with one stage of audio, loud enough to be heard a block away, without using antenna, ground or loop. When WLW is on the air, I can tune him out completely, and receive WSB on 429 meters, WRE and WDAF on 411 meters, and FWX, usually on 400 meters, but normally somewhat above that wave.

"I know of no other receiver that will even approach this performance for extreme selectivity, volume and distance."

## ULTRADYNE

### MODEL L-2

This application of regeneration is the most recent development of R. E. Lacault, E. E., A. M. I. R. E. since his perfection of the "Modulation System" used exclusively in the Ultradyne and which has so revolutionized all conception of selectivity, sensitivity, volume and range.

This Model L-2 Ultradyne, without a doubt, represents the peak of present day super-radio engineering skill.

### Ultradyne Kit

Consists of one Low Loss Tuning Coil, one Low Loss Oscillator Coil, one special Low Loss Coupler, one type "A" Ultraformer, three type "B" Ultraformers, four Matched Grid Condensers. The Ultraformers are new improved long wave Radio frequency transformers, especially designed by R. E. Lacault, Consulting Engineer of this Company and inventor of the Ultradyne.

To protect the public, Mr. Lacault's personal monogram seal (R. E. L.) is placed on all genuine Ultraformers. Ultraformers are guaranteed so long as this seal remains unbroken.

## \$30.00

Send for the 32-page illustrated book giving latest authentic information on drilling, wiring, assembling and tuning the Model L-2 Ultradyne Receiver.

## 50¢

PHENIX RADIO CORPORATION  
3-5-7-9 Beckman Street, Dept. A New York City

AN EVENING AT HOME WITH THE LISTENER IN (SEE INSTRUCTIONS FOR USE BELOW)

Table with columns for Station and City, Met., Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday. Lists various radio stations and their broadcast schedules.

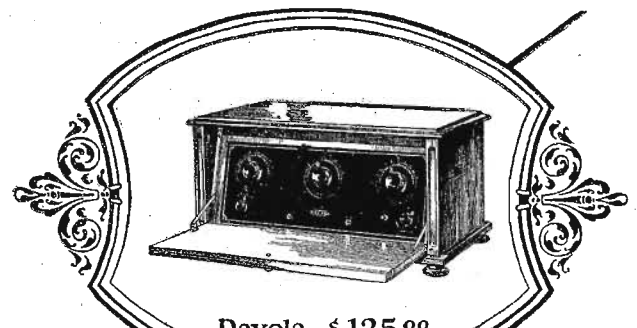
Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods listed; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. This table includes only the evening broadcasts, and, on Sunday, the late afternoon program.

STATIONS IN ORDER OF WAVE LENGTHS USED

Table with columns for Meters Call, listing various radio stations and their call letters.

Radio Again Makes Deaf Hear FEMBRIDGE, Ont., Can.—Radio again helped the deaf to hear their first time recently when A. E. Schenck of this city, deaf since birth, put on the headphones attached to a super-heterodyne and heard very distinctly a concert from WGY, Schenectady.

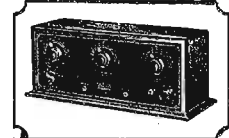
Hold Mass Meeting of Radiophans DAVENPORT, Iowa.—The largest gathering of Radiophans ever assembled in the tri-cities was held in the auditorium of the Palmer school here recently. The meeting was held under the auspices of the General Research Radio League. This school is the home of Station WOC.



Dayola \$125.00

Why there is more value in DAY-FAN Radio

1 All essential parts of DAY-FAN sets are made in our factory. These sets are not merely an assembly of parts made by others. All parts are designed and manufactured to work in unison and make possible extreme accuracy.



OEM-7 \$98.00

2 The appearance of DAY-FAN sets suggests a quality entirely in keeping with their accuracy of manufacture. Made of the finest materials they have a finish and design which harmonize with the surroundings of the most tastefully furnished homes.



DAYTONIA \$285.00

3 Their volume is such that on many stations it must be dampened for the ordinary room.

and other models

4 Their selectivity can be varied at will from broad tuning to extreme sharpness.

5 Manufacturing accuracy and the use of rivets instead of screws reduce servicing to the lowest point yet obtained in radio manufacturing.

These are a few of the remarkable DAY-FAN qualities. A demonstration will add many more.

The DAYTON FAN & MOTOR CO. Manufacturers of High-Grade Electrical Apparatus for more than 35 Years DAYTON, OHIO.

Day-Fan RADIO





SOUTHWEST BIRDS AT KOB FRIDAY

Monday, December 22

(Continued from page 14)

WCAU, Philadelphia, Pa. (Eastern, 278), 6 p. m., The Goodtime dance orchestra; 8, concert.

WJLD, Mooreshead, Ill. (Central, 270), 9:30-1:30 p. m., music; 3:30-5:30 p. m., music.

WKMG, New York, N. Y. (Eastern, 455), 4-1:30 p. m., 20th S. Harrison, soprano; 7:30-8:30, state and federal agricultural reports.

WFLA, Tampa, Fla. (Eastern, 327), 7-8 p. m., Jack Brown and his orchestra; 9:30, Duke Eldon and his orchestra; 10:30, Duke Eldon and his orchestra.

Dr. Harry Cloud is the director of the Magnolin Petroleum company's refinery band, which is gaining a reputation among the radiophans since the opening of Station KFDM, Beaumont.

Ruth Waterman, member of the KGO mixed quartet, which will be one of the features of New Friday's Christmas program next Thursday, December 24.



Albert B. Brown is rapidly becoming famous through his dinner concerts Tuesday, Wednesday and Friday; late request programs on Monday and Friday; and his early Sunday morning music at WJLD, Mooreshead. He will, however, leave Mooreshead for the new Ambassador theater, Chicago, when it opens.

Ruth Waterman, member of the KGO mixed quartet, which will be one of the features of New Friday's Christmas program next Thursday, December 24.

WJLD, Mooreshead, Ill. (Central, 270), 9:30-1:30 p. m., music; 3:30-5:30 p. m., music; 7:30-8:30, state and federal agricultural reports.

WJLD, Mooreshead, Ill. (Central, 270), 9:30-1:30 p. m., music; 3:30-5:30 p. m., music; 7:30-8:30, state and federal agricultural reports.

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WJLD, Mooreshead, Ill. (Central, 270), 9:30-1:30 p. m., music; 3:30-5:30 p. m., music; 7:30-8:30, state and federal agricultural reports.

Tuesday, December 23

WJLD, Mooreshead, Ill. (Central, 270), 9:30-1:30 p. m., music; 3:30-5:30 p. m., music; 7:30-8:30, state and federal agricultural reports.

WJLD, Mooreshead, Ill. (Central, 270), 9:30-1:30 p. m., music; 3:30-5:30 p. m., music; 7:30-8:30, state and federal agricultural reports.

WJLD, Mooreshead, Ill. (Central, 270), 9:30-1:30 p. m., music; 3:30-5:30 p. m., music; 7:30-8:30, state and federal agricultural reports.

WJLD, Mooreshead, Ill. (Central, 270), 9:30-1:30 p. m., music; 3:30-5:30 p. m., music; 7:30-8:30, state and federal agricultural reports.





# BROADCAST AT WGY, SCHENECTADY



These six jolly young women (above) are from the University of California and are called Jane MacDonnell's Synagogue Coads. They will be heard at KFT, Friday, December 26. Here is Joseph Plunkett (right), chief of the Plunketters, who are now broadcasting every Monday night at WEAF.

## Where to Hear Talks

Central Standard Time

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

- Saturday, December 20: 6, WDAF; 6:30, WEAF; 7, WFL, WIP; 7:30, WOC; 8, KNX, WNYC; 8:30, KJLJ, WGBS; 8:40, WFI, WMAQ; 8:45, KFI; 9:05, KYW; 9:45, KJLJ; 12, WAHG.
- Sunday, December 21: 8:45, KFT; 9, WDAY.
- Monday, December 22: 6, WDAF; WOAW; 6:10, WHN; 6:15, WBE; 6:30, WBE; WEEL; 6:35, WNYC; 6:45, WBE; 6:50, WDAK; KFI; 7:00, WGR; WBB; 7:10, WIZ; 7:20, WOC; 7:30, KSAC; WHO; 9:10, WNYC; 10, KGO; 11, KPO.
- Tuesday, December 23: 6, WDAF; WEBB; WHN; WJZ; WOAW; 6:15, WHN; 6:30, WBE; 6:35, WBE; 6:50, WDAK; 6:55, WJZ; 7, KFI, WIP; 7:30, KSAC; KYW; WFI;
- Wednesday, December 24: 6, WDAF; WBE; 6:15, WBE; 6:30, WBE; 7, KFI; WDAK; 7:30, KSAC; KYW; WBB; 8, KNX; WFL; 8:30, KJLJ; 9:30, WLS; 9:45, WMAQ.
- Thursday, December 25: 6, WDAF; 6:45, WGY; 7:30, KSAC; WOC; 8, KYW; WMB; 8:45, KFI; 9, KDF.
- Friday, December 26: 6, WDAF; WBE; 6:15, WBE; 6:30, WBE; 6:45, WBE; 7, KFI; WHH; 7:15, WBE; 7:20, WOC; 7:30, KSAC; WJZ; 8, KNX; KYW; WLS; WOS; 8:30, KJLJ; WDAF; WJZ; WMAQ; 9, WHN.

10:30, WFL; 10:35, WFL; 10:40, WFL; 10:45, WFL; 10:50, WFL; 10:55, WFL; 11:00, WFL; 11:05, WFL; 11:10, WFL; 11:15, WFL; 11:20, WFL; 11:25, WFL; 11:30, WFL; 11:35, WFL; 11:40, WFL; 11:45, WFL; 11:50, WFL; 11:55, WFL; 12:00, WFL.

10:30, WFL; 10:35, WFL; 10:40, WFL; 10:45, WFL; 10:50, WFL; 10:55, WFL; 11:00, WFL; 11:05, WFL; 11:10, WFL; 11:15, WFL; 11:20, WFL; 11:25, WFL; 11:30, WFL; 11:35, WFL; 11:40, WFL; 11:45, WFL; 11:50, WFL; 11:55, WFL; 12:00, WFL.

### Thursday, December 25

Thursday, silent night for: CHNC, CNRT, KFAC, KFBC, KFCC, KFQC, KWJ, KOB, KSD, PWX, KFOA, Seattle, Wash. (Central, 425), 6:30-8 p. m., special Christmas program; 8:30-9 p. m., special Christmas program; 9:30-10 p. m., special Christmas program; 10:30-11 p. m., special Christmas program; 11:30-12:30 a. m., special Christmas program.

### DANCING

Saturday, December 20: 8, WFL; 8:30, WFL; 9:30, WFL; 10:30, WFL; 11:30, WFL; 12:30, WFL.

10:30, WFL; 10:35, WFL; 10:40, WFL; 10:45, WFL; 10:50, WFL; 10:55, WFL; 11:00, WFL; 11:05, WFL; 11:10, WFL; 11:15, WFL; 11:20, WFL; 11:25, WFL; 11:30, WFL; 11:35, WFL; 11:40, WFL; 11:45, WFL; 11:50, WFL; 11:55, WFL; 12:00, WFL.

10:30, WFL; 10:35, WFL; 10:40, WFL; 10:45, WFL; 10:50, WFL; 10:55, WFL; 11:00, WFL; 11:05, WFL; 11:10, WFL; 11:15, WFL; 11:20, WFL; 11:25, WFL; 11:30, WFL; 11:35, WFL; 11:40, WFL; 11:45, WFL; 11:50, WFL; 11:55, WFL; 12:00, WFL.

### Friday, December 26

Friday, silent night for: CHNC, CNRC, CNRW, KFCM, KFRC, KGC, KIS, KJP, PWX, WAAW, WGBS, WSAI, WDBY, WEAQ, WFI, WVAZ, WLV, WHH, WSAI.

(Continued on page 18)

Friday, December 26

(Continued from page 17)

Columbia Outfitting company; 10-11, dance orchestra; 11-12, Abe Luyant's Oceanfront Grove dance orchestra.  
 KGB, State College, New Mexico (Central, 360), 7:30-8:30 p. m., "Call of the Southland," obtained by Mrs. O. C. Snow; Modern Mountain of Zieff-Hilly; "Dean R. Galt"; (Pacific, 423), 12-1 p. m., talk, Commonwealth club luncheon; 1-2, Rudy Seliger's Fairmont hotel orchestra; 4:30-5:30, Rudy Seliger's Fairmont hotel orchestra.  
 KSAG, Manhattan, Kans. (Central, 341), 12:30 p. m., musical readings, Getzner (Central, 341); lecture, winter dairy ration, A. W. Knott; lecture, "Rats and Sparrows," A. E. Omm; 7:20, Radio gallico quartet; 7:30, "Chemistry," W. L. Brantley; 7:45, "Illumination of Country Homes," W. E. Bradlett.  
 KSD, St. Louis, Mo. (Central, 548), 8 p. m., Mrs. E. Dale, soprano; Mrs. H. K. Dale, pianist.  
 KTHS, Hot Springs, Ark. (Central, 373), 5:30-10 p. m., McCaffery sextet.  
 KYW, Chicago, Ill. (Central, 536), 11:35 a. m., table talk, Mrs. Anna J. Peterson; 6:57 p. m., children's bedtime story, Uncle Bob; 7:30, dinner concert, Camarero hotel; 7:30-8, organ, Duane Sisters Music Publishing company; 8, speeches, auspices American Farm Bureau federation, "An Editor's Reflection on 1924," Arthur G. Page; hay and cattle club feature; 9-10, midnight revue; 11-12:30, midnight revue, Commonwealth Original Nightingales; W. Rounting Welsh organist.  
 WBAF, Ft. Worth, Tex. (Central, 478), 7:30-8:30 p. m., musical; 8:30-10:45, concert, Green River orchestra.  
 WBAV, Columbus, Ohio (Eastern, 423), 8 p. m., concert, Diamond Little Symphony orchestra; John D. Clark, director, playing Christmas selections.  
 WBZ, Springfield, Mass. (Eastern, 337), 7:30-8 p. m., University extension concert, 19-21:30, concert; 11:30-12, dance program, McDevilly's singing orchestra.  
 WDAE, Pittsburgh, Pa. (Eastern, 462), 8:30 p. m., dinner concert, William Penn hotel; 7:30, Uncle Bob; 8:30, musical program; 8, concert, B. Fisher & company's "Astor Coffee" dance orchestra.  
 WDAV, Northfield, Minn. (Central, 360), 8:30 p. m., book talk, two historical novels of the Early church; "The Identity of the Lords," "The Quinquagesima Fire," Dr. George Weide Strobel, lecturer.  
 WDAU, Philadelphia, Pa. (Eastern, 278), 6 p. m., the Georgian dance orchestra; 9, concert, Brer Fox Organ company quartet.  
 WDX, Detroit, Mich. (Eastern, 517), 4:15 p. m., musical program; G. Minor concert, Book-Cadillac hotel; 8:30, musical program; 10, dance program.  
 WDAF, Kansas City, Mo. (Central, 411), 7:30-4:30 p. m., the Star's string trio; 8-7, school of the air, piano tuning-in number on the Duo-art; speaker, auspices Kansas City Chapter's bureau; the Ted-Me-a-story tale; music, Hotel Middelhuis Triplex ensemble; 8-9:30, popular program, the Star's Radio orchestra; 11:15-1 a. m., nightclub Radio, the "Merry Old Chief" and the Pianissimo Players.  
 WDAF, Philadelphia, Pa. (Eastern, 303), 11:45 a. m., daily broadcast; 12:30 p. m., Stanley Theater organ recital; Arcadia cafe concert orchestra; 7, Arcadia cafe concert orchestra; playing National anthem of treaty and elevation; 7:30, Dream Daddy; 8, program of South music; playlet, WPAE-Valley Green-music players; 10:30, Arcadia cafe dance orchestra; Morning Glory club; features from leading Philadelphia theaters.  
 WEAF, New York, N. Y. (Eastern, 482), 6-7 p. m., dinner music, WEAF instrumental quartet; 7:30-7:45, children's stories, G. Minor company; 8-8:30, Happiness Camis boys; 8:30-9, music, G. Schirmer and company; 9-10, B. F. Fischer's Astor Coffee orchestra.  
 WEB, New York, N. Y. (Eastern, 273), 7-7:15 p. m., Bryant's review of new plays; 7:15-7:30, Burgoon de Rosa, tenor; Frank Germain, accompanist; 7:30-8, Circle quartet, Hutchinsons ballroom; 8-8:30, May

TABLE FOR MAKING TIME TRANSITIONS

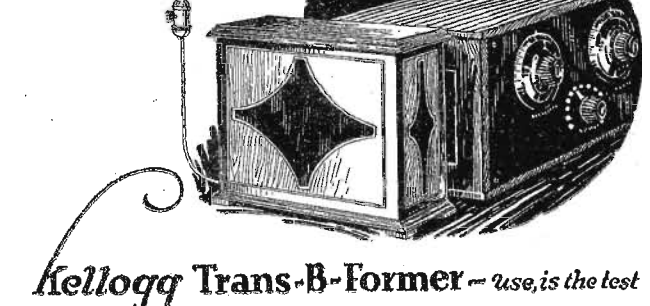
Eastern Standard Time	1	2	3	4	5	6	7	8	9	10	11	12
Central Standard Time	12	1	2	3	4	5	6	7	8	9	10	11
Mountain Standard Time	11	12	1	2	3	4	5	6	7	8	9	10
Pacific Standard Time	10	11	12	1	2	3	4	5	6	7	8	9

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

Storch Brown and Peter de Rose; 8:30-8, Clarence Williams Blue trio.  
 WEEI, Boston, Mass. (Eastern, 303), 8:30 p. m., Doherty-Bourne and his Sintonians; 7, Boston Edison Blue Boodle club; 7:30, concert, choir of Our Lady of Lourdes church; 8:15, John T. Connor company presents Percy Madison Croft; 8:30, concert, Gillespie company; 9, program, WEAJ, F. Fischer & company's Astor Coffee dance orchestra.  
 WFAA, Dallas, Tex. (Central, 478), 12:30-1 p. m., address, Dr. Robert Stewart Hyer; 8:30-8:30, Grace Methodist church orchestra, Marie D. Brenden, director.  
 WFI, Philadelphia, Pa. (Eastern, 285), 1 p. m., Meyer Davis Bellevue Stratford concert orchestra; 8, report, closing prices, Chicago grain market; 2:45, Carolyn Hoffman, pianist; 6:30, Meyer Davis Bellevue Stratford concert orchestra.  
 WBSB, New York, N. Y. (Eastern, 316), 9-10, Lillian Landry, known as "Beatrice Fairfax," on an interview; 8:10-8:20, H. Noble, tenor; 8:20-8:30, Isabella Longhain, actress-author; 8:30-8:40, H. Noble; 8:40-8:50, H. W. Jones, humorous readings; 8:50-9, Alfred Babyn, harmony and composition; 9-9:30, Uncle Bob; 9:30-9:45, "What the World is Doing," independent magazine; 9:45-10:30, Nat Martin's "Till Say She Is" orchestra.  
 WGN, Chicago, Ill. (Central, 370), 1:40 p. m., luncheon concert, Drake Concert ensemble, Blackstone string sextet; 8, organ recital; 8-7, dinner concert; 8-9, classical concert; 10-11, Don Restor Blackstone orchestra, Jack Chapman dance orchestra.  
 WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1 p. m., Hotel Statler concert ensemble; 2:30-4:30, Buffalo Quartet and Ensemble musical program; 6:30-7:30, dinner music, Vincent Lopez Hotel Statler dance orchestra, Harold Glover, director; 8-10, B. Fischer & company's Astor House Coffee orchestra, by remote control from WEAF; 10-11:30, musical program, Niagara history corporation, director of G. P. Bettinger; 11:30, supper-dance music, Vincent Lopez Hotel Statler dance orchestra, Harold Glover, director.  
 WGY, Schenectady, N. Y. (Eastern, 380), 2 p. m., Attractive Painted Parlor; 6:30, stories for children; 7, International Sunday school lesson; 7:35, health talk; 7:55, Leonard W. Grant, baritone; Wendell Phillips, violinist; Mrs. John May, soprano; 10:30, Lou Valin's Music box, Lou Valin, director.  
 WHAS, Louisville, Ky. (Central, 406), 4-5 p. m., selections, Alamo theater orchestra; "Just Among Home Wives," readings, Courier-Journal, Louisville Times; 7:30-8, concert, auspices Louisville and Jefferson County Children's Home Club, Grace Deane, director.  
 WHB, Kansas City, Mo. (Central, 411), 3-3 p. m., ladies' hour program, Sweeney Radio trio; 7-8, address, Mrs. Emma Le Foy, piano recital, pupils of Mary Neally Hinkle; music, Gilbert Judy's orchestra.

WMAQ, Chicago, Ill. (Central, 447.5), 12:35 p. m., C. A. Foster's Piano Club, piano club.  
 William Jencks; 4:30, pupils of Bush conservatory; 5, Holland lady Gene Davenport; 6, Chicago theater organ; 6:30, Hotel Joske orchestra; 8, WMAQ-Astoria club program; 8:30, musical program, Mr. and Mrs. Max E. Oxenbury; 9, Beethoven.  
 WMC, Memphis, Tenn. (Central, 509), 8 p. m., bedtime stories, Uncle Bob; 8:30, Briffings' Cafe orchestra; Fred. Cliff-Gunn, director; 11, nightclub finale.  
 WJ, Newark, N. J. (Eastern, 233), 10:20-12:30 a. m., Frank Daily and his Meadow Brook orchestra.  
 WNYC, New York, N. Y. (Eastern, 520), 7:30-8:30 p. m., notice, 8:30-9:30, specialty announced concert, favorite artists; 9:30-9:45, instrumental features; 10-10:10, official weather forecast; 10:30-10:40, notice, 10:40-11:30, Ben Bernice's Hotel Roosevelt orchestra.  
 WOA, Omaha, Neb. (Central, 526), 6 p. m., "Uncle Bob"; 6:50, period, conducted by his daughter, Doree Clair Sumner; 8:20, musicale, Harry Draper, choralia orchestra; 9:30-10:30, special, 10:30-11:30, specialty announced concert, favorite artists; 11:30-12:30, instrumental features; 12:30-1:30, official weather forecast; 1:30-1:40, notice, 1:40-1:50, Ben Bernice's Hotel Roosevelt orchestra.  
 WOC, Davenport, Ia. (Central, 484), 7:20 p. m., lecture, Mrs. Otto Bluegreen; 8, Harry Zenselle Meyer, tenor; Nadine Murray, soprano; Eleanor Mener, accompanist.  
 WOI, Ames, Ia. (Central, 369), 12:30 p. m., Christmas readings, Charles A. Fritz.  
 WOO, Philadelphia, Pa. (Eastern, 569), 41 a. m., organ recital, Mary E. Vogt; 12:42 p. m., Wainwright crystal tea room orchestra, Robert E. Golden, director; 5:10, organ recital and notice, 5:15, organ recital, Mary E. Vogt; 7:30, A. Casadeo and his Hotel Adelphi concert orchestra; violin solos, A. Casadeo; 8:15, Erno Raabe and his Radio Gang; Tom Fox theater studio; overture, Fox theater grand orchestra; piano solo, Harold G. Rinker; 10:30, organ recital, Mary E. Vogt; 10:30, Vincent Mizos and his Hotel Adelphi dance orchestra.  
 WOR, Newark, N. J. (Eastern, 405), 9-9:15 p. m., educational talk, Miss R. Cullinane; 6:30-7, non-fiction stories; 10-10:30, sports.  
 WOS, Jefferson City, Mo. (Central, 440), 8 p. m., "Missouri," George A. Dickens; 8:15, a Radio presentation, Jewel Hayes; 8:30, old time band dance program, R. B. Jones; Oliver Brothers.  
 WQJ, Chicago, Ill. (Central, 448), 11-12 a. m., Fred Mann and his Sunday dinner menu, Ted Wilkey; 3-4 p. m., "Christmas Night Suspense," Dorothy Mitchell Dickson; "The City of Shanghai," Mrs. Harry E. Sanchez; 7-8, dinner concert, Ralph Williams and his Radio Grand orchestra; Marjorie Berenson, baritone; Fern Denike, accompanist; Dorothy Schmidt, Jane Slav soprano; piano duo, Edith Phineas Heller, Elie Pruninger; 10-12, Ralph Williams and his Radio Starline; Gardner, Winston, Rick, harmony duos; Rogas Bay, Larry, Billie; Nola Allen, contralto; Monogram trio; West Highland quartets.  
 WSB, Atlanta, Ga. (Central, 429), 12 a. m., entertainment; 5-6 p. m., bedtime story, Bonnie Bannard; 8-9, Kimo Kambis Mountain troupe; 10:15, Radio musical entertainment.  
 WTAN, Cleveland, Ohio (Eastern, 399), 6 p. m., Guy Lombardo's Royal Canadian orchestra.  
 WTAS, Elgin, Ill. (Central, 286), 12:30-1:30 p. m., Lincoln hall orchestra; 7:30, Terrace Garden dance program; 9:30, Kinnhall studio hour; 10:30, supper dance program, Terrace Garden orchestra; Jimmy Everett, Jack Little, Paul Small, Lindsay Coon, Lee Sims; 11:30, Jay Gould and Maxine Brown from "Flora Jean"; Terrace Garden orchestra.  
 WTAY, Oak Park, Ill. (Central, 283), 6:45-7:45 p. m., Jay Kay, Harry Smith, pianists; Matt Sisters; Rick Cal orchestra.  
 WWJ, Detroit, Mich. (Eastern, 517), 3 p. m., the Detroit News orchestra; 7:30, weather and markets; 7, the Detroit News orchestra; Mrs. Mary F. Cooper, pianist; sonnet, Ralph Hald, baritone; Anne Campbell, the Detroit News poet.

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Kellogg Trans-B-Former—Use, is the test

THIS compact unit will better your reception, materially lower the cost of operation and actually improve the appearance of your radio installation. In its handsome two tone walnut finish cabinet it is far better looking than batteries, your "B" current supply is steady, and assured for years to come. As to size, this unit has about the dimensions of a Jumbo "B" battery.

A neodyne receiver consumes about a kilowatt of plate energy per year—\$55.00 worth, if "B" batteries are used. Trans-B-Former costs \$50.00 and keeps right on working indefinitely, supplying "B" energy at 1/5 of a cent per hour.

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# Demonstrating Radio Principles at Home

## Chapter II—Induced Currents and Theory of Condensers

By J. E. Owen

**RADIOPHANS** inclined to experiment will find in this series of articles, directions for illustrating to their own satisfaction the underlying principles of Radio. They will be told how to set up the experimental apparatus, which will be simple and not so complicated as to require the equipment of a large laboratory, using odds and ends probably already at hand. Few new parts will be needed. The chapters to follow will be:

- Chapter III—Aerial Installations.
- Chapter IV—Devising New Circuits.
- Chapter V—Presenting the Experimenter Senior.
- Chapter VI—Presenting the Experimenter Junior.
- Chapter VII—Presenting the Experimenter Supreme.
- Chapter VIII—Experimenting with Push Pull Amplifiers.

WHEN a current passes through a coil of wire, Figure 1, there is a magnetic field set up, the intensity of which depends on the strength of the current, the number of turns of wire, and the magnetic permeability of the space in which the magnetic field exists. The ratio between the intensity of the magnetic field and the amperage flowing is called the inductance of the coil. As will be seen, the inductance of a coil is an electrical measurement, dealing not with the amount of current it will carry, its ohmic resistance, or its size, but with its action towards varying currents, such as direct pulsating, or alternating currents.

It was indicated in the last chapter that there are forms of resistance other than ohmic resistance. One of these is called inductive resistance. Consider again Figure 1. If the current which is passing through the coil is reversed, the magnetic field around it collapses, and then builds up in the opposite direction. This building up and collapsing may be compared to such an arrangement as in Figure 2, in which we have a spring with

a weight on the end of it. If this weight is moved up and down at a certain frequency, there will be but little opposition encountered, but if there is an attempt to change this frequency, the opposition may be very large, depending on the amount of change of frequency attempted.

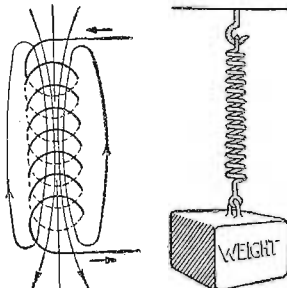


Figure 1

Figure 2

The action of a magnetic field around a coil is very similar. There is a certain frequency of change of the magnetic field around any coil, such as in Figure 1, to which there is little resistance offered, but to other frequencies there will be a considerable amount of resistance offered, this resistance being greater, the greater the difference between these frequencies and the natural frequency of the coil. This is what is termed inductive resistance.

### Electromotive Force

If there is a conductor in the changing magnetic field around a coil, Figure 3, there will be set up in this conductor an electromotive force (abbreviated e.m.f.) and if this conductor forms a closed circuit, there will be a flow of electrons. If there is a break in the circuit, there will be practically no flow since this break constitutes an enormous resistance. There will be a voltage drop across this break.

The inductive resistance of a transformer is very important since it determines the frequency which this transformer will pass the most easily. For example, a Radio frequency transformer is so designed that it will offer a low inductive resistance to high frequency currents. An audio frequency transformer is so designed that it will offer a low inductive resistance to low frequency currents. Another factor in the design of audio frequency transformers is that the transformers must offer a low inductive resistance to all frequencies within the range of the usual sound frequencies. This means that the peak of the characteristic curve of a transformer must not be very much higher than the rest of the curve within this band.

It has been found impossible to design an ideal transformer; consequently, to overcome this imperfection, different ratios of transformers are used in the different stages of amplification. A common fault with most poorly designed transformers is that they will not pass the higher frequencies, such as the frequencies above 10,000 per second. It is these frequencies which give the timbre to tones. They make it possible to distinguish a saxophone from a clarinet, or from a cornet. They give that pleasing richness to piano music, and that characteristic twang to the music from a harp.

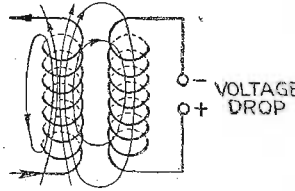


Figure 3

So when these higher frequencies are cut out, the saxophone, clarinet, and cornet sound almost alike, the piano and harp have a modest timbre, and all other sounds are similarly distorted. Many of these transformers also cut out the lower range of sounds such as are involved in a bass solo. The selection of a transformer for use in an amplifier is a very delicate job. A pretty good test is to hear a bass solo and a piano solo using the transformer in question in the amplifier.

Exactly The conventional symbol for a condenser is very good for representing the

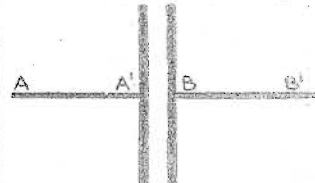
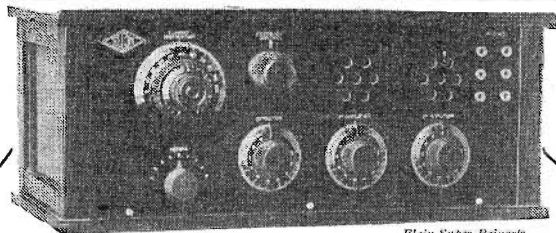


Figure 4

actual construction of a simple condenser. Consider Figure 4. A charge is carried along the wire AA', and the electrons collect on the plate A', the plate of the condenser connected to the wire AA'. It will be noticed that in a condenser there is no actual electrical connection. The electrons collect on A' and repel the electrons on B, these electrons flowing out along BB'. Thus the electrons themselves do not cross over, but the e.m.f. is transferred to the other plate and it continues on as though the condenser were not there. The amount of transfer does depend on the nature of the material between the plates. This material in this position is called the dielectric of the condenser.

(Continued on page 22)



Elgin Super-Reinartz 2LO Model Tuner

### The Set That Heard London

This astonishing reception was accomplished twice, in two separate cities of the United States during the trans-Atlantic tests last season.

The Elgin Super-Reinartz, 2LO Model Tuner spans the continent nightly at the hands of thousands of Radiophans. Through this highly efficient circuit amazing reception has been obtained. New York is entertained by KGO and Houston, Texas, listens in on WLAG with surprising regularity.

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Dealers: Write for Proposition

### Free Coupon

Elgin Radio Supply Co.  
Dept. A, 207 E. Chicago St., ELGIN, ILL.

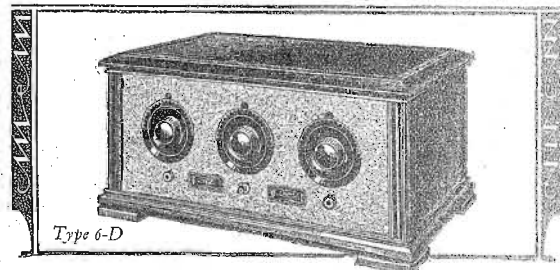
Send at once the working drawings of the ELGIN SUPER-REINARTZ, 2LO MODEL TUNER—The Set That Heard London. I am enclosing stamp to cover postage.

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Address .....

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## EISEMANN ELECTRICAL EQUIPMENT



Type 6-D

### Approved by the expert

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# Radio Digest

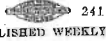
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## International Radio Week

America Beats Countries Abroad on Reception

FROM time to time we have mentioned the fact that a message can be sent around the world and the speaker can hear his voice after the Radio waves carrying it have encircled the earth. Perhaps these words were written without much thought that we would ever be able to do such a thing.

International Radio week cleared the air at least so that the attempt to span both oceans two ways was successful in a measure.

This is not the only thing to be credited to the tests. It is an established fact that more power is required by the stations for distant broadcasting. Interference mostly came from regenerative sets. Poor receiving equipment abroad resulted in much failure to even pick up messages.

Good receivers and good broadcasting with plenty of power appear to be the things most needed.

## Broadcast Regulation

Contrast in Service Between America and Great Britain

THE British Postoffice controls all communication by mail, wire or Radio in Great Britain. For this reason the development of Radio in that country has been obstructed. When it became apparent that the science was being stunted the government relinquished its rights for a time and turned the control over to a broadcasting company. Under this company's direction broadcasting has become very popular.

They have an annual tax system. By this means they know how many receiving sets are in use. It develops that more than one million licenses have been issued and there are sixteen hundred dealers and nineteen broadcasting stations. The prices of sets have been fixed, license fees and royalties have been established, even policies in regard to the length and contents of a program have been set under the rigid censorship exercised.

In America we have a semi-unorganized competitive condition stimulating development, but of which the ultimate effects are difficult to predict. There is quite a contrast between the two nations in the way of giving Radio service and only time will tell which will prove the better and more economical from a service standpoint.

## Church at Home

Broadcasts of Services Growing

NOT so very long ago there were thousands of people who never went to church, and perhaps, they do not go to church today, but that same church is brought to them by Radio. Science, which has not always been in tune with church doctrines, has made it possible and practicable for the church to tune in with those who stay at home and send its messages to them. The pulpit has been brought nearer to the fireside.

At first the church was not much in accord with this innovation but the results have been so gratifying that the broadcasting of services has become a custom in every part of the country. Plans are now being made for an extension of this work.

The new method of religious education presents great possibilities. Eventually, perhaps, the churches will unite in a campaign to broadcast sermons to all who will listen in.

## Radio Show Instructive

New Conception of the Latest Science

THERE are many millions of people interested in Radio but the vast majority have only a dim idea of what are the uses of the science outside of the entertainment field. The Radio shows have been an enlightenment to the vast crowds attending them. The dispatch of messages to foreign countries and military Radio are two of the many uses that are unknown to the average Radiophan. The shows have been much of an education to those who have seen them.

## RADIO INDI-GEST

### The Modern Hiawatha

By a set sits Hiawatha.  
Radio sets of knobs and dials,  
Mounted in a glossy cabinet;  
Listens he each morn' and ev'ning  
To the jazz and classic music  
From the large and distant cities,  
Broadcast much upon the ether.  
Knows he each and every station,  
From the east coast to the west coast;  
From the northland to the southland;  
Knows them each by name and wave length,  
All the way from Maine to Texas.

Hiawatha is a genius  
In the science of Radio.  
Knows each dial and hook-up,  
From the crystal to the super;  
Super 'flex and neutrodyne.  
Tries out all the newest circuits,  
Makes them work or proves them wrong.  
Hiawatha's mother often  
Scolds him for the many hours he  
Tinkers with his Radio.

Hiawatha's gun is rusting.  
Wild game scampers everywhere,  
Heeds them not, nor tries to shoot them.  
Lets them scamper in the forest.  
All the hunting that he does now,  
Does he on his Radio,  
Hunting for the distant stations,  
Many, many, miles away.

H. K. MAYFIELD.

### P. S. Ans.—On a Cat, of Course

Dear Indi: I am thinking of building a Snooper Heater Dine and need a little help. First, how many "B" batteries do you use on the filament? Will a bear trap do to trap waves, and, say, will waves bite? One of them smart guys told me to hook my batteries to the plate. What good is a china plate in Radio? Say, Indi, I would like to see 5KV answer those if he knows how. TRANS FORMER.  
P. S.—Where is a cat whisker used?

### Aha! Many Are Cold, but Few Are Frozen

Dearest Indi: We note that Don MIX, returning to the states, complains of the bitter cold in the Dakotas. That, after sojourning for months within eleven degrees of the North Pole. Interviewed relative to the question, Don replied, "The weather up there wasn't so bad." Could it be that the Arctic Circle Chamber of Commerce has underwritten a publicity campaign, with Don as propagandist? FARGO IKE.

### Mrs. Partington Speaks Out

Dear Indi: Mizz Partington says she seen in the Radio Digest where it says the Chief Engineer of the British Broadcasters union says the Americans don't know how to broadcast and that we also don't have sense enough to keep on listening to programs which we don't want to hear. He thinks listeners who are close to a big station should ought to only have one tube set and patronize home industry only. He thinks it is a shame so many of us can afford to have six tube sets and do so much DXing around instead of getting only the local stations. She reckons he would say our way with a telephone is all wrong, too, but if we were to telephone like the British do, we would be liable to be sent to the bug house to onet, without troubling with medical or legal examinations. The best way is for the British to do as they like, for we'll do as we please anyhow, and we'll have a better time than they will. SIGNING OFF.



### "Oh, California! Polish Up the Sun"

Dear Indi: Ain't those California fellers funny. They don't want any Japs out there and they don't want anybody to hear any broadcasting from other countries, because they seemed to "need the air" while the fellers across the water were trying to get over. INS. U. LATION.  
P. S.—I could be put in jail and have my aerial grounded for what I thought about them. I. U. L.

### "Sing a Little Song"

Dear Indi: The press frequently reports Radio brides—singers who have sung their way into responsive hearts in various parts of the country, with the result that letters, proposals and marriages follow.  
We are reminded of one young groom who fell in love with a beautiful soprano voice—and married the extremely plain owner.  
Waking early and glancing across at his snoring, open-mouthed bride, he called: "Wake up. And for Gawd's sake, sing!" MAMA HAYMES.

### She Was Sending Out Damped Waves

Indi, Old Thing: The dry sleuths have been restrained from dismantling or destroying the Radio transmitter of Roy Olmstead, Seattle Radiocaster, so the papers say. It was claimed that Mrs. Olmstead was putting wet bedtime stories on the air to dry, and that bootleggers were getting their instructions thusly.  
Far be it from us to raise our hand in an appeal to desist, but allow us to register that wet bedtime stories could be no worse than a lot of dry lectures. SPIDER WEB.

No, Grapejuice, you did not hear Moscov the other night. That was our neighbor playing with his sonper-five-circuit-regenerative-cockadoodle-do-dickey-bird set. You're welcome!

## Interference!



## Condensed

By DIELECTRIC

It does anyone good to be made to think of the problems of education, and comes with force when presented by such an authority as the president of the University of Ohio. WEAO afforded the privilege of listening to a discussion of the public school system, with its note of optimism, as outlined by Dr. Thompson. Thank you sir.

Then the dials had their way and stopped at the Union Trust station, WJAX, to allow some of the concert Radiocast in behalf of the Community Fund to entertain us for a while. Permitting listeners in to hear the chorus of infants protest against things as they are was a unique feature for a Radiocast station. The concerts gave cause for loosening up on the purse strings to aid these little orphans.

It may seem as though singing was about the fondest thing in my code of entertainment. Well, it is—when good. KDKA is one station it is hard to go by without at least waiting for their call, and when they gave so excellent a program by the Westinghouse Electric Choral club, I had to listen. If you missed it, look for them the next time.

From WIP, one of the City of Brotherly Love Radiocast stations, there came the full rich notes of a soprano, whose singing and art were alike of a high character. There really are sopranos and tenors in that city to whom it is a pleasure to listen. Baritone and contraltos do not shine with the same brilliancy—via Radio, at least.

KDKA had a glorious evening with the Fellows Club Frolic in full working order. Among the members of that organization are to be found many clever entertainers. One of the piano numbers was dedicated to two occupants of the tubercular ward in an army hospital in North Carolina and played by one of their buddies. One hilarious time!

It isn't often that my ear muffs find the mellow note of Miss Jones' voice actuating them, but when they do something good usually follows. I am not so enthusiastic about the particular orchestra that station had on the program as I listened. It was the Rader orchestra. We differ in taste, however, and many do enjoy their playing, so there.

Just before Thanksgiving day arrived WEAU proffered a feature that made "Everready" less monotonous by many meters. In addition to the stringed trio (the vertical, horizontal and rectangular batteries respectively), they were augmented by a mixed chorus singing some of the honest-to-goodness Thanksgiving day songs. Variations are pleasing. Belated, but welcome comment perhaps?

You remember how you held your breath, locked the doors to the Radio sanctuary and—cussed the squealing regenerative sets, on the nights we were supposed to focus our attention on the far side of the Atlantic ocean. Well, one of the best programs sent out from this side left the Mike of WBZ, all in Esperanto. Even the notes of the piano were couched in diplomatic international parlance.

The United States Playing Card company can never be mistaken for another station when the regular announcer is at the Mike. Some orchestra was rendering the orthodox melodies of hotel ball rooms, that much was sure, then came the announcement "WSA, the Gibson hotel orchestra." As the hotel variety goes, this was very acceptable.

# How to Build the Simplest Possible Super-Het

## Part VI—Adding Regeneration to the Super's Loop Aerial

By John G. Ryan

**SUPER-HETERODYNE** fans this year seem to be a pretty well posted crowd of experimenters. Leave out anything and they let you know about it in a hurry. This particular receiver was supposed to be as labeled, the "simplest possible," and it was presented as such. We purposely left off the hard-to-adjust C battery for the intermediate frequency amplifiers, the push-pull amplification, the antenna coupler, antenna regeneration and several other accessories that, while they might possibly be helpful, were not essential to successful operation of a full-fledged super-het. As the reader has probably seen by the two previous installments, we were reminded of this from all sides, so the writer suggests methods of adding some of these extras.

Loop aerial regeneration has purposely been saved until the last so that readers would have had an opportunity to build the set and get acquainted with it in its simplest form. The addition of regeneration in the loop will not increase the number of controls, nor the complexity of operation, but it will make the tuning even sharper and add fully 50 per cent to the range. As was stated in a previous issue, if the set is built as described, most of the sharpness is in the oscillator condenser. The addition of regeneration sharpens the loop and stations operating, supposedly on the same wave length, can be separated on the slight errors in their tuning.

### Explanation of Regeneration

Now let us see what regeneration really is and does. Take the circuit composed of our loop, the variable condenser, the pick-up coil, the grid condenser, its leak, the filament and the impedance between grid and filament. In that array of items there is bound to be quite a lot of resistance to the passage of the incoming signals. Let us say this figure is 20 ohms. Quite a lot of the minute energy reaching the loop must be consumed in overcoming this resistance and, in addition, the tuning is extremely broad. The incoming energy is "damped out" very fast and has no chance to build up to anything like the volume it could if this resistance could be eliminated. Suppose now we could introduce some energy into

this circuit, which would offset almost all of this resistance, leaving but, let us say, two ohms effective resistance. That is exactly what regeneration does. The resistance of the various items listed above is called the positive resistance, the energy introduced to offset it is called negative resistance, while that little bit which remains is known as the effective resistance.

It will not do to reduce the effective resistance to zero by feeding back a little

regeneration into our loop circuit, the loop aerial must be provided with a tap at its center point. If yours hasn't one now, it is not hard to add. The "simplest possible" set has two binding posts provided already for the two ends of the loop; put another between them, or, if you haven't room put in another little strip for it. The loop tuning condenser still remains across the terminals of the loop so those connections will not have to be changed. Reference to Figure

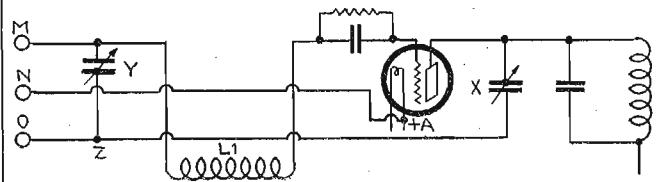


Figure 1

too much energy from the plate circuit as the circuit would oscillate beyond control and, in an instant, would build up energy to a terrific howl. The trick is to introduce just enough negative resistance so that the signals build up ever so slightly but not quite enough to get away from us. Remember this when working on any type of set: it takes less feedback of energy to reach the howl point on short waves than it does on longer ones. There are several tuned Radio frequency sets on the market that work beautifully on stations above 400 meters, begin to blur the program around 325 meters and squeal consistently when their circuits are brought to resonance on 235 meters. The makers figured just a little too close either in the placing of the transformers or the number of primary turns.

### Adding Regeneration to the Set

Getting back to our super-heterodyne, however. To introduce the benefits of

I will show the changes that have to be made. The principal one is that moving the "pick-up" coil L-1 from the grid return lead into the grid lead itself. In this diagram, M and O are the ends of the loop while N is the center tap.

This change leaves the loop and one side of the condenser connected together and to nothing else. In Figure 1 you will see this is to be connected to a condenser designated as X and this in turn is connected to the plate of our first detector. The actual feeding back of negative resistance into the grid circuit from the plate is accomplished in the loop but the amount of feedback is controlled in the condenser X. This condenser is very small and its maximum capacity should not exceed .00045 mfd.; one slightly smaller with a maximum of .00003 mfd. might be better in fact. Such condensers are known as the midget variety, are readily obtainable anywhere, and occupy but little space.

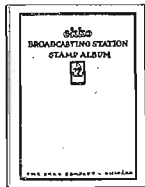
We now come to the placing of this unit in the set, and two courses are open. This condenser may be placed on the baseboard, adjusted for maximum possible regeneration on a low wave length station and left there. By this procedure maximum regeneration is secured on low wave stations and slightly less, but plenty to be effective, on the higher stations. Or the unit may be had for panel mounting, may be placed with its knob protruding through the panel midway between the large dials and can be slightly re-adjusted for each station when going out after extremely long range. Take your choice. Personally, the writer prefers the former, as in the sets built, the gain from this condenser could be plainly seen throughout the broadcast range with the condenser on the baseboard and adjusted but once. The best place for it was found to be directly in front of socket number 2 between the condensers. The most convenient place, if put on the panel, is on a line with the large dials and midway between them.

### Where to Place Condenser X

One point in the connecting of this condenser is important. If you are using condensers of the new low-loss, grounded rotor type, connect the stator plates of X to the point Z and the rotor plates of Y to Z, and connect common point Z to the loop. The rotor plates of X should connect to the plate of the first detector while the stator plates of Y go to the pick-up coil and the grid. If your two large condensers are of the dielectric end plate type, the stator plates of Y go to point Z and the rotor plates to the pick-up coil. If you find that even with the plates of X all the way out, there is still too much regeneration as evidenced by mushiness, a whistle or a howl, this can be corrected either by removing one or two plates of X or connecting a .00005 mfd. fixed mica condenser in series with it. This latter course will have the effect of reducing the capacity from .000045 to about .000025 mfd.

### Tuning with X on Panel

The tuning procedure, if the condenser X is placed on the panel, is as follows. Turn X to zero and bring in a station (Continued on page 22)



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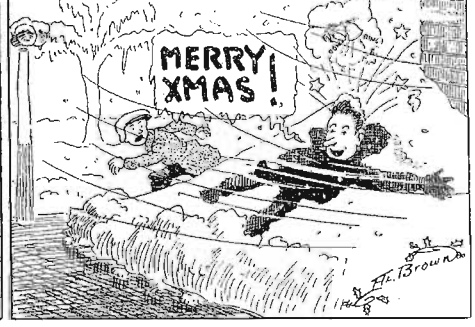
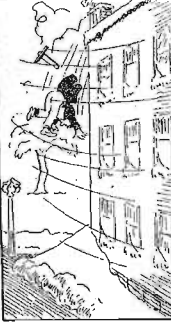
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Spir L. and Lew P.

A Satisfactory Ground



SIMPLEST SUPER-HET

(Continued from page 21)  
to maximum with the two large dials. Then bring up X and an increase in volume will be noted up to a point where mushiness begins to spoil the quality of reproduction. Naturally, this setting should be left at the point just below that where reproduction begins to be affected. Turn X to zero and tune in another station on a different wave length then bring up X as before. Repeat this for several stations, noting the best point for this little condenser on each station. It will soon be seen that there is a certain definite relationship between the loop tuning dial and this regeneration control, which should be kept in mind when looking for distant faintly heard stations.

We have now outlined in some detail how to couple this set to an aerial, how best to add a push pull amplifier, how to use 189 tubes and the best method of utilizing regeneration. The set proper, however, is still the "simplest possible" and the builder can add these other devices as he desires. Questions will be answered either directly by mail (please enclose stamped return envelope) or in the columns of the Digest. Go over everything if it does not "perk" just right at first, try a little experimenting of your own, such as varying B battery voltages and grid leaks, then write in. Most im-

portant of all; use the oscillator hook-up furnished by the manufacturer of the kit you buy. Many differ from that shown here, although just as good. Study the wiring diagram furnished by the manufacturer and, if it differs in what seems to be any essential details from ours, use it and use only that part of these articles which pertains to layout. In the main, however, the hook-ups provided with kits are very similar to that shown in the second article and few will have any trouble on that score.

(CONCLUSION)

(This is the final article by Mr. Ryan, unless developments make new material available. The descriptive booklet, with full size layouts, however, is ready.—Editor's Note.)

DEMONSTRATING RADIO

(Continued from page 19)

When the e.m.f. causing the flow into plate A' is removed, there will be an e.m.f. back along A'A, the electrons on plate A' repelling each other. Consequently, if there is a path for a flow, the flow will take place, thus permitting a flow back along E'B. These alternating surges which may be caused by applying an alternating e.m.f. on a plate of a condenser may be compared to the arrangement of figure 2. For any condenser there

is a certain frequency which it will pass freely, other frequencies being opposed. This frequency is determined by the capacity of the condenser. Consequently for a variable condenser, the corresponding frequency may be changed. This opposition to other frequencies is called capacitive resistance, and is comparable to the inductive resistance of a coil.

Inductance and Capacity in Tuning

The relation between inductive resistance, capacitive resistance, and ohmic

ances depend on the values of inductance and capacity of the circuit. To illustrate, the relations between inductive and capacitive resistance, suppose that you are tuning to a certain wave length. Suppose further, for example, that the inductive resistance of the circuit is fixed for that particular set. Now by varying the capacity of the circuit, as by adjusting a variable condenser, the effective resistance composed of the capacitive and inductive resistances may be made approximately zero in the desired frequency, thus leaving only the ohmic resistance for the frequency to overcome.

(The next chapter leads us directly into our experimental work. In it will be presented a standard crystal circuit with some modifications, including some new two crystal circuits.—Editor's Note.)

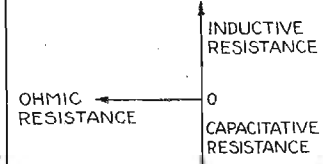


Figure 5

resistance showing their combined resistance to a certain frequency is given in figure 5. Ohmic resistance is constant regardless of the frequency. As has been shown, inductive and capacitive resist-

Ground Wire

If copper, the ground wire should not be smaller than number 14, and if copper-clad not smaller than number 7. Run the wire as directly as possible to the ground. Gas pipes should never be used as the ground, because static or electric sparks are likely to jump about and ignite the gas. The cold water pipe or radiator generally serves well as ground contact. The cold water pipe is the better of the two.

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# How to Construct a Bulb Battery Charger

Transformer Is Important Unit

By Jacques Fournier

A RADIO receiver is a pleasure and a constant source of new entertainment features—as long as the battery contains enough energy to light the tubes. Many a good program that had a group of listeners enthralled has suddenly begun to fade and ended as a series of squeals and howls, due to the battery running down. Those Radiophans who have their battery charged outside at a service station are particularly liable to this discomfort as there is always the tendency to let the charging go a day or two too long. Buy or make a charger.

There are several types of chargers available both in complete, ready-to-use form and for the home builder to construct. The bulb type is one of the best of these several forms as it will charge rapidly, quietly and with little attention. It is, without question, better to buy such a charger from one of the dozen or more manufacturers who market this type, as there is then not the slightest question as to its operating efficiency and the appearance is usually much more attractive than when such a piece of apparatus is built on the kitchen table.

Many of us, however, do not feel that the expenditure of \$12.50 to \$25.00 is within our means, and since time is no object, will build at home. This is not so difficult, as the construction of a bulb charger is far simpler than the task of assembling a three tube receiver. It contains only two parts, a bulb and a transformer, the first of which must be purchased just as we buy vacuum tubes, while the assembly of a transformer is comparatively easy, once one knows how large to make the core and how many turns of wire to put on it. It is the purpose of this article to tell Radio Digest readers the data essential to such a transformer.

**Use on 60-Cycle Only**

It should be understood before you begin though that this piece of equipment is for use only on alternating current (A. C.) of 60 cycles, at 110 volts. If you have direct current, a bank of electric lights is all that is required to charge batteries; if your home is supplied with 25-cycle current, such as they have in Buffalo, another type of charger will be necessary.

Every community has a concern that works in sheet iron and has, therefore, a large foot shear for cutting sheet metals. Unless you have the patience of Job and a large metal hand shears, it would be well to employ the services of such a concern to cut your core pieces, although it can be done at home. The material required is, preferably, silicon steel .018 inch in thickness. This is not hard to obtain in the average city, but the rural

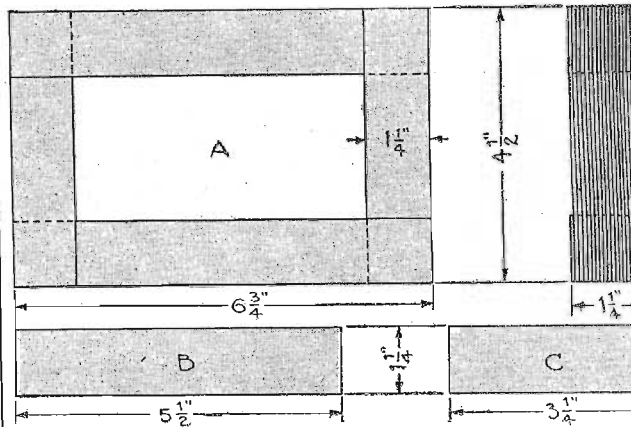


Figure 1

enthusiast may have some trouble. If it cannot be had, electrical sheet iron will be almost as good and no difference will be noted in operation.

**Core Assembly**

Referring to figure 1, it will be noted that the core is to measure 6 3/4 by 4 1/2 inches outside, be 1 1/4 inches square in cross section and have, therefore, a center opening 4 1/4 by 2 inches. Each leg of this rectangle is made up of pieces of our sheet steel fitted into each other at the corners. Enough pieces of the size shown at B in figure 1 should be cut to make two stacks each 1 1/4 inches high when tightly pressed together. These two piles will form the long legs of our transformer core. The same number of pieces should be cut of the size shown in C, figure 1.

To assemble one of the long legs, lay one piece like B on the table and place another on top of it so that it projects 1 1/4 inches beyond the first at one end and is 1 1/4 inches short at the other. A third piece is now placed directly over the first, which will leave the second projecting out at one end from between one and three. Piece four is now placed directly over piece two. Proceed stacking pieces in this way until the pile is 1 1/4 inches high when pressed tightly together. Now bind the whole together with friction or electrical tape, covering the iron strips only where they overlap and leaving 1 1/4 inches uncovered at each end.

Four layers of tape are wound on the core for a width of 1 1/4 inches. The ends are left uncovered for the insertion of the end pieces after the coils are put on. In order to provide a smooth surface on which to wind the coils, the tape should be covered with a single layer of empire cloth or heavy wax paper. The remaining long strips cut to the size shown in E, figure 1, should now be assembled to form another leg just like the one described above and should be taped and covered as was this first one.

**Winding the Coils**

To wind the primary of our transformer take one of these finished legs and wind on 440 turns of number 13 double cotton covered wire. A good way of securing the first turn is to take a piece of tape about six inches long and fold it lengthwise over the wire which forms the first turn and lay the tape so that the following turns must be wound over it. The first turn is thus held in place by those which follow and will not slip out. Start this winding about 1 1/4 inches from one end of the core so there will be no danger of the end pieces of the core cutting into

the wire when they are inserted later. When the final turn has been put in place it may be held there by wrapping tape around that end of the winding. This forms the primary of the transformer which is to be connected to the lighting circuit. The secondary is wound on the other finished and taped leg, but consists of 100 turns of number 12 double cotton covered wire. After 50 turns have been put on, a tap should be brought out by looping the wire for a distance of about 4 inches and then the remaining 50 turns continued. The short legs can now be put on the transformer by inserting the small iron pieces which were cut like C in figure 1. Since they are 1 1/4 inches wide and we staggered the long strips 1 1/4 inches, these short pieces should go in without difficulty.

In figure 2 is shown one method, among the many possible, of clamping the ends of our transformer between two heavy pieces of wood so that there will be no possibility of our core coming apart and very little hum when our unit is put into action. The transformer just described is for use with the 5-ampere bulb and for this purpose a Mogul socket will be necessary. The connection for the transformer and the socket and the output binding post are shown in figure 2. Be careful to connect the tip of the bulb as the minus terminal of the output circuit, as the battery will be discharged if this should be reversed.

**For Two-Ampere Bulb**

There may be many readers who do not wish to charge their battery at the 5-ampere rate, or who do not care to invest in a 5-ampere bulb. If readers would rather use the 2-ampere size the following changes will be necessary in the transformer. As described above, the primary had 440 turns, so that the ratio of turns would be correct to supply the filament of the tube with 2.5 volts. Since the smaller tube requires only 2.3 volts on the filament it is only necessary to increase the number of primary turns to 450 so as to get this required voltage. The voltage which will now be developed in the 50-turn winding will also be slightly cut down, but will still be high enough to charge any 6-volt battery. The connections remain the same, but a standard socket will take the 2-ampere bulb and the special Mogul will not be necessary. This apparatus can either be

(Continued on page 24)

## Pfanstiehl

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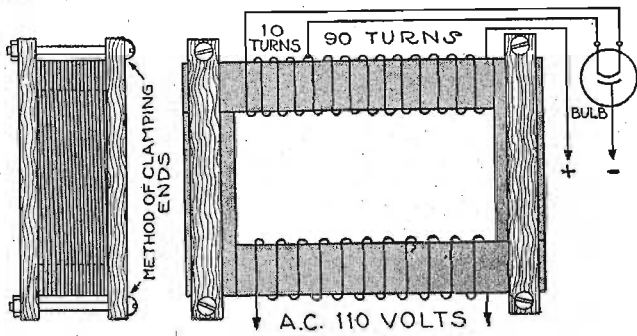
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**APEX ELECTRIC MANUFACTURING CO.**  
1410 West 59th Street  
CHICAGO

### BATTERY CHARGER

(Continued from page 23)

mounted on a flat board and placed in some out of the way corner or can be mounted in a cabinet if it is to be placed where it will be seen. Ventilation holes



should be provided in the sides of such a cabinet so that air can circulate around the transformer and the tubes. Such ventilation holes should be 1/4 to 1/2-inch in diameter and there should be three or four in each of two opposite sides of the cabinet.

A double pole double-throw switch may be incorporated as part of this piece of apparatus so that the battery may be readily thrown on to the charger or to the set. The battery terminals should be connected to the switch arm terminals while the charger binding posts should be connected to the terminals at one end and the filament circuit binding posts on the set connected to the terminals at the other end. Thus, there is no danger of connecting the set to the battery while the charger is in operation, which is likely to happen if such a switch is used.

### TROUBLE SHOOTING

(Continued from page 11)

preferable to use an outdoor wire, even if only a short one, paralleling the wall of the building, and an indoor wire, if used, should be kept well away from the walls of the room to avoid effects set up between this wire and the steel girders of the building. Other less frequent causes of

oscillating receivers are too high, a B battery voltage, a tube for which the set was not designed, and which does not possess the proper capacity.

If an aerial of too great a length is used, the set is liable to be broad in tuning. A length of 100 to 125 feet, in-

is run down the side of the building wooden supports from 2 to 3 feet long may be used at the top and bottom. If it drops through a courtyard, it is a simple matter to run it diagonally. It should be borne in mind that the lead-in is part of the aerial system, and as such should act as an energy collector and not as a dampener. The interior of the cabinet should be kept free from dust, as dust on the parts will cause leakage and dampening of signals. A pipe cleaner may be used to clean between the tuning condenser plates occasionally.

We have covered the three major complaints encountered in neutrodyne reception. Another less frequent trouble is distortion of the received program. If such is your case, do not jump to the conclusion that your receiver is responsible. At the present state of development there is some distortion in all broadcast transmitters, though such stations as WJAF and WGY are notable exceptions.

If all precautions have been taken against oscillation and batteries are all fully charged, look for a defective tube as a cause of distorted reception. If nothing of the nature is found, it is likely that your loud speaker is at fault, and you should have same tested. In passing it might be well to state that it is impossible to use over 90 volts of B battery on a neutrodyne without the use of a grid bias or C battery, if distortionless reception is desired. It seems, however, that a C battery "fever" has recently been created; various writers and lecturers having broadcast the C battery gospel freely and somewhat ambiguously. A properly designed neutrodyne is so connected that a negative bias is automatically placed on the grid, and when using

B battery of 90 volts or less is of correct value.

During these summer months when thousands of fans are taking their sets to their summer homes, we hear many sad tales of "static," poor reception, and dead spots. Static is a summer bugaboo the means of elimination of which has not yet been discovered. There are many nights during the summer, however, when static, or atmospheric electricity is not particularly disturbing.

Although the receiving range during summer months is normally somewhat limited, it should be borne in mind that for most efficient results the same care should be used in making a temporary installation as in the permanent location.

#### Dead Spots

The so-called "dead spots," of which the eastern end of Long Island is a notable example, afford many opportunities for interesting observation, and experimentation. Actually, however, there is no such thing as a dead spot. In the location noted above there is a peculiar condition, which shields or deflects the waves from stations in the Metropolitan district, but stations such as WGY, KDKA and even further distant stations as Chicago and Davenport come in on favorable nights, and as a rule with much greater audibility than the locals.

The above is not intended as an exhaustive treatise covering every form of trouble which may be encountered, but it does include the most common complaints. A number of manufacturers have recently published pamphlets enumerating many causes of difficulty. It would be well to write to the manufacturer of your receiver and ascertain if they have such a booklet in print, requesting that you be sent a copy.

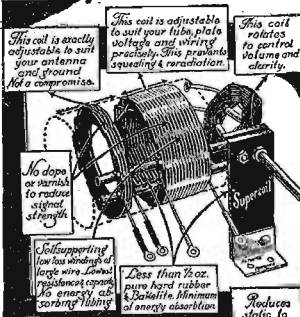
cluding lead-in, is usually optimum, though if located within a few miles of a broadcasting station, a shorter antenna may be found more advantageous. Some of the cheaper lightning arresters have a high inherent capacity and therefore introduce leakage losses, with a resultant loss in signal strength and distance as well as in selectivity. If it is necessary to run the aerial and ground leads parallel, always keep them separated at least 6 inches, or preferably even more. Cases have been found where long aerial and ground leads were run on twin porcelain knobs, using twisted pair conductor. Such an arrangement cannot produce efficient results. Still another condition which produces broad tuning maintains, when the aerial lead is run parallel to the building for a considerable length on its way from the roof.

#### Lead-in Line

For best results it is not necessary to insulate the lead-in from the building, but it should always be kept as far away from it as possible. If this wire

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- 4 Number 18 wire used—large, but not too large—to insure low resistance.

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Just send us your name and address, and that of your dealer's, and we will send you FREE our easy to read booklet, and our newly printed bulletin—"The Why of Low-Loss Design." If you want a Supercoil, if your dealer cannot supply you, pay the postman \$7.00, plus the parcel postage, when he delivers your Supercoil. Please write plainly.

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# Matching Tubes to Improve Receiving Set

## Part I—How Tube Characteristics Vary

By D. C. Wilkerson

**T**HE demand for "matched tubes" has arisen from the sudden and universal interest taken in multi-tube sets. The rapid rise in popularity of the neurodyne circuit, and the equally popular super-heterodyne circuit, has placed very rigid requirements upon tube manufacturers in standardizing their product. This demand really calls for a great deal more than many manufacturers are able to do in turning out absolutely uniform tubes, as regards tube characteristics.

What is a "matched tube?" Simply, it is a tube whose electrical characteristics are such that it functions more efficiently because placed in an amplifier unit along with other tubes possessing characteristics closely approximating its own.

In order to have a standard by which to judge tubes it is necessary to set that standard. A radio amplifier tube has certain definite work to perform. Its job is to receive in its grid circuit a small quantity of current, carried there from the antenna circuit or from a preceding stage of tube amplification, and amplify the variations in impulse thus received in its plate circuit. This work is more exacting in a Radio frequency stage of amplification than in an audio frequency circuit.

### Tube Characteristics

Receiving tubes, as we know them today, those of the UV, C and WD series, all have certain definite limits to their electrical characteristics. These same "characteristics" about which we are hearing more and more, are simply the ratings of the tubes, figured out in much the same manner as is the horsepower of an electric motor. In the case of the tube, the greater the change in plate circuit current for a given change in grid voltage, the higher the efficiency of the tube. The value which shows, in a numerical way, this relative degree of excellence is called the mutual conductance. It is measured in micromhos. Remembering that our unit of electrical resistance is the ohm, we can readily understand a parallel manner of evaluation which is based on the relative conductivity of a circuit.

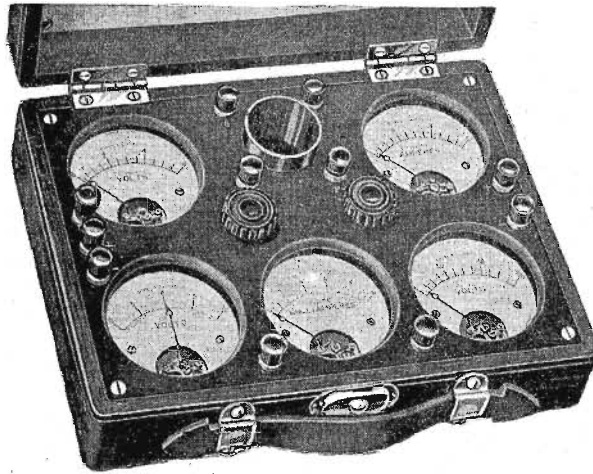


Figure 1

It is simply the reverse sort of thing, only in the vacuum tube, we have to use a millionth part of an ohm in making measurements, since a whole unit would have to be represented by a decimal point, followed by six ciphers, with a number after that, to obtain a correct value.

Another so-called "characteristic" is the amplification constant. This value is an arbitrary one, based on the ratio between changes in grid and plate voltages, for a fixed amount of plate current change. This latter value of plate current is simply a unit of comparison be-

tween grid and plate voltage changes. The third and last "characteristic" is called the plate impedance, or plate circuit resistance, and it is measured in ohms. It represents the resistance offered by the vacuum lying between the filament and the plate in the three-electrode tube, to the passage of current across that space.

At ordinary operating voltages, the 201-A type of tube should show amplification constants between 7 and 9, mutual conductances between 475 and 600, and

plate circuit resistances of from 14,000 ohms to 20,000 ohms. Any wide diversity from these figures shows a defect. The higher the plate circuit resistance, the "harder" the tube. It is always desirable to obtain a hard tube, provided the other characteristics follow good practice.

### Qualifications of a Detector Tube

A "soft" tube means one which is gassy. Some tubes show a blue glow when the plate voltage is applied. This is due to the presence of gases in the vacuum space. A gassy tube makes a good detector, but is usually so critical as an amplifier that unless one is painstaking, the results obtained will be poor. No 201-A tube should show a blue glow at 20 volts plate.

In a Radio receiver we have conditions which, unless properly provided for, will produce distortion and excessive howling.

An ideal towards which all set manufacturers are striving is the elimination of "strays," and cross circuit linkage or parasitic induction. Whenever a lead wire carrying amplified Radio or audio frequency currents comes close to a grid lead, there is bound to be regeneration with the consequent howling effects.

The location of condensers, and other instruments in the field areas of a transformer coil, will unbalance an otherwise stable and reliable set. We are beginning to learn that Radio frequency currents are difficult to control, and that they need very special attention, as regards insulation, and parasitic induction, before they can be carried to the grid of the tube upon which they set up an impulse.

It is not impracticable to construct transformers and coils of identical electrical natures, in that every coil has a definite inductance and capacity value, and, under standardized conditions, will show a fixed value field strength, parallel to its similarly constructed neighbor.

(Continued on page 26)

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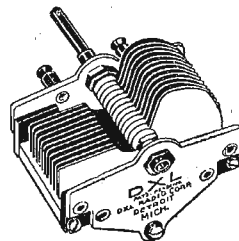
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Your set will give its absolute maximum. D. X. L. Condensers are manufactured with infinite precision upon the exclusive D. X. L. design.

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**MATCHING TUBES**

(Continued from page 25)

In Radio tubes, where, for instance, the daily product of a manufacturer totaling 5,000, is tested, the actual test records for electrical characteristics, show that very few among the entire output will have identical characteristics, or anything approaching equivalent electrical constants. This seems strange since one might think that all of the 5,000 being made exactly alike, under identical working conditions, pass-

of an inch will make a decided difference in the characteristics.

The writer has proved this fact by making test readings of a tube, then giving the tube a sharp blow, cushioned in the hand to avoid breakage of the filament, followed by repeat test readings. The second set of readings have been at wide variance, due to the fact that a change in the relative spacing of the elements was produced by the blow. The slight bending of the support wires allowed the grid to come closer to the plate on one side, and possibly farther from the

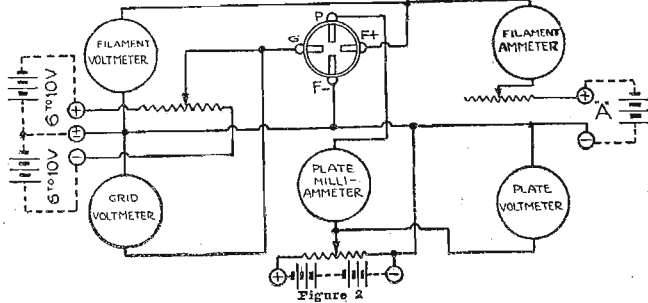


Figure 2

ing through the same hands performing parallel operations, would most surely exhibit electrical characteristics approximately alike at least. Actual practice shows a different story.

The reason for such a diversity in characteristics in tubes, is that the electrical principles involved are so delicate that, for instance, a difference of spacing of the grid of less than ten thousandths

filament on the other, with the corresponding difference in the electrical characteristics.

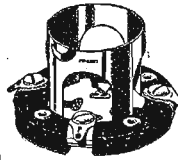
Of more importance than mechanical spacings, is the degree of vacuum achieved by the exhausting apparatus. Every bit of gas of any nature must be removed from the vacuum tube before it will produce maximum results in a Radio set. The presence of foreign matter of any

type will destroy this vacuum. The slightly acid moisture from the fingers of an operator is enough to ruin what otherwise would be a good tube.

(A valuable chart to be used in making tube tests will accompany the concluding part of this article next week.—Editor's Note.)

**Cleaning Insulators**

The cold weather will be here soon, so now is the time to lower the antenna and clean off the insulators. If composition insulators are used it is advisable



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to replace them with the porcelain type. The corrugated insulator should be given preference over other types.

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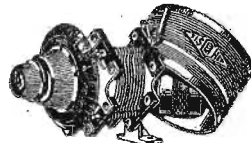
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See your dealer today or write us for information.

Blue prints of circuit sent separate from kit for 10c.

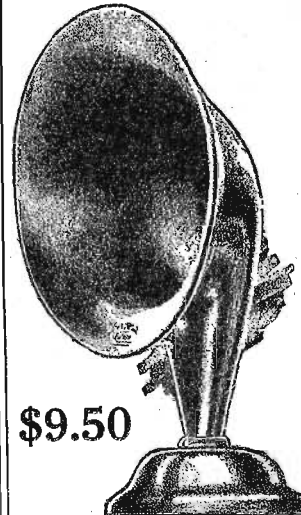
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Scientific radio apparatus that is distinctively different and superior in efficiency and appearance.

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Fultone has been thoroughly tested on regenerative, reflex, tuned radio frequency and super-heterodyne receivers and has proven its ability to handle both faint programs from distant stations and the roaring volume of the locals. This it does without distortion, without blasting and with a pleasing absence of tinniness or other metallic noises.



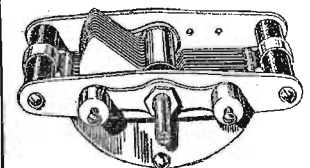
\$9.50

If your dealer cannot supply you, send money order or check for \$9.50

**HALL & WELLS, Inc.**  
128 N. Wells St. Chicago, Ill.

**Lincoln**  
RADIO PRODUCTS  
Laboratory

**Tested and Approved**



**Lincoln Low-Loss Condenser**

Lincoln Low-Loss Condenser. 23-plate model is most efficient electrically, strongest mechanically. Several radical improvements. List price \$1.50.

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The "summat" depends for efficiency on its oscillating circuit. The Lincoln Oscilloscope permits such delicate control of oscillations that it produces amazing results. List price \$6.50.

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Condenser, inductance and tripler coil all in one. Add a socket, rheostat, grid-condenser and leak... and you have a wonderfully efficient complete set. Constant-range with clearest of reception equal to big expensive sets. List price \$18.00.

**Lincoln Collapsible Loops**

Correctly designed mechanically and electrically. Insures quality reception and is most convenient. List price \$6.50. The Lincoln Collapsible Four-Point Tapped Loop is ideal for "superhet" and other radio-frequency circuits. List price \$8.00.

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Includes the "Long 45" Tuner, everything for a 5-tube set with constant-range. Easy to assemble, easy to add to. List price \$21.50.

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**Lincoln Radio Corporation**  
224 N. Wells St. Chicago, Ill.

# Two-Tube Set Gives Clear Signals

## Receiver Uses Two Dry Cell Tubes in Circuit

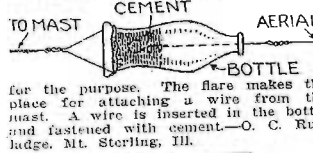
The accompanying illustration shows a hook-up of a two-tube set that I have been having good success with and I pass it along for other fans to try out.

### 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 copy. Send to  
**RADIO KINKS DEPARTMENT**  
Radio Digest,  
510 North Dearborn St., Chicago

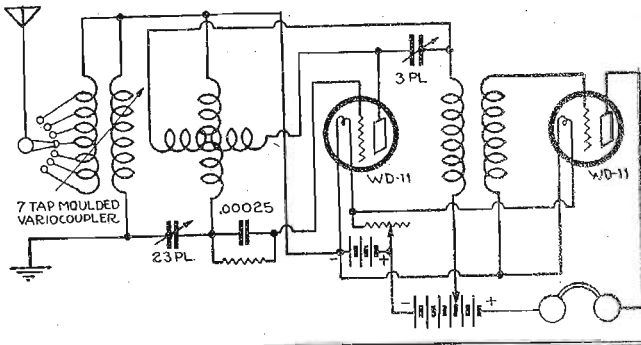
and improve on it. Using WD-11 tubes with 2 1/2 volts on the plate I have tuned in Los Angeles clear and loud during the warm weather.  
The variocoupler has seven taps and with its use I can get the high waves and clear up reception. There is considerable howling when a station is tuned in until the tickler of the variocoupler is in the right place, then the signals come in clear.—Wm. U. Griffith, Houston, Texas.

**Bottle Makes Aerial Insulator**  
With the use of a flaring bottom bottle, some cement and wire, or an eyebolt, I have made a very good insulator for the end of an aerial wire. Certain makes of ketchup bottles have the flare suitable



for the purpose. The flare makes the place for attaching a wire from the mast. A wire is inserted in the bottle and fastened with cement.—O. C. Rutledge, Mt. Sterling, Ill.  
**Purpose of Phone String**  
Good radios have a string attached to the end, where the tips are. This string has a definite use.  
Since the tips are to be used only as connections through the phone plug, there must be some way to hold the cord to the plug. The string is put there for that purpose.  
Some plugs have a little hook to which

## DX RECEPTION WITH THIS HOOK-UP



the cord is tied, so that the individual cord to each tip hangs loosely and does not strain the tip. If there is no such hook, some way should be found by which the string may be tied.  
It means longer life to the phone cord.

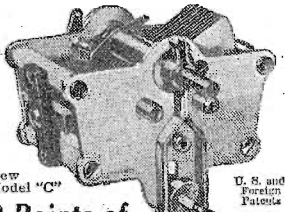
It is better to wrap foil around the crystal than it is to solder a connection to it.

**Receiver's Distance Range**  
The distance range of a receiver depends upon the resistance in the antenna system of the receiver as well as the power radiated by the transmitter. This means that the antenna should be made of heavy wire, well-soldered, as high as possible, with a direct lead-in and as short a ground connection as possible.

## EVEREADY Radio Batteries —they last longer

Conspicuous for vitality and endurance—the right batteries by test and proof for every radio use.

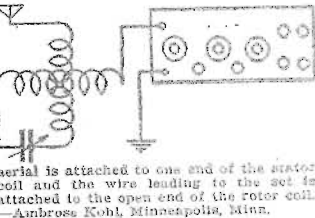
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Headquarters for Radio Battery Information  
New York San Francisco  
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Factory and Offices: Toronto, Ontario



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**CHICAGO DISTRIBUTORS:** Hudson-Ross, Manhattan Electric Supply Co., Wakom & McLaughlin  
**For Better Radio Hammarlund CONDENSER**

## Split Variometer Used in Wave Trap Circuit

After making some experiments I find that one of the best wave traps may be made with the use of a split variometer. The illustration shows how the variometer was used in connection with a 11-plate variable condenser placed between the rotor and stator coils. The



aerial is attached to one end of the stator coil and the wire leading to the set is attached to the open end of the rotor coil.—Ambrose Kohl, Minneapolis, Minn.  
**Do Not Use Steel or Iron**  
When mounting inductances of any sort avoid the use of steel or iron brackets. These metals impair the efficiency of the inductance by the introduction of magnetic metals into the field of the coil. Use brass brackets.

**50 CENTS SPECIAL INTRODUCTORY PRICE**  
For a limited time only, and to introduce this new and superior Storage "W" Radio Battery to the Public, we are selling it for 50c. Regular Retail Price is \$1.50. You save \$1.00 by ordering NOW. A finer battery cannot be built than the **World Storage "W" Battery** (12 CELLS—24 VOLTS)  
To see million homes with this battery, and to see the thousands of progressive homes—the WORLD Storage "W" batteries—being installed by the thousands, come to our store. Here is a battery that you can feel in a few weeks' use. Its power and performance are beyond all comparison. And you save \$2.00 by ordering now!  
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**A TOROFORMER**  
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It does not pick up stray or unwanted signals, is unaffected by other parts of the circuit and has no effect on other instruments.  
Outfit includes complete diagrams and hook-ups. Priced at only **\$5.00** and obtainable at any first-class Radio dealer.  
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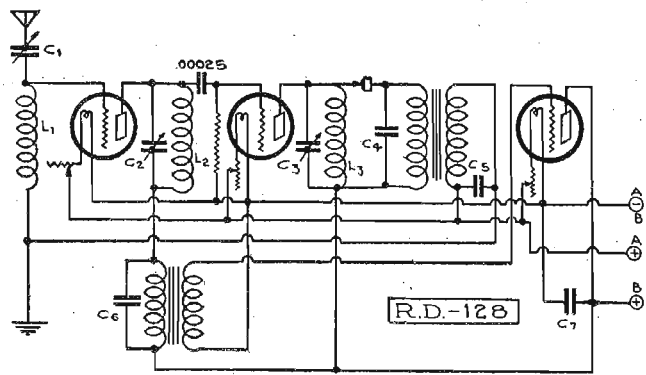
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Ozarka representatives make real money because they give real values and deliver a real service. For instance, there is a 4-tube Ozarka instrument for loud speaker operation, giving wide range of reception at \$39.50. Our men demonstrate Ozarka instruments and install. The instrument makes the sale easy by its performance. We train you to know radio and our methods, accredited representative. Precious experience is not necessary. In fact we prefer to do our own educating. If you have a clean record, are industrious, and have saved up a little cash, here's a real opportunity. If you can qualify for an exclusive territory. We already have 2500 representatives. Territory going fast.  
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Prove satisfactory World performance. Send date and name your name and address—we will ship battery free, unless you prefer to pay; and give you your choice of "W" Storage Batteries in accordance with your specific needs. FREE, FREE, FREE!  
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This FREE 2-Yr. Guarantee Battery makes the difference in the way you buy batteries. Get the battery that will last longest. It is the only battery of its kind equipped with solid rubber separator and built-in positive and negative. Take advantage of our special offer and get your battery now. To those who order it, we will send FREE a handsome nickel plated flashlight and 100 "W" Storage Batteries. Be sure to specify when it is mailed.  
**FREE**  
To introduce this new and superior World Storage Battery to the Public.

### TUNED RADIO FREQUENCY R.D. 128



THE circuit used this week is one for which we are indebted to English experimenters. The radio frequency amplification is of the tuned impedance type, the detector is a crystal one, there is a stage of reflexed audio and a stage of pure audio amplification. The panel used to mount the apparatus shown may well be 13 by 12 inches and 3/16 inch thick. Condensers C-1, C-2 and C-3 should be placed in a row across the lower edge of the panel, that for the antenna circuit being at the left. Each of these condensers is .0005 mfd. capacity and preferably, though not necessarily, vernier. The three rheostats are mounted across the horizontal center line of the panel or slightly above it, depending on their diameter and that of the condensers.

The three single honeycomb coil mounts are mounted across the top of the panel, and so fastened that the two end coils will be horizontal and the center one vertical to avoid coupling between them. Tube sockets are mounted on a shelf behind the upper half of the panel, above the condensers and behind the coil mountings. This makes for short connections to the rheostats which will be on a level with

these sockets, short leads above to the coils and short wires also to the condensers below. The location of the audio frequency transformers is left to the builders' own judgment as these vary in size.

The constants are as follows: L-1 is a 75-turn honeycomb coil, L-2 and L-3 are 50-turn coils, C-4 is .001 mfd. mica fixed, C-5 is .002 mfd. mica fixed, C-6 is .001 mfd. mica fixed and C-7 is 2.0 mfd. fixed. The grid leak for the second tube is approximately 2 megohms but this may vary with the tube used. It should be understood that many of these R.D. circuits, such as this one, are not presented for the man who expects to put parts together in the same manner as he does knock-down furniture and have everything finished; rather a circuit such as this is for those thousands of experimenters who enjoy constantly trying out that which is new to them and requires some fixing here and there to secure perfection.

Tuning R.D. 128 will not be found diffi-

LIST OF PARTS	
3 Variable condensers .0005 mfd. @ \$5.50	\$16.50
3 Single honeycomb coil mountings @ 50c	1.50
2 Honeycomb coils 50-turn @ \$1.50	3.00
1 Honeycomb coil 75-turn	1.60
3 Tube sockets @ \$1.00	3.00
3 Rheostats @ \$1.00	3.00
1 Crystal detector	1.50
2 Audio frequency transformers @ \$4.50	9.00
1 Mica fixed condenser .002 mfd. @ 40c	.80
1 Mica fixed condenser .003 mfd.	.50
1 Mica fixed condenser 2.0 mfd.	1.00
1 Mica fixed condenser .00025	.40
1 Grid leak and mounting	1.50
1 Panel 18 inches by 12 inches	2.25
1 Cabinet	3.25
Bus bar, screws, etc.	1.50
<b>Total cost</b>	<b>\$50.30</b>

cut and the selectivity will be a delight to the listener in a city congested with Radio-cast stations.

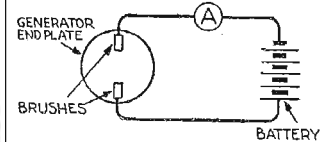
#### Testing Armature Coils

It is occasionally found necessary for the hunk to test the coils in the direct current generator of his CW set. It is usually a comparatively easy job to test the field coils, but the armature coils are less easy and the hunk must try out tricks, one of which is shown in the illustration. This one is efficient and the work of testing can be accomplished quickly.

Remove the end plate of the generator which supports the brushes that make contact with the armature. Connect a wire from one of the generator brushes to one side of the ammeter (A in the illustration) and from the other side of the ammeter to one side of a six-volt battery. Use a dry battery if possible for this work. From the battery a wire is run to the other generator brush. After this

is done place the armature in the same position in the end plate as when it is in the generator. Turn the armature around slowly in the end plate. If the ammeter registers a few amperes steadily all is well, except for a possible short circuit, which will have to be found in other ways. If it flickers, slowly turn back to the position in which the ammeter registers no current. This cessation of current may be due to dirty segments of the commutator. Before condemning the coil to which the segments are connected it is best to clean them and try the test again. If the current still refuses to flow it may be safely asserted that the coil is burned out, in which case it must be rewound.

The same method may be used for testing grounded coils. For this test disconnect the wire from one of the brushes and connect it directly to the end plate. Turn the armature slowly and if the ammeter shows no current all is well. If it flickers, however, then one of the coils is grounded.

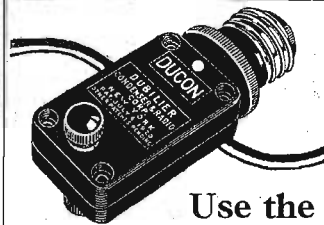


If there are several flickers to every rotation it need not be taken for granted that there are several coils grounded, for one grounded coil will cause several flickers, due to the two segments on the commutator passing each brush in its turn. If the brushes are exactly opposite the ammeter will probably flicker twice at each turn, and if the brushes are located less than 180 degrees apart the ammeter will probably flicker three times. These tests may also be used on a motor armature with equal advantage.—Allison L. Mitchell, Mt. Jewett, Pa.

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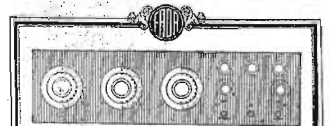
Because many people have had good results with the STAR-ITE CRYSTAL used as a detector with non-regenerative tube sets, we have had a great many letters from radio folks who seem to be of the impression that this is the—as yet unperfected—OSCILLATING CRYSTAL of which so much has been said in the radio press.

We do secured oscillation with crystals in a laboratory fashion, but would not attempt to sell the STAR-ITE to take the place of amplifying tubes.

We do say that the STAR-ITE is the absolute pinnacle of perfection as a crystal to be used in a REFLEX Set, or a CRYSTAL Set, and as a detector in many non-regenerative tube sets, and are glad to support our belief by making it extremely easy to try one for yourself.

## Star Crystal Co.

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All Tubes Guaranteed to give best results in Radio Frequency. Also for high-powered circuits such as Neutrodyne, Reflex and Super-Heterodyne sets.

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The Coil Without Losses

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- 3—Eliminates adhesives.
- 4—Increases volume 50 to 180 per cent. over old type coils. Also improves selectivity.
- 5—Laboratory tests prove conclusively that it is the only coil worthy of the name low loss.

FREE! Ask your dealer or send for a stamped envelope for wiring diagrams of circuits in which this remarkable coil can be used.

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Type 400-3.4 Volts, .06 Ampere Amplifier and Detector  
Type 499A-3.4 Volts, .06 Ampere with Standard Base Amplifier and Detector  
Type 412-1 1/2 Volts, .25 Ampere Platinum Filament Amplifier and Detector

### All Standard Types . . . \$2.50

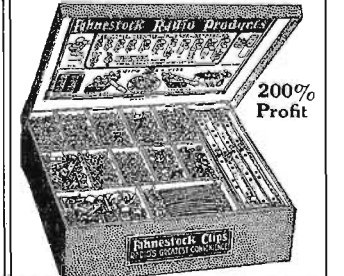
TYPE 402 5 WATT TRANSMITTERS.....\$3.00

EVERY TUBE GUARANTEED to work in Radio Frequency. Especially adapted for Neutrodyne, Reflex and Super-Heterodyne sets.

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Contents Retail for \$51.50

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**FAHNESTOCK ELEC. CO.**  
LONG ISLAND CITY NEW YORK

# Questions and Answers

### Tube Queries

(19731) DKS, Toronto, Ont., Can.  
 Will you please tell me if using four dry cells will burn out a UV-200 tube? If so, what would be a good make of storage battery to buy? And also will this tube stand 45 volts on the plate?  
 A.—The UV-200 tube is properly operated on a 6-volt storage battery, and a 6-ohm rheostat, its filament potential being rated at five volts. The voltage of an unused dry cell is 1.5 volts, and four cells connected in series would provide the correct potential and not impose a hazard on tube, although being a one ampere tube the cost of operation on dry cell batteries is prohibitive, dry cells being designed in singles to supply current not in excess of one quarter ampere. If dry cell operation is desired for one ampere tube a sufficient number of cells in multiple should be used to reduce to 25 amperes the drain upon each cell.  
 Any standard storage A battery may be used.

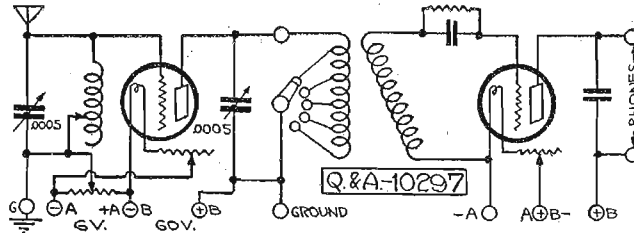
The rated maximum plate voltage of the UV-200 tube is 24 volts and should not be in excess of that. To use a greater plate potential will cause a rapid deterioration of the filament through ionization by collision. This condition is characterized by a "blue-glow" discharge in tube.

### Falling Off in Reception

(19673) JJD, Indianapolis, Ind.  
 I have been a Radio nut for about two years and have read many crazy questions in your question department. Now, I have one of my own.  
 I am using an Erla reflex two tube set which I built myself. At times I have had splendid success with this set and again very poor.

Within the last two or three weeks I have been able to receive stations of low meters only. I can pick up WLS, Chicago; Zion, Illinois, and Springfield, Massachusetts, at most any time, but this is about all I can do. I have tested every part of my set, battery voltage is correct and I am at a loss what causes this. Would certainly appreciate any suggestions from your department.

A.—Your description is hardly a sufficient basis for determination of the source of limitations recently encountered in operation of your Erla reflex circuit. However, we are suggesting that it is quite possible that your tube or tubes are falling off in efficiency or that other



factors of wear and tear incur losses which prohibit reception on high wave lengths. We are suggesting a compensation in connecting a .0001 mfd. fixed condenser across the secondary of each Radio frequency transformer.

### Single Stage Radio Frequency

(10297) PPH, Detroit, Mich.  
 I want to build a single stage Radio frequency amplifier and add it to my receiver. To do so would I connect its output to the binding posts where I now have aerial and ground in the diagram?

A.—The diagram submitted should meet your requirements as it shows one stage only of tuned Radio frequency and detector. The output of amplifier (plate) is connected to the input of detector (grid). The fifty turn coil and variable condenser are a part of the Radio frequency stage.

Herewith is shown a hook-up of a Radio frequency amplifier which will be found more or less uniform and adapted to most of the receiving circuits in use, possibly serving you more helpfully than the type submitted previously. A single slide tuning coil or tapped inductance designed for wave lengths ranging from 200 to 600 meters should be used.

### Interference

(10662) EA, Pittsburgh, Pa.  
 I have a Crosley 3R3 Trirdyn three tube receiver, and am having considerable interference from nearby sources. I am located within 100 feet of a big power house and eight big pole transformers and my set is twenty feet from a power line. The set will bring all locals without any interference or distortion; reception is

perfect, despite nearness of power house, lines and transformers, but as soon as I tune in any distant station, it comes in loud, but with a terrific roar accompanying it, something like that of a passenger train going full speed, or that of a wheel turning at 120 turns a minute and striking some object at each revolution. It is not a buzz or 60-cycle hum. It sounds similar to the noise made by an automobile with a motor crankshaft bearing burned out and running at slow speed. Is this the power house dynamo? I can hear it all over the dials with equal intensity, perhaps somewhat louder around 400 meters. However, it is faint, unless both dials are set the same, and as all stations require identical settings on each dial, I cannot tune them in without the interference. I have sixteen DX stations on the loud speaker in one evening, but the noise ruined the reception completely, although WGY and WGN nearly succeeded in subduing the racket. I get the interference at all times at the same intensity and am sure it is from one source only. Can I at least decrease it to some extent? Nothing is wrong with the set, in fact it is the most remarkable receiver I have ever seen; tuning through powerful locals like a razor blade. It has brought in WBZ through KDKA, a 1,000 watt local only a few meters off without any interference on the loud speaker. Using two tubes, KDKA comes on the loud speaker without ground or antenna. Can you suggest a remedy for my exasperating troubles? Dealers advise me

to move. That's the best advice, but easier said than done, for I'm here for a full year and hate to give up DX.

A.—There is no doubt of the source of your interference, which is more noticeable when amplification is used and on certain wave lengths. Several remedial measures which may afford greater or less relief are offered. A counterpoise will probably be the best. It is also some times possible to balance out this type of induction by using an auxiliary antenna which extends in a direction opposite to that of the antenna used for the receiver. The auxiliary antenna can be connected through an inductance to the ground. The inductance should be coupled with a similar inductance in the regular antenna. This coupling must be in the proper direction to oppose rather than aid the two interfering effects in the antenna.

Having a notably selective circuit in all probability either of these methods will suffice.

### Use a Voltmeter

A voltmeter is especially useful to check up on the strength of the B and C batteries, where several tubes are used and the drain on plate voltage is high. The storage battery is tested by a hydrometer.

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### The Reader's View

#### How to Stop Interference

In listening in on the address of Mr. Hazeltine, transmitted by WEAF, I was entirely in accord with the speaker, that the only way to get rid of the annoying squeals produced by regenerating sets in hands of innocent offenders was by persuasion. But the speaker failed to say how it should be done. Did he mean that every Radiophon should chase around the neighborhood and find him? Certainly not. It remains therefore still an open question how to do it. Allow me to offer the remedy. Supposing once a month we set aside a "Radio Day" and on that day all broadcasting stations during the evening say every hour, give a three-minute talk direct to the listeners in, and advise them how to tune their set something like this: "Have you a regenerative set? If so, do you know that your set spoils the pleasure of thousands of other listeners? You surely do not want to do that. Now, listen to my voice. Turn your tubes down as low as you can and still plainly hear me. Thank you. You see, by turning them higher you not alone make squeals in somebody's set, but you are wearing your own tubes out to no purpose."

This is only a suggestion of what the synopsis of the announcer's talk would be. I am sure that no Radiophon willingly wants to disturb somebody else; but he is simply ignorant of the fact that he does it, and furthermore even if he did he would not know the remedy. Undoubtedly my suggestion could be improved upon; but my idea is to catch the offender in the act and give him friendly advice. During Mr. Hazeltine's and Mr. MacMillan's address I could tune out all other stations, but some regenerative set kept up a squeal all the while, and although I have a metrodyne and wave trap, it was impossible to get the enjoyment out of the talk.

**Log Books, Maps, best out. Space for 300 stations, 25c each. Roy Stacy, Rockford, Ill.**

**Men to build radio sets in spare time. Leon Lambert, 601-H Kaufman Bldg., Wichita, Kansas.**

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 Dealers: Write for Our Proposition

**THE E-S-K COMPANY**  
 310 Canton Building, Cleveland, Ohio  
 771 Elliott Square, Hartford, Conn.  
 608 Ch. of Commerce, Pittsburgh, Pa.

My idea is that, for instance, the first Tuesday in November, first Wednesday in December, first Thursday in January, first Friday in February, first Saturday in March, first Sunday in April be set aside as "Radio Days" for this purpose. In this way we will get our object pretty nearly brought to attention of every listener in. What say you, Mr. Editor?—**Aug. Larsen, Rochester, N. Y.**

#### Announcing at Foreign Stations

Speaking on behalf of several thousands of Radiophons of the Spanish-speaking countries of America, many stations are heard, but it is impossible to identify them most of the time on account of the language, or of the fast talking of the announcer, or because they call only at the beginning of the concert. I beg for the help of your paper to support our request to the broadcasting stations of U. S. A. to call their letters in Spanish, which will be very easy to do, as the announcer only has to learn the pronunciation of the letters to announce first in English and then repeat the call in Spanish.

As you know, all Cuban stations announce in English, also, and of course receive a number of letters from foreign countries because the Radiophons have the chance to know exactly who is broadcasting, and I am sure that the American stations would have an increase in their mail of 30 or 40 per cent if they do as suggested.

If you help with your valuable cooperation you may be sure that thousands of Radiophons that read your Magazine will be as grateful.—**Luis Machado, Banco Nacional No. 210, Habana, Cuba.**

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#### Hard on Canadian Stations

In your November 22 issue, page 3, you have an article criticizing the applause from Canadian fans. The trouble is this: we seldom get Canadian stations loud enough to be able to intelligently write an applause card. I have been calling up fans by phone all afternoon, users of sets from three tubes to super-hets. They all report the same. Here in Kitchener, KGO, Oakland, California, comes in stronger than Montreal. We had CNRW one night last week, but the reception did not warrant an applause card. Personally I send out seven to nine cards per week and am always ready to give applause where it is deserving.—**C. W. Kitchener, Ont.**

#### Ground Connections

I believe that the ground connection is the most important, also the most neglected part of the average receiving set. I recently made some tests on different grounds with the following results: A milliammeter connected between the water pipe and steam radiator indicated a current flow of five milliamperes from the radiator to the water pipe and when connected between the water pipe and the ground side of the light circuit a current flow of 8 amperes was recorded. When using the ground side of the light

system as a ground an increase in signal strength was noted; however, the set tuned broader due to the counterpoise action, as the ground on the light system was some distance from the set. When using the water pipe ground I found that some noise could be eliminated by connecting the ground side of the light circuit to the water pipe. If a milliammeter is not available a common voltmeter can be used to determine the difference in potential between two grounds. When static is bad I can obtain very good results by using a short outside antenna and one turn around the picture moulding of the room as a counterpoise.—**Ray Blain, Omaha, Nebr.**

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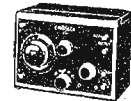
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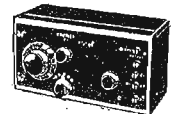
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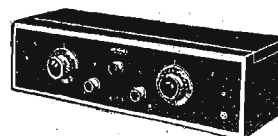
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