

Aerial Aids for Christmas Set Buyers—J. E. Owen; New Het-duo-gen Circuit; "X" Wire—Key to Neutrodyne Success; Details of \$1,000.00 Gold Award Set

Radio Digest

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

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NEW SET—FIND OF YEAR



PHONE CONNECTION LONDON - NEW YORK

NEW STATION READY FOR SERVICE NEXT YEAR

Will Use 4,000,000 Watts Power for Transoceanic Talking—Toll Charge Approximately \$25

LONDON, Eng.—It is not only possible, but absolutely certain that in a year's time, any man in England can pick up the ordinary telephone in his house and speak to a friend in New York.

This new scientific stride will be a great help to a number of people, particularly business men who are making regular trips to Europe. Many trips will undoubtedly be saved.

This will be possible when the long distance Radio station of the British post-office at Rugby is completed. Eight giant masts cover an area of 800 acres. Towering 820 feet above the ground, each of the masts is in the form of a tripod and weighs 200 tons.

Use 4,000,000 Watts Power

The power plant will be the greatest of its kind in the world. Over 400, 10,000 watt tubes will be used for this service. They are built of fused copper and glass to permit their cooling by water.

Thanks to Radio, the ordinary telephone subscriber will be able to communicate with any vessel in mid-ocean. This has been tried experimentally with wonderful success on boats crossing the English channel.

The station will be used to communicate with Rocky Point, Long Island, and when it is completed, anyone in England can telephone to anyone in New York at a charge of about \$25 for a limited number of minutes.



Left, Louise Jacobsen, pianist who performs for the fans through Station KGW. Center, Dorothy Mackall, hostess at the recent Radio show held at the Ambassador hotel in San Francisco. Right, Anita Hanisch, twelve-year-old pianist who plays at Grebe station WAHG, and is well liked.



HET-DUO-GEN TUNES EITHER COAST EASILY

Selectivity Is Perfect

C. E. Brush Uses Six Tubes in Decidedly New Hook-Up—Tells How to Build

Meet the Het-duo-gen! The set that really brings in what you want when you want it has come to light at last. A complete surprise because its development is so different from the lines along which most experimenters were known to be working.

Combining the advantages of the heterodyne with regeneration on two tubes, C. E. Brush, of Chicago, has achieved a degree of selectivity that is almost miraculous. The sensitivity seems consistently to equal that of an eight tube super-heterodyne while the volume from three stages of audio frequency amplification is more than enough for dancing. A large loud speaker is required to handle it.

Once the circuit is explained and the operation understood, it all seems so simple that one wonders why it hasn't been done before. Cost? The cost to

(Continued on page 2)

TO FIND \$1000 GOLD AWARD SET!

ENTHUSIASM ANSWERS CALL FOR BEST ORIGINAL HOOK-UP

Radio Digest Contest, Open to All, Stirs Radiophan Interest—Many Sets Already Entered—Speed Necessary in Submitting Receivers.

With only seven days in which to send their sets in since the announcement last week of the Radio Digest \$1,000.00 Gold Award Set contest, several score of entries have already made their appearance at this office!

The surprise of all came when five sets were submitted on the day the December 20 issue made its appearance on the newsstands.

Evidently the contest has taken the Radiophans by storm. Everyone seems interested and willing to co-operate with this publication to determine whose receivers contain the most important contribution to the Radio art.

Radio clubs have written for particulars.

Newspapers have asked for more information regarding the award.

Telegrams and letters direct to Radio Digest indicates that interest is booming in every section of the country.

Remember Shipping Instructions

Emphasis must be placed on the manner to be used in shipping entries to Radio Digest. Read carefully rules 5 and 6 in the list given on this page.

Careful packing may be the cause of one set winning out over another, because of damage incurred by the poorly packed one.

Do not send novelty or freak sets built in miniature houses, dolls, finger rings, tie pins, etc. Read rules 7 to 8.

Remember that you need not know how to write articles in order to enter your set. Ability as an author has no weight in awarding the prizes. Draw a hook-up diagram, send it with a short explanatory letter to the Gold Award Set Editor, pack your set entry carefully and send it separately prepaid, insured, to the Gold Award Set Editor, Radio Digest, 510 N. Dearborn street, Chicago.

Selectivity Big Factor

New ways of obtaining selectivity practically, without the employment of a great many extra tubes, will undoubtedly have an important bearing on the choice of the prize Gold Award sets.

Broadcasting stations are growing so numerous nowadays that the problem has become that of tuning them out, rather than tuning them in. Of course, selectivity must not be obtained at a sacrifice of other desirable qualities, such as range, quality and volume of reproduction, simplicity of operation, ease of construction, minimum re-radiation, etc.

The first prize Gold Award set is going to be a GOOD SET.

Everyone will want to make one like it, if early interest in the contest is any indication.

Hurry Along with Entries

Only three more weeks till the contest closes! At the stroke of midnight, January 17, every entry must be in.

Don't delay. Get your idea of the best set in to the Gold Award Set Editor at

TWO NEW LARGE STATIONS; RUMOR

Former Chicago Mayor and Commonwealth Edison Plan to Erect Studios

CHICAGO.—And still they come! Two more broadcasting stations are making arrangements to go on the air some time in the near future in this city. One of these will be owned and operated by William Hale Thompson, formerly mayor of Chicago, and the other will be operated by the Commonwealth Edison company, which furnishes the light and power for the city.

The station which Mr. Thompson contemplates erecting will be a 1,000-watt station. The call letters assigned are WHT. This station will go on the air February 22, 1925. It will be located on the tower of the Wrigley building.

The new Commonwealth Edison station may be one of the 5,000-watt stations now being built by manufacturers of broadcasting equipment. At the present time KYW's operating plant is on the roof of the Edison building. This will be moved soon to their new quarters in the Congress hotel.

once. It will not be held longer than absolutely necessary to make comparisons.

Some of the most radical Radio improvements have come from Radiophans who did not know what they had done, but recognized the fact that they had something better than ordinary.

Many important inventions in use today were only accidents when first conceived.

Perhaps your set contains such an accident?

Perhaps you have thought out something new in circuits?

Judges to Be Announced Soon

Several world-renowned leaders and Radio inventors have been invited to sit as judges in the Gold Award Set contest. Their acceptances are being awaited.

Every precaution is being taken to insure the fair selection of the winners.

The contest is on! Who will win the \$1,000.00?

Only those who submit entries will be taking advantage of this great opportunity. It may be the turning point in someone's life. It may make a Radio manufacturer or inventor out of a man or woman who has never considered him or herself as even a cog in this rapidly progressing, but still infant, industry. January 17 is the finishing line. Hurry!

\$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 tied for, will be awarded to each tying contestant.
3. Contest is open to all Radiophans, 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 prepaid 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 contents plainly 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
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.

Telegraphic communication by Radio established between Beirut, Syria, and Belgrade, Jugo-Slavia, has recently been made available for commercial uses through an ordinance issued by the French high commissioner for Syria.

NEW SET—FIND OF YEAR

(Continued from page 1)

build is remarkably low, much lower than a "super." The 23-plate variable condenser and three good quality audio frequency transformers are the principal items in the list of parts.

Controls are symmetrically arranged on the panel and het-duo-gen is attractive, as well as being the most efficient ever tested. Two het-duo-gens were tried out to be sure that location had nothing to do with the results.

Goes Through Locals

Located within a mile of two of Chicago's most powerful northside broadcasters, a het-duo-gen went through on a Tuesday evening and brought in WJY, WTAM, WMC, WDAF, WFAA and KGO time after time. Tuning was done entirely on the loud speaker. Could any Radiophan ask more?

Radio Digest did, so operations were moved to Evanston where another outfit was installed on a short antenna. This time the het-duo-gen repeated the performances of the first and added WOAI, KFI and WOR to the list.

The explanation and construction of this surprise set of 1924 is begun by Mr. Brush on page 15 of this issue. Begin to build, for there is nothing "tricky" about this set, no "ifs" and "shoulds." The coils are easily assembled at home and no special kit or make of parts are essential.

Official Opening of KTHS New Years

Distinguished Guests from Throughout Country Attend Gala Affair—Located on New Arlington Hotel

HOT SPRINGS NATIONAL PARK, Ark.—Mr. and Mrs. Radiophan and the whole family, 20,000,000 strong are given a special invitation to attend the grand opening and christening party of the New Arlington hotel station, KTHS, which will start at 9 o'clock New Year's eve and continue until 1 o'clock the morning of 1925.

Distinguished guests from all over the United States will be present for the gala occasion, with 1,500 table reservations taxing to capacity the spacious ballrooms. The New Arlington is regarded as one of the most beautiful examples of hotel architecture in the United States and will hold open house in regal style New Year's eve.

A feature de luxe of the New Year's eve Radio feature will be Henry Santrey and his famous Cameo Record orchestra of 11 pieces and a complete caste of vaudeville stars. In addition, the Meyer Davis orchestra of Philadelphia, favorites of the Prince of Wales on his recent American tour, will be on the job with a specially prepared assortment of dance music and specialties. This noted orchestra will be regular KTHS entertainers during the winter.

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Looking Ahead

The Construction of Het-Duo-Gen Is Begun in Next Issue, and C. E. Brush tells about winding the antenna coupler, oscillator and filter. A baseboard layout is shown which will give builders a picture of what the "insides" look like.

Fada Neutrodyne Receivers Are to Be Taken Up by the Operating and Trouble Shooting Department. The suggestions given cover four models, Neutroceiver, Neutrola, Neutroceiver Grand and Neutrola Grand. Fada owners will learn much from this article, as will operators of other forms of neutrodynes.

You, Too, Can Devise New Circuits and calculate the correct inductance and capacities from the article by J. E. Owen in the next issue. Testing and improving are also explained thoroughly.

A Mechanical Amplifier-Loud Speaker Used in Paris will be discussed next week by Frederic M. Delano. Constants and assembly are given and the true experimenter will find this article the basis for many pleasant hours in a new field of construction.

Have You Thought of Entering the Radio Digest Gold Award Set Contest? Many are doing so. Perhaps you have the prize winning set but do not recognize it. Don't miss this opportunity. Send it in!

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

Name

Address

City.....State

HOOVER WITHDRAWS CALL FOR NEW LAW

ASKS HOUSE NOT TO PASS PENDING WHITE BILL

Art Growing Too Fast to Be Bound by Inflexible Law, Is Argument Presented

WASHINGTON, D. C.—Support of the pending White Radio bill in the House of Representatives has been withdrawn by Secretary of Commerce Hoover because he feels that the art of Radio is developing so fast that any bill enacted into law at the present time would be obsolete in the near future.

It is understood that the Congressmen are not so pleased at this withdrawal of support.

In connection with this changed attitude Secretary Hoover has sent a communication to Representative White of Maine, who introduced the legislation.

Secretary Hoover proposes to amend the present Radio law of 1912 merely by adding a paragraph to the law as follows:

"The wave length of every Radio transmitting station for which a license is now required by law, its power, emitted wave, the character of its apparatus and the time of transmission, shall be fixed by the Secretary of Commerce as in his judgment and discretion he shall deem expedient and may be changed or modified from time to time in his discretion."

Mr. White refused to discuss the letter following its receipt.

Colored Lights Atop Towers Guide Flyers

Crosley WLW Station Is Harrison, Ohio, Marker

CINCINNATI.—Night aviation is becoming less dangerous and the recent inauguration of the nocturnal service in the airplane mail division bespeaks well for the confidence of the government officials in the safety of the flyers.

In order that aviators might have an additional guide while flying at night, Powel Crosley, Jr., has had red and green lights placed atop the aerial towers of his new five-kilowatt transmitting station at Harrison, Ohio. The red light is placed on the north tower while the green one is on top of the one to the south, separated by four hundred feet of the aerial wire.

This combination of red and green lights with their location has been brought to the attention of aviators' organizations in order that they might notify their members of the added guides while flying in the vicinity of the new WLW station.

Flood-lighting the towers at night makes them visible for several miles and they present an imposing sight as they rise 200 feet from the top of one of the highest knolls in that part of the country and serve as a guide to the town of Harrison, Ohio.

BARNYARD PASTIME WILL BE BROADCAST

BELOIT, Wis.—"Clink-clank—ah-h, Si Smith from up Milwaukee way has thrown another ringer." If you happen to be listening in New Year's afternoon on 268 meters, and hear the above or strange kaplunks and arguments galore—don't think that your tubes are on the bum. It'll just be Station WEBW broadcasting a grand old barnyard golf tournament.

NEW BODY FORMED TO BANISH GLOOMS

YE OLD APPLESAUCE CLUB BORN AT STATION KYW

New and Original Contributions Sent in by Fans Read Before Microphone—Open to All

CHICAGO.—Do you happen to know of any "wise cracks," any new and original ones, or any "funny bone ticklers?"

If so, you are eligible for a new club, regardless of financial status, race, age, sex or previous condition of servitude. It's "Ye Old Applesauce Club," conducted by Station KYW. Ransome Sherman is the chief applesaucer.

Contributions should be sent in addressed to Ransome Sherman, Westinghouse station KYW, Chicago. And down in the corner of the envelope, care of the Chicago Evening American studio.

If they are new and funny, you promptly become a charter member of "Ye Old Applesauce." Listen in, and you will hear your contribution, and your name.

Three Prizes—but No Third

Mr. Sherman offers a first prize, a second prize, and a fourth prize—first, second and third prize would be common. But, and this is confidential, the prizes aren't real. That's a part of the joke.

It's a new club, but it is growing by leaps and bounds. There's no clubhouse, nor golf links, but the membership role is astounding. Something like the fellow who owns a ten-mile railroad. He claimed that while it wasn't as long as the New York Central, it was every bit as wide. And so it is with "Ye Old Applesauce Club."

So come on humorists, send them in. One more point. Mr. Sherman suggests that barber shop jokes are now in order. Time was when they were rather raw but in these days, with the members of the alleged weaker sex filling the spaces below the stripped pole, the air has become so refined that the jokes are now eligible for the ether.

New Station at Ogden, Utah

OGDEN, Utah.—A broadcasting station is being erected here by Browning Brothers company's store. Browning Brothers deal in sporting goods and one of the partners in the firm invented the Browning machine gun, used in the world war.

FIRST GREAT DANE TO GO ON AIR



When Miss Dorothy Blackwell of WEEI reads a chapter of "Beauty and the Beast" to the Big Brother club members, she is always assisted at the "Mike" by "Pep," this Great Dane.

PEP, a great Dane dog owned by Harvey Mason of Melrose, is the latest member in the Boston Edison Big Brother club. Although Pep cannot meet all the requirements for membership in the club and is three years below the age requirement, he has more than made up for this by doing Big Brother acts.

Pep was made an honorary member of the Big Brother club in the studio at WEEI with pompous ceremonies directed by Big Brother Emery. The Big Brother act resulted in Pep's being elected as an honorary member would be worthy of any

Big Brother, or, for that matter, of fathers or grandfathers. Pep is responsible probably for saving the lives of Mr. and Mrs. Mason and the five little Masons when their home caught fire recently. Pep's barks and howls awoke the Masons, and Mr. Mason on investigation found the kitchen of his home in flames. Since this occurred a few weeks ago, Pep has been the idol of all Big Brother members.

Pep is a big pet, measuring six feet from the tip of his nose to the tip of his tail and weighing 160 pounds. Pep is only four years old but enjoys broadcasting.

NEW ORLEANS PICKS UP VOICE OF OMAHA



Irene Fleming

OMAHA. — Irene Fleming, one of WOAW's most popular soloists, added another achievement to her long list when recently her special Zenith program, broadcast from WOAW, was picked up and amplified for visitors at the New Orleans Radio show by the staff at the Zenith Radio corporation booth.

Miss Fleming is an ardent believer in the help music affords demented people, and has devoted several years to the directorship of music at the State Hospital for Insane at Lincoln, Nebr.

Her charming soprano voice has been heard from practically every Omaha theater and club, besides the many times the WOAW audience has listened with pleasure to it.

British and American Fans Play Chess Match by Radio

HAVERFORD, Pa.—The first international chess match by amateur Radio was played recently between Haverford college here and Oxford, England, using the college Radiotelegraph station of both universities.

The communication was maintained for five and one-half hours on a wave length of 85 meters, despite a very heavy, grinding static.

The game was begun at 7:15 p. m. Eastern time and was postponed to another day at 12:45 a. m.

"The Mikado" from WEA F Chain

NEW YORK.—Incidental music from "The Mikado" was broadcast recently from five stations, WEA F, WJAR, WCAP, WEEI and WDBH, when this was given at the Capitol theater here in connection with the film, "The Snob." WEEI and WDBH are new members of the WEA F-Capitol theater chain.

WHO Heard in St. Thomas

DES MOINES, Iowa.—Station WHO, located in this city was recently heard at St. Thomas in the Virgin Islands, about 2,700 miles from here. A letter received from a U. S. Navy Radio man who heard them, told of wonderful reception and volume.

One of the mental patients held in a British asylum has complained that he was being poisoned by Radio.

LONG HERALDED KOA TAKES ETHER DEBUT

IS GENERAL ELECTRIC CO.'S LAST LINK IN CHAIN

Broadcasts on 323 Meters and Uses 1,500 Watts Power—Thousands Hear Formal Opening

DENVER, Colo.—Another Radio voice has been added to the long list of stations now in existence. Station KOA, located in this city recently went on the air, broadcasting on 323 meters and using a power rating of 1,500 watts.

The opening of this station marks the completion of the General Electric link of broadcast stations across the country.

Station KOA is half way between the Mississippi and the Pacific; Mexico and Canada, and has been heard by millions of fans since its opening. Hundreds of letters were received before the official opening of the station. The call letters used during the dead of night experiments were 9XA.

"From the foundation to the roof, this station has been designed and built for the sole purpose of broadcasting," declared Martin P. Rice, who is director of broadcasting for the General Electric, and is at the present time located here.

"Use of broadcasting pick-up circuits will permit public events, addresses, concerts and services of many churches to be placed on the air. The station is surrounded by a rich file of talent from which to select music, entertainment and educational features in addition to the KOA staff artists."

For the present, programs will be broadcast three nights a week, the dates will be announced later, in addition to the Sunday features. Harry D. Randall, will have local supervision of the station.

"R. F. D." NAME OF NEW FARMER RADIO GROUP

WLS Organizes Radio Farmers' Democracy Body

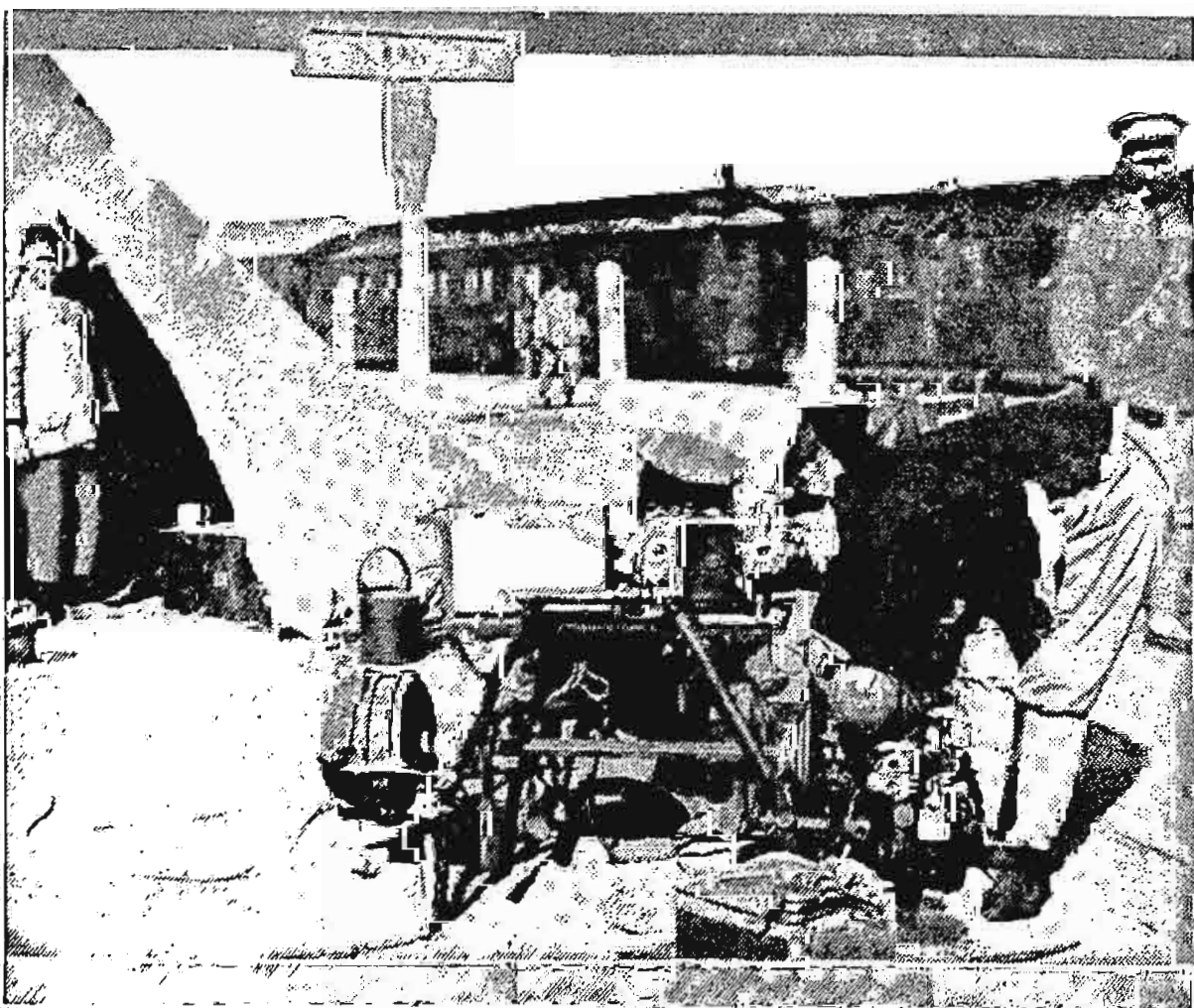
CHICAGO.—"R. F. D." is the name of the national Radio farm organization recently launched in Chicago over WLS by the Sears-Roebuck Agricultural foundation.

The name was chosen as a result of a contest among the farmers themselves, more than 10,000 suggestions being submitted. The winning name stands for "Radio Farmers' Democracy" and was submitted by Roy Wixon, Spring Valley, Ill., who wins a Radio set as his reward.

Mr. Bill, director of WLS, will manage the new farm Radio club which will meet in the various communities at 8 o'clock Central time every Tuesday night.

Applications already have been received from 10,000 people.

CHINESE ARMY NOT OLD FASHIONED



Chinese national troops at the Shanhaikwan front under command of Marshal Wu Pei Fu, who fought against the Manchurian invasion of the Fengtein troops to protect the unity of the country, used this modern portable Radio field set at a railway station near the front at Marshal Wu's headquarters.

BROADCAST "WHITE CARGO" FROM STAGE

PORTRAYS LIFE IN AFRICA AMONG THE BLACKS

Station KYW Holds Fans Interest During Entire Show—Theatergoers Given Unusual Treat



Gladys Frazin

"White Cargo," the vivid play of the tropical jungles, was broadcast by Station KYW from the stage of the Cort theater, Friday night, December 12, at 8:20 p. m.

This play came to Chicago after having been played in New York fifteen months and London ten months. It is the story of Langford, a young English idealist who, fresh from London culture, goes into the African jungles. He will "stay white," he will not forget that he is a gentleman. Langford arrives at the interior trading post, nattily attired, clean shaven. He looks about him in disgust—disgust for his fellow countrymen who have discarded those ideals that he holds so dear.

Only One Woman in Cast

There is some excellent acting in the piece. Tondeleyo is portrayed by Gladys Frazin, the only woman in the cast. Frederick Roland plays the part of Witzel, a hardened tropical dweller, most frank in his vices. Then there is Conway Wingfield, as the doctor who has degenerated from an able surgeon to a ragged derelict, sent to the coast as a spotter, to watch for signs of leprosy among the natives.

It is a play that is much talked about. It broadcasts well. A microphone was placed off stage, as well as three along the footlights. During the moments of silence, the action and scenes were described by the announcer.

European Notes

Whether or not broadcasting and commercial Radio should become a government monopoly, provided an enthusiastic discussion recently before the French chamber of deputies. French plans call for a super power central broadcaster in Paris, with smaller stations located in the hearts of the various regions. These have not been affirmed.

Copenhagen, Denmark, is broadcasting irregularly now on 750 meters. It is also transmitting regular Sunday, Wednesday and Thursday programs on 471 meters.

The international committee for Radio telephony is planning to convene in Paris from April 16 to 20, 1925. Twenty-seven nations will be represented. Radio amateurs are considering a meeting in Paris at the same time.

Belfast, Ireland, has prohibited the stringing of aerial across streets and other thoroughfares.

Radio-Paris, on 1,780 meters, cannot be heard so easily by Irish and English listeners when Chelmsford, 1,600 meters, is in operation with its 25 kilowatts of power. Chelmsford, 5XX, entirely blankets Radio-Paris.

Scotland is now in the throes of a religious controversy caused by a ban placed on the broadcasting of full religious services by the Glasgow Presbyterian council.

M. Deloy, French 8AB, is heard in the United States clearer and louder than the Eiffel tower. He uses 1,000 watts on 100 meters and 100 watts on 50 meters. Both transmitters have better success in crossing the Atlantic than Eiffel tower. 8AB has also been heard in Transvaal and Australia.

With the inauguration of the Munster, Germany, broadcasting station, Dr. Bredow, secretary of state, said that there were 250,000 private Radio sets in Germany.

The British Broadcasting company is planning during the foggy months of the year to broadcast weather reports for London so that commuting listeners can start for their offices earlier in the morning when there is a heavy fog.

WLS BEGINS MOVIE BROADCAST STUNT



Betty Bronson

CHICAGO.—For the first time, movies were broadcast over the air from Station WLS, when they gave a production of Peter Pan. This was a scenario synopsis of Barrie's popular play, and arrangements were made with the Paramount producers to have Betty Bronson—who plays the leading role—come from New York to do the broadcasting.

The musical score was played on the Barton pipe organ by Ralph Emerson. This was accomplished by using two microphones, a novel scheme upon which WLS has been experimenting for some time.

"Now that the broadcasting of motion pictures has proven successful, we will make it a permanent feature of WLS," said Harry Sadler, director of the WLS theater, "all the prominent stars will take part in specially arranged plays on different evenings. This will give the movie fans an opportunity to hear the voices of their favorites, whom they have known only by their faces on the screen."

"Pan" Radioed to Author in London by Rebroadcast

LONDON.—Seated in the Savoy hotel here, Sir James Barrie recently listened to the loud speaker reproduce the lines of his own "Peter Pan," spoken in New York by the company now playing at the Knickerbocker theater there.

The program, of which the "Peter Pan" numbers formed a part, was broadcast by KDKA short wave to 2LO here, where it was rebroadcast.

WGBS, New York, WOO, Philadelphia, and KFKX, Hastings, Neb., carried the program for American fans.

Forty per cent of Germany's estimated 250,000 Radio sets are located in Berlin.

Victor Saudek Begins Giving Musical Talks

Demonstrates Various Pieces That Make Up Orchestra

PIITSBURGH, Pa.—One of the most unusual series of addresses ever arranged for the broadcast audience started recently from KDKA, when Victor Saudek, director of the KDKA Little Symphony orchestra, presented the first of a series of educational talks on orchestral instruments.

The talks are unusual in that seldom has the public been given an opportunity to have analyzed and illustrated the various instruments making up an orchestra and having made perfectly clear why such instruments are included in the orchestra. The talks will be a musical education in themselves.

Station WOC Expects to Go on Air Soon with New Set

DAVENPORT, Ia.—Station WOC, located in this city, expects to be able to send New Year's greetings to the world by means of their new 5,000-watt set.

Workmen have been busy for some time completing the studio which will be used with the new apparatus. These rooms are located on the roof garden of the administration building.

WEAF Receives Permission to Increase Power Output

NEW YORK.—Based on their desire to assist the department of commerce in determining the effects of increased power, in an endeavor to give the Radio listeners better service if it is possible, WEAF recently requested and received permission to increase their power from 1,000 to 1,500 watts.

Wins Household Contest

NEW YORK.—Clare Y. Genung, of Maplewood, N. J., was awarded the prize of ten dollars for the best letter on "Creating Leisure in the Household," by Station WHN, Loew's State theater here.

Radio Wilson Memorial

WASHINGTON.—Memorial services for Woodrow Wilson held recently in the House of Representatives, were broadcast by WRC, WJZ, WEAF, WGY and several other stations.

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.

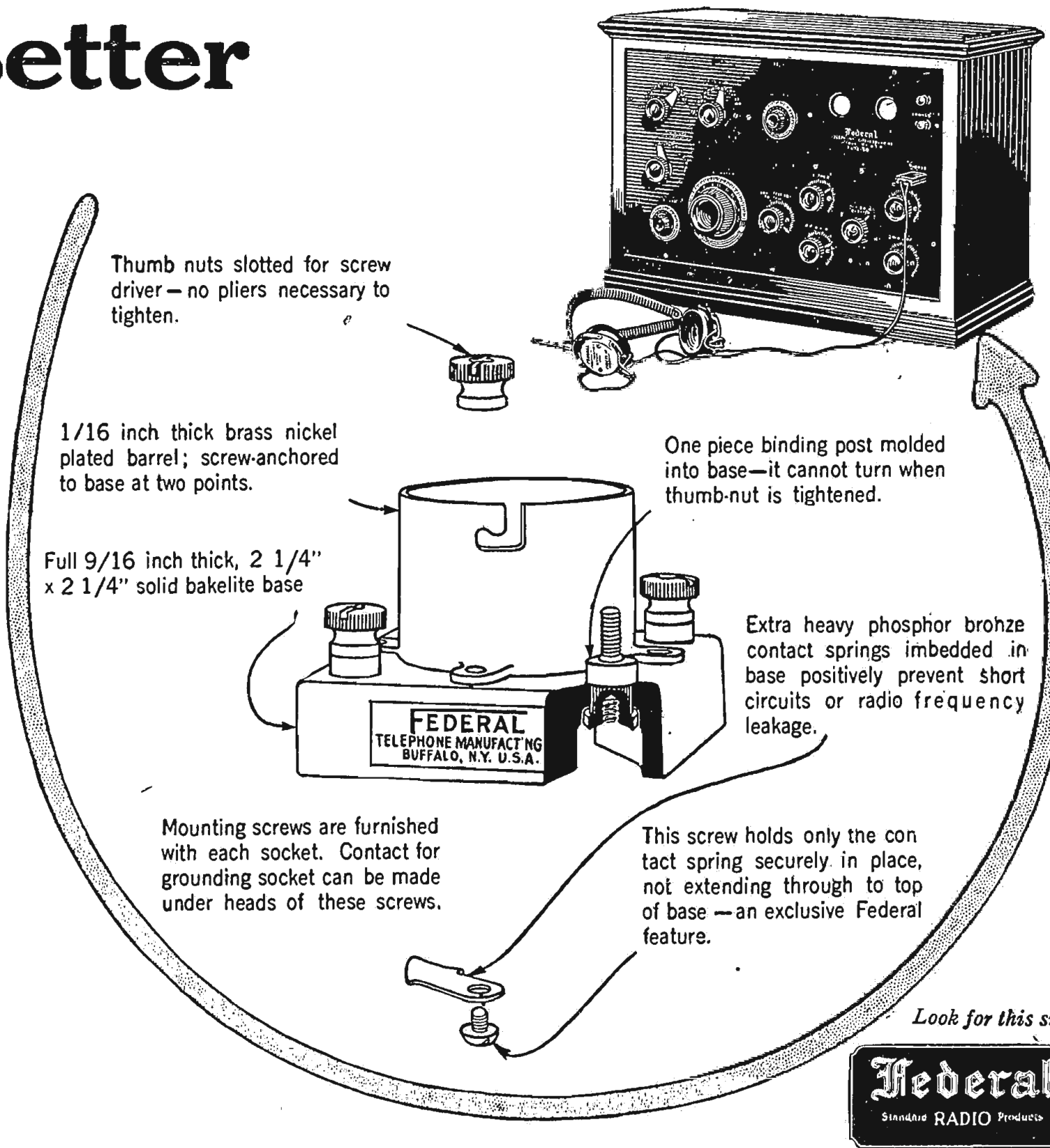
FEDERAL TELEPHONE & TELEGRAPH COMPANY
BUFFALO, N. Y.

Boston New York Philadelphia Pittsburgh Chicago
San Francisco Bridgeburg, Canada



Federal

Standard RADIO Products



WLW— One of the Queen City's Attractions



Left, Adelaide Apfel, one of the first pianists to broadcast for Radio audiences. She has been a regular afternoon attraction. Above, Barbara Fones, singer; Dorothy Stolzenbach, pianist and Ruth Morris, violinist. All are from the College of Music and frequently appear on Crosley programs.

By Webb G. Welborne

BACK in "the good old days" before Mr. Volstead handed John Barleycorn the solar-plexus blow under which he crumpled up and took the count, the country frequently heard of "the beer that made Milwaukee famous," while in Cincinnati there was brewed a brand of the same popular beverage, which, it was claimed and proclaimed, "made Milwaukee jealous." And now, in this latter day of foamless home-brew near-substitutes, there has been evolved an institution or industry or something that has "made Cincinnati zealous," for the big city at the South's gateway verily is earnest, with an intense enthusiasm, in its Radio zealously, typical of the Cincinnati way of doing things.

Whole-heartedly, then, with zest and earnestness, Crosley's WLW broadcast station automatically has been popularized to the extent of having attained a position high up among Queen City ideals; it's a pet among the myriad things of ingenuity, originality, attainment and superiority boasted by loyal and civic-proud Cincinnati-ans.

Though aided

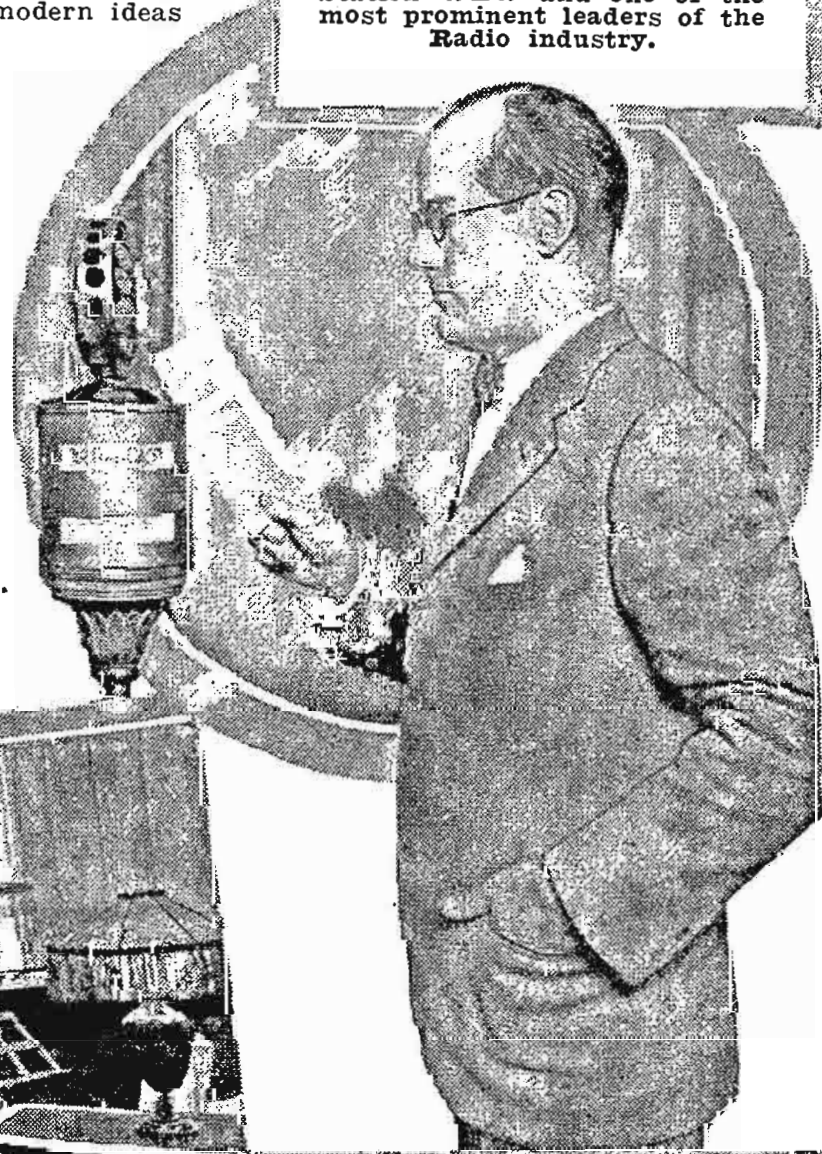
materially by a liberally-responsive public, one individual in the person of Fred Smith, program and studio director, Radio teacher of Spanish and Ido, who knows and tells you all about composers, authors, artists and stars; who has originated more novel and unique entertainment features than, perhaps, any other announcer, largely is responsible for this universal popularity. But, let's halt a minute and consider some of the aids Smith has had, mechanical, physical and otherwise. In the first place he was supplied with one of the best equipped plants known, kept up to the minute by the addition and substitution of modern ideas and appliances as they developed, which soon is to be supplanted by a new, complete super-power outfit—the last word in Radio ingenuity development.

Added to this has been the co-operation of Dr. Frank Stevenson, pastor of the Church of the Covenant Rev. Frederick N. McMillin, pastor of the Walnut Hills First Presbyterian church, Cincinnati College of Music and Conservatory of Music, Sunday school editorial staff of the Methodist Book Concern, Senator Schultz, nationally wide favorite; Western and Southern, Chubb-Steinberg, Doherty Melody Boys orchestras, Formica band and orchestra and Milnor instrumental trio, contributing a wealth of educational and entertainment features of exceptional merit and which the nation's great invisible audience applauds nightly.

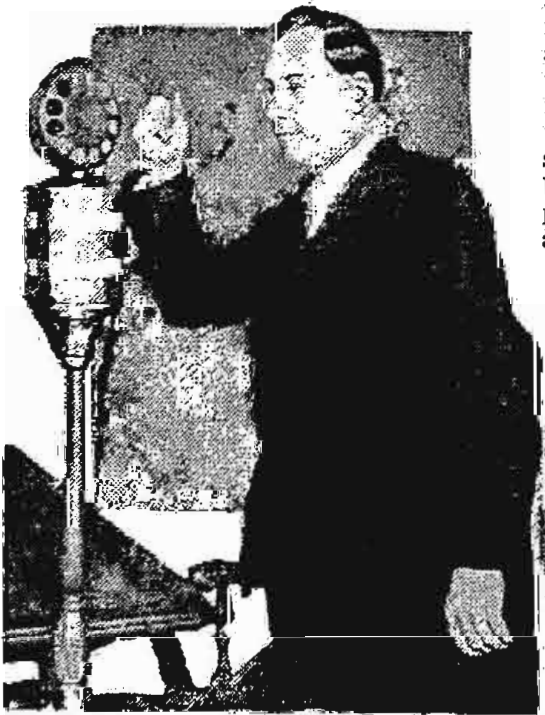
Encompassed with mahogany mounted transparent and art-colored glass walls and partitions in a building designed and erected for the purpose, graceful art displays itself all over and through WLW's twin studios and the commodious auditorium. This latter reflects the handiwork of talented decorators

(Continued on page 6)

Powel Crosley, Jr., owner of Station WLW and one of the most prominent leaders of the Radio industry.



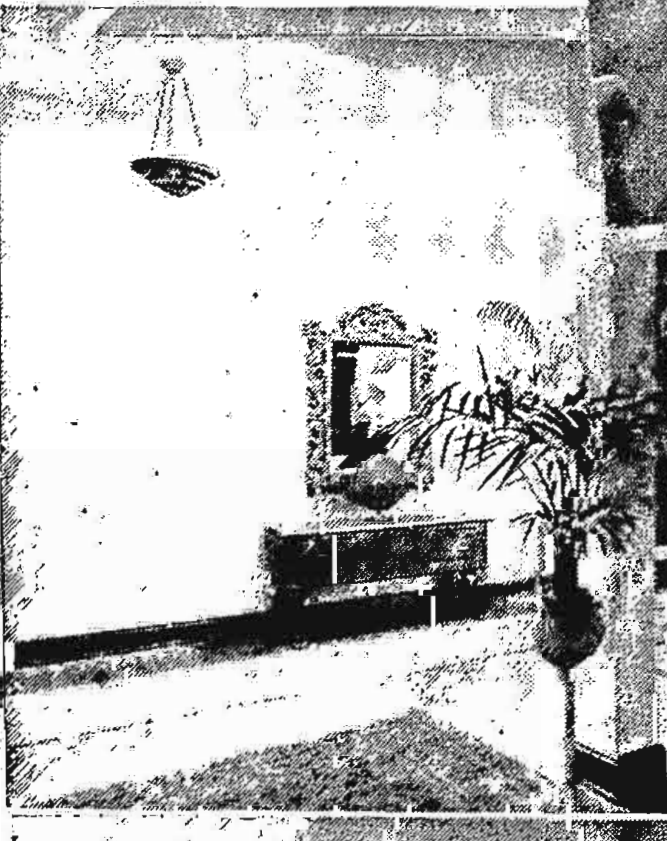
Fred Smith before the microphone giving Ido lessons to the vast Radio audience of Station WLW.



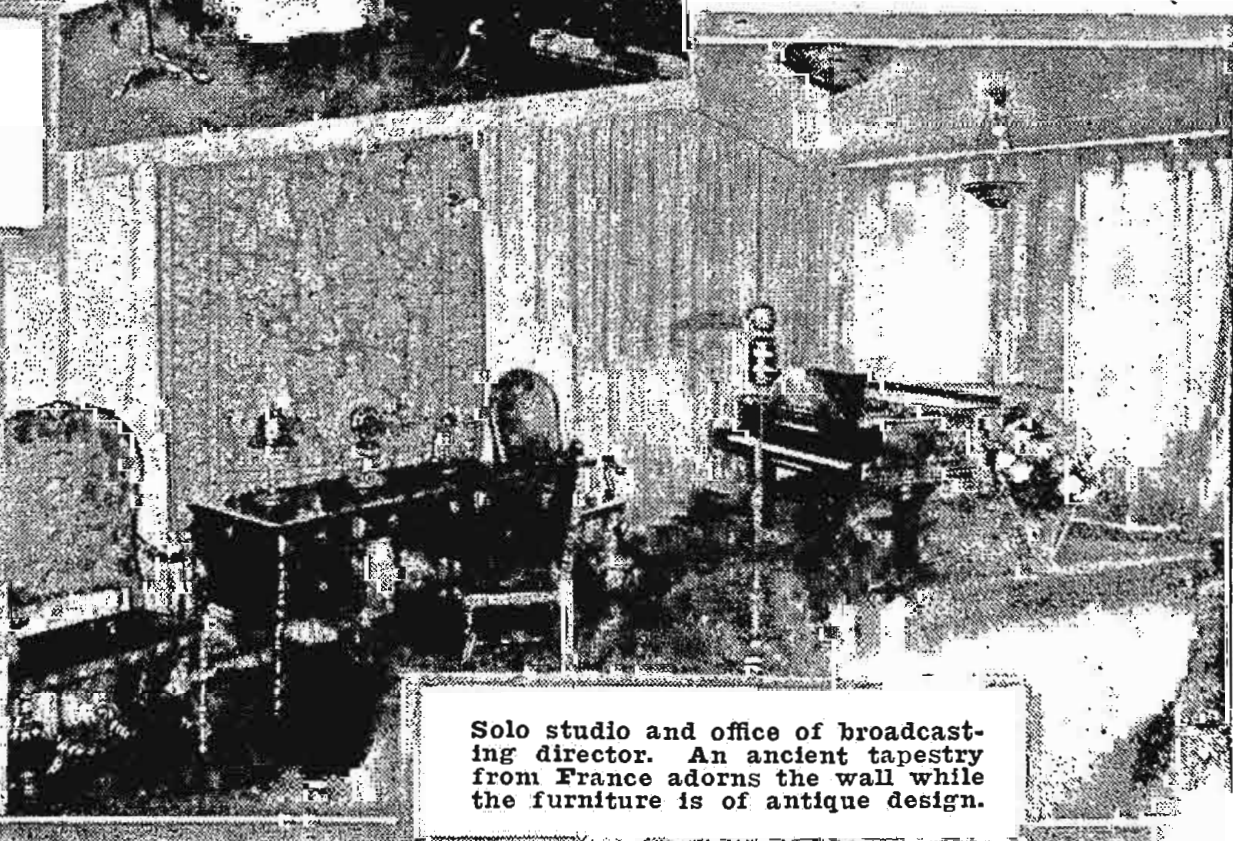
Senator Schultz, (J. E. Klein) who amuses the fans every Thursday night from Station WLW. He is known to thousands.



Beautifully decorated ensemble studio at Station WLW. Everything possible has been done to obtain perfect acoustical quality of reproduction.



Antique furniture and gorgeous tapestries give beauty to the WLW auditorium. Temperamental artists find surroundings to their liking.



Solo studio and office of broadcasting director. An ancient tapestry from France adorns the wall while the furniture is of antique design.

BROADCAST SPECIAL PROGRAM FOR FANS

WESTINGHOUSE STATIONS LINKED ON EVENT

Rebroadcast from KDKA to KYW, WRC, KFKX and KGO—Called Brunswick Hour

PITTSBURGH, Pa.—On Tuesday, December 9, from 9 to 10 o'clock p. m., was inaugurated the national relay program, furnished by the Brunswick recording stars. The program was broadcast from Station WJZ, New York, was picked up and rebroadcast by stations KDKA, KYW, WGY, WRC, KFKX and KGO. The artists on this program were of the first magnitude and known the world over. It is the purpose to broadcast a similar program each Tuesday evening, thereby giving the Radio public of the country an opportunity to listen in on a rare one hour's entertainment.

Famous Artists on Programs

The first program on Tuesday, December 9, including selections by the Cleveland Symphony orchestra, an organization that gives more than 150 concerts each year. The director, Nikolai Sokoloff, is a musician of international reputation. Vocal selections from Florence Easton enriched the hour, widely known for her operatic work on the continent, in England and in America.

On Tuesday evening, December 16, at 9 o'clock, the second national relay program was given over the Radio—the same broadcasting stations joined in this work.

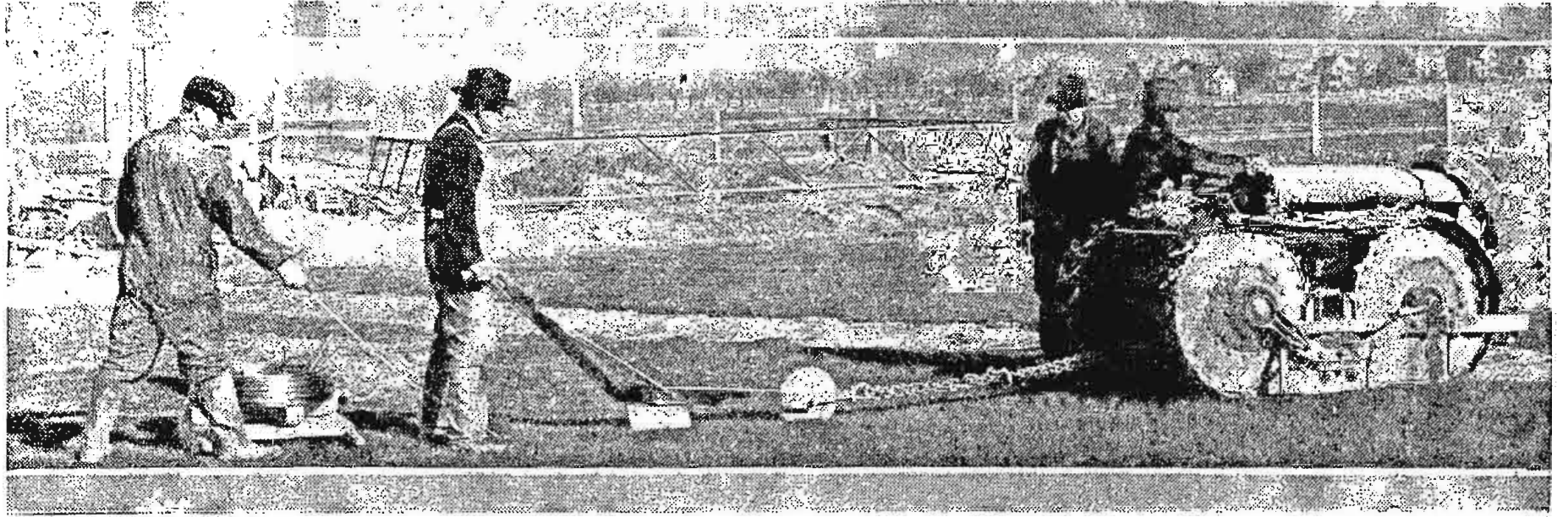
The national relay program, which is to be a regular Tuesday feature, and which will be known as the "Brunswick Hour of Music," is a new departure in Radio activity.

Station WHN Opens Larger Studio; Closed for a Time

NEW YORK.—Alterations which necessitated the closing of the WHN studio, and the cancellation of the afternoon programs for a short time, have been completed.

The new studio, augmented by a large reception hall for artists and their guests, is the last word in the decorators' art. It is one of the most inviting in the country.

SINKING SUPER POWER GROUND WIRES AT WCBD



This is the way that Station WCBD, Zion, Illinois, is laying the ground wires for its new super power station. The wire is attached to the heel of the plow and follows in channel made by point. The wire is laid ten inches deep. A thin knife makes an incision, while the lawn remains undisturbed. Nine and one-half miles of wire are required.

WLW AT CINCINNATI

(Continued from page 5)

and drapers, who have left scattered throughout groups of textile-back chairs, gorgeous Oriental floor coverings, tapestry hangings, mirrors, chests, couches and other furniture of antique design, amid which are chime clocks, paintings and musical instruments. The studios are separated by a triangular-shaped room containing amplifiers, switches, telephone equipment, etc., for use in remote control work.

Plans of the Crosley corporation contemplate tremendous possibilities and wonderful achievements in connection with the completion and induction of its new five-kilowatt transmitting station "away out in the country." It required titanic pressure and the influence of some of Cincinnati's financial masters to obtain the site selected for this station, which was found by electrical experts and Radio engineers to offer the greatest resistance to absorption of any location hereabouts. It is at a point near Harrison, a quaint, historical town on the Ohio-Indiana state line, eighteen miles removed from the central portion of Cincinnati.

WLW takes the Sunday school, devotional services and two sermons each

Sabbath to thousands and thousands of people who can not or do not attend these church activities in person. On week days it devotes considerable time in rendering a public service by broadcasting a resume of business conditions, price quotations, weather forecasts and kindred data and information of incalculable value and importance; it teaches languages, recovers lost children and dogs, traces and captures thieves, highwaymen and murderers, locates stolen automobiles and provides a big annual Christmas party for those children of Cincinnati who may have escaped the notice of Santa Claus.

And then when WLW signs off its listeners hear the cheeriest "good night" that ever was uttered.

WHAA Heard 2,450 Miles

IOWA CITY, Ia.—The University of Iowa station, WHAA, has set a new distance record of 2,450 miles for its programs. Word was received this week that one of the programs was picked up by a Radio operator on a ship 647 miles southwest of Los Angeles, bound for Honolulu.

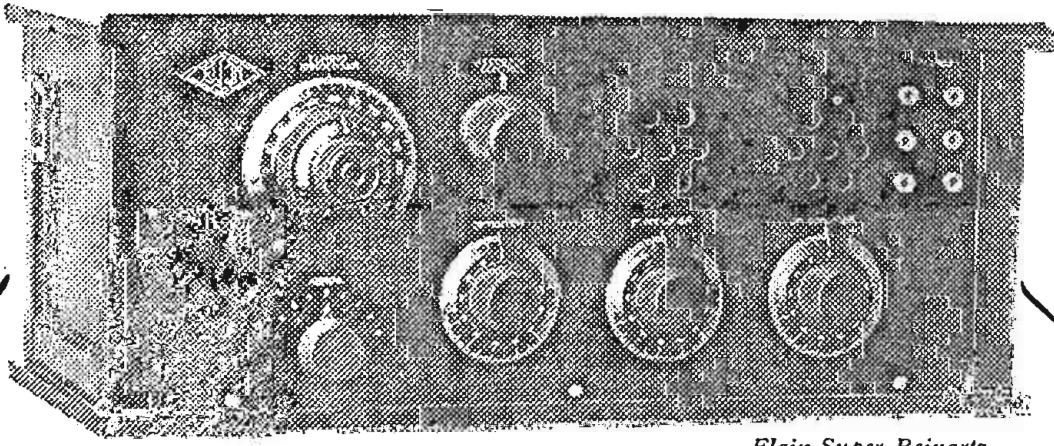
Comedy in Symphonies to Be Shown by KGO

Oakland Station Has Interesting Week in Store

OAKLAND, Calif.—That even a great symphony may have a "comic section" will be demonstrated to Radio listeners Sunday afternoon, December 28, at 3:30 o'clock Pacific time, when the KGO Little Symphony orchestra will play the allegro movement of Beethoven's Pastorale Symphony with an illustrative talk preceding it.

Incidental parts will be played by the orchestra, during the illustrative talk, after the style of Beethoven's village string band, the sleepy bassoon player, who could only play three tones on his instrument, the willing oboist, and the energetic second violinist, for which the allegro is said to have been composed by Beethoven originally, will be heard by proxy over the air.

The stage play, "Dulcy," will be presented in audio drama form, January 3.



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.

ELGIN Super-Reinartz "The Ford of Radio"

will give you the DX records it has brought to others.

You must learn more about this wonder circuit at once!

Mail the coupon TODAY with your name and address and we will send—FREE of charge—the complete working diagram of the Elgin Super-Reinartz, 2LO Model. There are no obligations, of course.

Dealers: Write for Proposition

Free Coupon

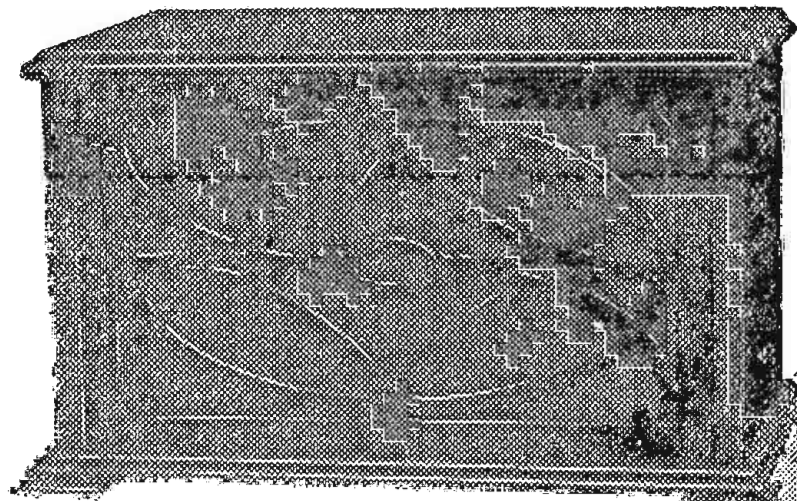
Elgin Radio Supply Co. Dept. A, 207 E. Chicago St., ELGIN, ILL.

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.

Name

Address

(PLEASE PRINT IN PENCIL)



Model "C" Cabinet Type \$30

The New Cabinet Model

For those who admire the full, round, musical voice of the Audiophone, but prefer a cabinet design, we have brought out this splendid model.

The case is real mahogany. The design is in keeping with the best furnishings. The size, 17x10x10 1/4, is just right for the top of your phonograph or your receiving set. The voice of the Audiophone is

Not a "Phone Unit"

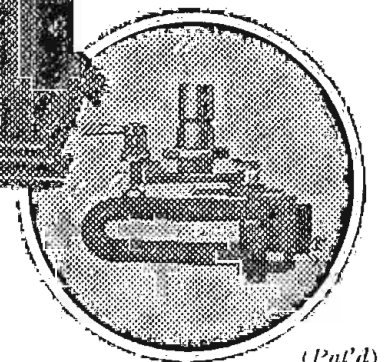
It is a highly developed, electro-magnetic tone mechanism which reproduces with natural quality in most powerful tones, yet has a sensitiveness equal to any loud speaker developed.

The Bristol line includes five Audiophones priced from \$12.50 to \$30.00. If not at your dealer's write for Bulletin AY-3022.

The Bristol Co., Waterbury, Conn.

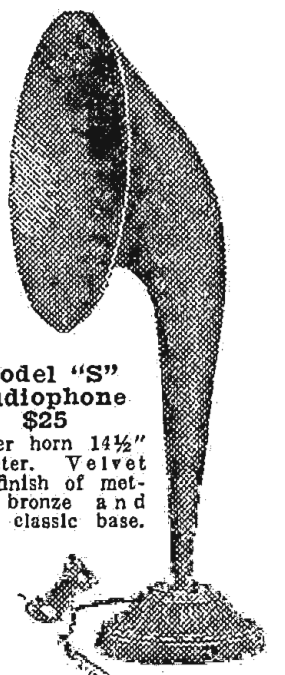
Bristol

AUDIOPHONE LOUD SPEAKER



(Pat'd)

The Voice of the Audiophone



Model "S" Audiophone \$25

Rubber horn 14 1/2" diameter. Velvet mat finish of mottled bronze and gold; classic base.

The "X" Wire: Key to Neutrodyne Success

Overall Neutralization Necessary

By Jacques Fournier

THE hours of work and foot-pounds of energy put into unsuccessful attempts to neutralize 100,000 neutrodynes would probably run even Ford's big plant many days. The directions say "put a small piece of paper on a filament spring in the socket, replace tube and adjust neutrodon on distant station until signals disappear." If only it were that simple! In most cases, the set squealed and distorted on certain dial settings, was weak on some range of wave lengths or

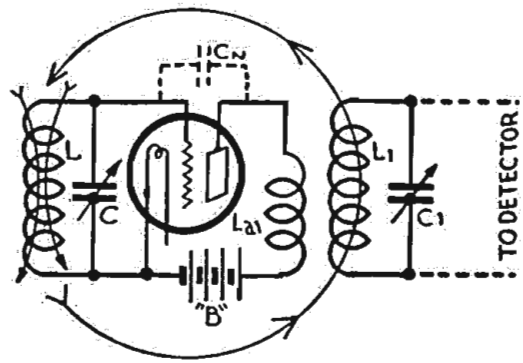


Figure 1

just plain refused to "perc" at all. As a result there are many who condemn what is, when correctly adjusted, an exceptional receiver.

First of all, in the process of straightening out the neutrodynes, let us explode one popular belief. The neutrodons are not put there to neutralize tube capacities—that is not primarily. True, there is a slight feedback through the tube, but its effect toward oscillation does not compare with that from electro-magnetic coupling between neutroformers. Setting these air-core transformers at the well-known 54.7 degree angle, while it reduces this coupling to the lowest possible minimum, does not eliminate it entirely by any means.

Positive Feedback

In figure 1 we have the circuits surrounding the second stage of Radio frequency amplification. Only that portion of the circuit which has influence upon the coupling is shown. What is known

as positive feedback is clearly illustrated. The fields of L-1 and L-2 are quite extensive due to extremely low circuit resistance and the fact that air-core coils several inches in diameter are used. Energy passing through a vacuum tube emerges in a state known as 180 degrees out of phase. By this is meant that on each half cycle or alternation of the current, the voltage rises to maximum strength one half cycle behind the current. When the current is rising to a peak on what might be called a plus alternation, the voltage is rising to a negative peak, which peak really belongs with the preceding alternation of the current that was, of course, a negative one. Therefore at any given instant, when signals are passing through, the energy in L will be in phase while that in L-1 will be 180 degrees out of phase.

By connecting a neutrodon from a tap on L-1 to the grid of the tube, advantage is taken of this fact and voltages are made to oppose each other. This neutralizes the magnetic feedback between transformers and the minute feedback through the tube itself. The current rises to similar peaks in two adjoining grid circuits at the same time while in one the voltage is rising to a plus peak in phase and in the other it is rising to a negative peak out of phase. This may seem a little difficult to visualize but a fuller explanation is not essential to the practical application of this article. Many wish to know why the tap is taken off the coil instead of connecting from grid to grid. One of our opposing circuits would be composed of the condenser Cn (tube capacity) and the coil L, while the other would be composed of the coil L-1 and the neutrodon. Since L and L-1 are equal, our neutrodon would have to be so small that it would be difficult of construction and operation. By tapping L-1 at a point about 12 turns from the lower end, a larger capacity can be used, yet the opposing voltages will be equal.

Capacity in Wiring

Full understanding of the above is necessary to appreciation of the functions of

the "X" wire and the third neutrodon. The individual tube neutrodons offset the tendencies to oscillate between the input and output of each tube but there is yet another factor to be reckoned with. No matter how carefully a set is wired and the neutroformers adjusted to their theoretically correct angle, there will be capacitive coupling between the wiring in the grid circuit of the first tube and that of the third or detector tube; also between the coil L-0 and coil L-1 (see

them back in phase and they would be found this way in coil L-1. Passing energy back to coil L-0 in this condition would aid undesirable regeneration; the direction of current flow, taken at any given instant, must be reversed. Therefore, the neutrodon X is connected to the end of the primary corresponding to the B lead of the other neutroformers while the P end of this primary is connected to the F end of L-0, the ground and the negative A battery wire. This changes our

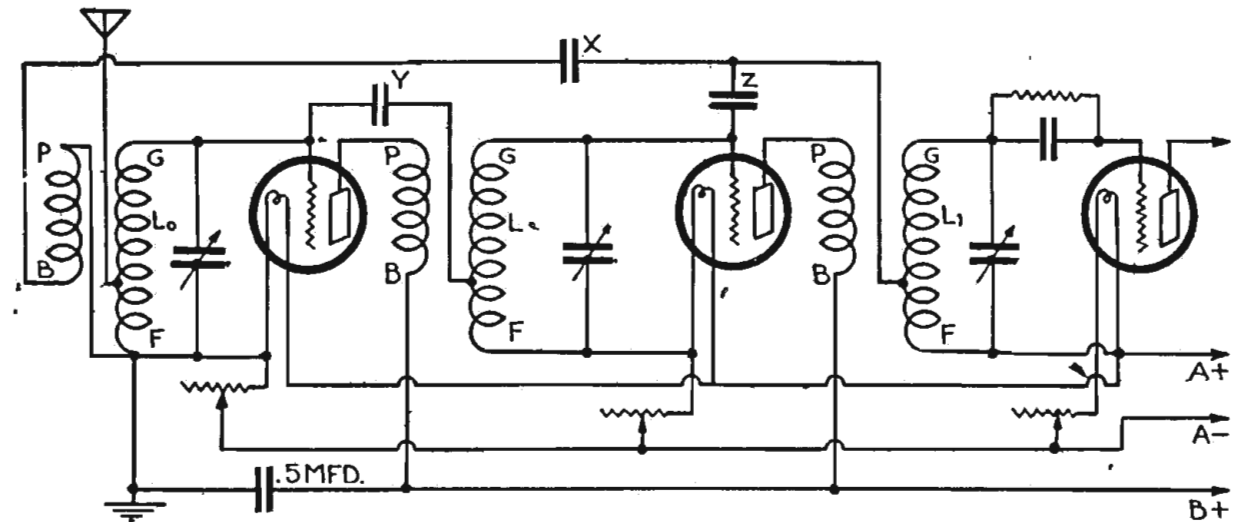


Figure 2

figure 2). None will be effective between the inputs and outputs of the tubes once neutrodons Y and Z have been adjusted, but the coupling between input and output of the entire amplifier unit will still exist.

Consider now the action of neutrodon X. If this were connected to the grid of the first tube or to the tap on L-0, we would be aiding the regeneration which produces distortion or squeals. Our first tube would throw voltage and current out of phase, in which condition they enter coil L; the second tube would throw

intentional feedback which now has the effect of offsetting coupling between L-0 and L-1.

Applying Overall Neutralization

In many outfits it will be found that there is no primary inside the coil L-0 and the experimenter will wonder how to apply this overall neutralization. Five turns of number 20 to 26 dcc. wire should be wound on coil L-0 at the F end, spaced about 1/8-inch and in the same direction as the turns on L-0. This new winding is now connected as shown in

(Continued on page 20)

For the Radio Fan's Christmas

The ekko Broadcasting Station Stamp Album

Here's just the gift for the radio fan—an Ekko Broadcasting Station Stamp Album. Because it affords a convenient, permanent and authentic means of recording the stations received over a set, the Ekko Stamp collecting hobby has swept the radio public.

The Ekko Album contains spaces for a beautifully engraved stamp from each of more than 550 stations. These Ekko stamps prove your reception of a station. With the album are furnished PROOF OF RECEPTION CARDS. You state on these cards facts which prove to the station that you have heard their broadcasting. You then send the card, together with ten cents to cover the cost of verification, to the station. In return the station sends you its Ekko stamp as verified evidence of reception. You then paste the stamp in the space provided for it in the album. From the Ekko Album you can tell and prove at a glance what stations you have heard.

The stamps are beautifully engraved in different colors. Each station has its own stamp showing call letters. The album is 9 1/2 x 11 inches, handsomely bound in a two color cover. It contains 96 pages with spaces for stamps of all recognized stations in the U.S. and Canada, arranged alphabetically by states and call letters. Contains also a convenient log and an alphabetical list of official names and other interesting features of call stations.

For more information see your dealer today. Then give an Ekko Album to your radio friends, and start yourself this fascinating game of station stamp collecting. If your dealer cannot supply you, sent direct on receipt of price. Money back if not satisfied.

Most of the important broadcasting stations now furnish Ekko stamps on proof of reception.

At leading radio dealers and book stores

Price **\$1.75** In Canada \$2.50

THE EKKO COMPANY, 111 W. Monroe Street, Chicago

EISEMANN

ELECTRICAL EQUIPMENT

Whistles and Squeals Eliminated

TYPE 6-D is a non-oscillating receiver and does not create a neighborhood disturbance. Distant stations are "tuned in" easily, quietly and without objectionable tube noises.

Price \$125.00 without accessories

EISEMANN MAGNETO CORPORATION
165 Broadway, New York

DETROIT SAN FRANCISCO CHICAGO



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

Table listing radio stations and their broadcast schedules for Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday, and Friday. Columns include Station and City, Met., and broadcast times for each day.

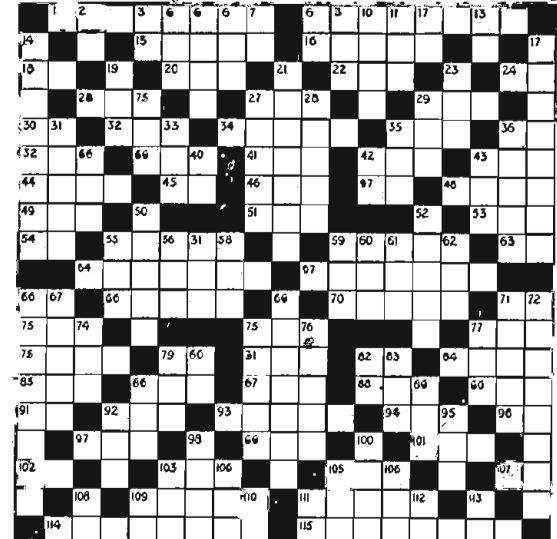
Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. This table includes only the evening broadcasts,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

STATIONS IN ORDER OF WAVE LENGTHS USED. Table listing station call letters and their corresponding meter frequencies.

ALL-AMERICAN ONE TUBE REFLEX ALL-AMAX JUNIOR. Includes an illustration of a Native American figure and a radio set. Text describes the product as semi-finished complete for \$22.00.

ALL-AMAX MAKES A MERRY CHRISTMAS WIRE IT YOURSELF. 1 SINGLE-DIAL CONTROL—A child can tune it. 2 SELECTIVITY—Provided by Universal Coupler... 4 VOLUME WITH TONE QUALITY—Reflex sets operate most efficiently... 5 ECONOMY—One dry cell tube used.

Enter the DAY-FAN National Cross Word Puzzle Contest



You can win a splendid prize

You can have fun winning it

HERE is a real opportunity. Even if you have never before worked out a cross word puzzle you can win a fine prize in our big contest. This contest is creating a tremendous amount of interest.

Your dealer will give you complete information. The contest closes January 1st but you still have time to win a prize.

See your dealer The Dayton Fan and Motor Co. Dayton, Ohio. Day-Fan RADIO. Includes the company logo.

EAR OUT, WELCOME NEW YEAR IN



Louise Smith is one of the young performers who is heard regularly at WOAW, Omaha. Her readings are a part of the dramatic hour given at 6 p. m., Mondays.

These two pretty girls are sisters. Kathryn Kirk (left) will play the cello and saxophone and Jessie Mae Kirk (above), the piano, at WBB, Kansas City, Monday, December 29.

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 27:** 6, WDAF; 6:15, WBZ; 6:30, WFAF; 7, KFI, WFI, WIP; 7:15, WRC; 7:30, WDAW, WOC; 8, WCCO, WOR; 8:20, WBBR; 8:30, KHJ; 8:40, WMAQ; 8:45, KFI, WOR; 9:05, KYW; 9:15, WFI; 9:30, KFSG; 9:45, KFI, KHJ.
- Sunday, December 28:** 8:25, WBBR; 8:45, KFI; 9, WJY.
- Monday, December 29:** 6, WCCO, WDAF, WOAW; 6:10, WHN; 6:15, WBZ, WGY; 6:30, WBZ; 6:45, WCAE; 7, KFI, WCAU, WBB, WHN, WNYC; 7:20, WBBR, WOC; 7:30, KSAC; 8, WAAM, WCCO, WDAF, WJZ, WMAQ; 8:20, WMAQ; 8:30, KFGZ; 8:50, WMAQ; 9, WFAF; 9:15, KFGZ; 10, KGO; 11, KPO.
- Tuesday, December 30:** 6, WDAF, WBBJ, WHN, WJZ, WOAW; 6:10, WHN; 6:15, WBZ; 6:45, WGY; 6:50, WDAW; 7:15, WRC; 7:30, KSAC, KYW; 8, WJY, WRC; 8:20, KYW; 8:30, KHJ, WGBS; 9, WJY; 9:30, KHJ, WGBS, WIP; 10, KGW.
- Wednesday, December 31:** 6, WCCO; WDAF, WGBS; 6:15, WBZ; 6:30, WCAU, WMAQ; 6:55, WHN; 7, KFI, WAAM, WDAW; 7:30, KSAC, WCAU, WNYC; 8, WMAQ, WOS; 8:30, KHJ, WOR; 9, WFAF; 9:05, KYW; 10, KPO; 11, KFI.
- Thursday, January 1:** 6, WDAF; 6:10, WHN; 6:45, WGY; 7, WGBS, WRC; 7:15, WCAO; 7:30, WCCO, WRC; 8, KYW; 8:10, WBBR; 10, WLW.
- Friday, January 2:** 6, WDAF; WEBJ; 6:15, WBZ; 6:30, KGO, WBZ; 6:35, WNYC; 6:45, WGY; 7, KFI, WAAM; 7:15, WJY; 7:20, WOC; 7:30, WEBJ, WJZ; 7:45, WEEI; 8, KYW, WJY, WMAQ; 8:30, KHJ, WCAU, WMAQ; 9, WMAQ; 9:10, WHN; 9:30, KFGZ, KFSG; 9:55, KFGZ; 10, KGW; 11:15, KFSG.

Friday, January 2

- Friday, silent night for: CHNC, CKAC, KFKX, KJS, KPO, WBBR, WCCO, WQBY, WEAQ, WHAZ, WKAQ, WRC.
- KOKA, E. Pittsburgh, Pa. (Eastern, 326), 7 a. m.,** morning exercises, O. Shannon; 8, morning exercises, O. Shannon; 12:30 p. m., Sunday school lesson; 6:15, concert, Hotel Schenley Meyer Davis orchestra, Lon Chassy, director; 7:30, children's period; 8:15, program, University of Pittsburgh studio; 8:30, concert, KFAE, Pullman, Wash. (Pacific, 330), 7:30-9 p. m., Marian Zimmerman, pianist; William P. Hanson, cornetist; Ivar Melander, pianist; "Essentials of Successful Farm Management," Prof. George Severance; "Present Tendencies in Automobile Design," Prof. A. C. Abell; "Success or Failure with Bees," B. A. Slocum; book reviews, Alice L. Webb.
- KFGZ, Berrien Springs, Mich. (Central, 286), 7 p. m.,** Bible bedtime story; 9-9:15, Radio Lightness choir; 9:15-9:30, Mrs. Mable C. Butterfield, soprano, negro spirituals; 9:30-9:45, "The Christian's New Year," O. Dunn; 9:45-9:55, H. E. Edwards, baritone; E. Hurd, tenor; 9:55-10:10, "New Years in South Africa," Herbert Sparrow.
- KFI, Los Angeles, Calif. (Pacific, 469), 5-5:30 p. m.,** Evening Herald, table talk, news; 5:30-6, Examiner musical half-hour; 6:45-8, Aeolian residence pipe organ recital, Dan McFarland; 8-9, Evening Herald, dance orchestra; 9-10, Examiner, dance orchestra; 10-11, Ladonia Naylor, pianist with assisting artists.
- KFNF, Shenandoah, Ia. (Central, 266), 7:30 p. m.,** concert, Smith-Belding Harmony orchestra.
- KFOA, Seattle, Wash. (Pacific, 455), 12:30-1:30 p. m.,** luncheon program; 6-6:30, concert, Seattle Post-Intelligencer; 6:45, program; 8:30-10, Seattle Times concert.
- KFOX, Seattle, Wash. (Pacific, 238), 7:15-7:45 p. m.,** Aunt Vivien's bedtime story; 8-9, Earl Gray and his orchestra; 9-10, concert; 10-11, Earl Gray and his Butler hotel orchestra.
- KFSG, Los Angeles, Calif. (Pacific, 278), 10:30-11:30 a. m.,** sunshine hour; 3:30-4:30 p. m., organ recital, Roy Reid Brignall and assisting artists; 7:30-9:15, "Crusaders" meeting, testimonials and sermon; 9:15-10, Judge C. S. Hardy, talk to young people; N. E. Brown on technical radio subjects; 10-11, organ recital, Roy Reid Brignall.
- KGO, Oakland, Calif. (Pacific, 312), 3 p. m.,** studio musical program; 4-5:30, concert orchestra, Hotel St. Francis; 5:30-6, the girls' half hour, Esther Wood Schneider.
- KGW, Portland, Ore. (Pacific, 492), 12:30 p. m.,** concert, Original Serenaders of Winter Garden; 5, children's program, story, Aunt Nell; 8, popular lecture, University of Oregon extension service; 10:30, Hoot Owls.
- KHJ, Los Angeles, Calif. (Pacific, 395), 12:30 p. m.,** program of news and music; 2:30, Edward Murphy, reader; 6-6:30, Art Hickman's concert orchestra, Edward Fitzpatrick, director; 6:30-7:30, stories American history, Prof. Walter Sylvester Hertzog; Richard Headrick, screen star, Uncle John; 8-10, Carrie Jacobs Bond program; 10-11, Earl Burnett's Biltmore hotel dance orchestra.
- KNX, Hollywood, Calif. (Pacific, 337), 8 a. m.,** morning prayer; 9, Town crier, news; 9:30, Estelle Lawton Lindsey, personal problems; 2 p. m., literary talk, R. D. McLean; 6:30-7:30, dinner hour, Nicholls Grain Milling company; 8-10, feature program; 10-11, amateur hour; 11-12, Abe Lyman's Coconut Grove dance orchestra.
- KOB, State College, N. M. (Mountain, 360), 7:30-8:30 p. m.,** vocal solos and duets, Aida and Lelette O'Hara.
- KPO, San Francisco, Calif. (Pacific, 423), 12:45 p. m.,** Commonwealth club luncheon talks; 1-2, Rudy Selger's Fairmont hotel orchestra; 4:30-5:30, Rudy Selger's Fairmont hotel orchestra; 5:30-6:30, children's hour stories, Big Brother; 7-7:30, Rudy Selger's Fairmont Hotel orchestra; 8-9, Theodore J. Irwin, organist; 9-10, program, Annae K. Blotcky, Director; 10-11, E. Max Bradfield's Versatile band.
- KYW, Chicago, Ill. (Central, 536), 2:35-4:30 p. m.,** New Year's day frolic; 8-8:20, twenty minutes of good reading, Rev. C. J. Perrin; 8:20-9:20, musical program; 10-2:30 a. m., evening at home program.
- WBBR, New York, N. Y. (Eastern, 273), 8 p. m.,** Watchtower orchestra; 8:20, oriental music, Toufic Moubaidi, Elizabeth Award; 8:30, tenor duets, Fred Frazz, Fred Twarosch; 8:40, oriental music; 8:55, tenor solos, Fred Frazz, Fred Twarosch; 9:10, "The Dawn of a New Day," Judge Rutherford; 9:50, Watchtower orchestra.
- WBZ, Springfield, Mass. (Eastern, 337), 6-7 p. m.,** concert; 7:10, kiddies' bedtime stories; 7:15-7:30, lecture, address; 8:30-10:30, concert.
- WCAE, Pittsburgh, Pa. (Eastern, 462), 9:30 a. m.,** religious service; 3 p. m., special New Year's concert; 8:30, dinner concert, William Penn hotel; 8:30, New Year's concert.
- WCAL, Northfield, Minn. (Central, 360), 9 p. m.,** New Year's program.
- WCBD, Zion, Ill. (Central, 345), 8 p. m.,** Fred Faassen, organist; Grace Winkle, contralto; Ralph Reed, baritone; Gerald Mason, cornetist; Mrs. Cassie Bedore, reader; Beulah Myhre, pianist; G. R. Sparrow, tenor; Mrs. G. R. Sparrow, contralto.
- WCCO, Minneapolis-St. Paul, Minn. (Central, 417), 4 p. m.,** magazine hour, "Happy New Year"; 5:30, children's hour; 8, dinner concert, Minneapolis Athletic club, C. Eddy Fortler, leader; 7:30, New Year's message to business women, Mame Stevens.
- WCX, Detroit, Mich. (Eastern, 513), 4:15 p. m.,** music; 6, dinner concert, Book-Cadillac hotel; 7, musical program.
- WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m.,** the Star's string trio; 6-7, school of the air, piano tuning-in number on the Duo-Art; Cecile Burton, reader; the Tell-Me-a-Story Lady; music, Hotel Muehlebach Trilon ensemble; 11:45-1 a. m., nighthawk frolic, the "Merry Old Chief" and the Plantation players.
- WOAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m.,** daily almanac; 12:02 p. m., Stanley theater organ recital; Arcadia cafe concert orchestra; 2, Arcadia cafe concert orchestra; "Care of Children," Mrs. Louis Love; 4:30, Marcella North, pianist; 7:30, Dream Daddy's bedtime stories.
- WDBY, Chicago, Ill. (Central, 258), 7 p. m.,** George S. Schuler, director; Carmen Smith, soprano; Francis Fredericks, Caroline Cedar, Violet Flodin, Ralph Briggs, baritone; Carl Blackmore, pianist.
- WEAF, New York, N. Y. (Eastern, 492), 6-7 p. m.,** dinner music, instrumental quartet; 7:30-8, Rev. Hans Dresel, string quartet; 9-9:45, music, lobby of Hotel Waldorf-Astoria; 11-12, Vincent Lopez and his Hotel Pennsylvania orchestra.
- WEAO, Columbus, Ohio (Eastern, 294), 8 p. m.,** chimes concert, Prof. A. P. McManis; 8:15 p. m., short story, read by Sada Harbarger, department of English, Ohio State university; 8:25, program arranged by Raymond Gawler, violinist; quartet, Gawler, violin; Clarence Snyder, cello; C. N. Fox, flute; Mildred Davis, piano; Radio talk, "Wave Lengths and Kilocycles," A. M. Rose.

(Continued on page 14)

WDAF;
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WDAF;
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1), 11:45 a. m.,
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Mrs. Carrie B.
ime stories; 8,
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32), 6-7 p. m.,
5, story telling,
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olin and piano;
Coffee orchestra;
Red Barr, piano
e orchestra.
1, 7-7:15 p. m.,
3, DeDroit's or-
8-8:15, Sara V.
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30 p. m., Dok-
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l his orchestra;
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12:30-1 p. m.,
8:30-9:30, Mrs.
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accompanist.
1 p. m., Meyer
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3-3:15 p. m.,
ertrude Tucker;
6-6:30, Uncle
1 Say She Is"
p. m., luncheon
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for the children,
Healy; 6:30-7,
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30-4:30 p. m.,
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ts; 9-10, Astor
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Lyric quartet;
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180), 2 p. m.,
5, health talk;
rs; 10:30, joint
wood L. Clark,
), 4-5 p. m.,
7:30-9, concert,
1), 2-3 p. m.,
trio; 7-8, varied

6:30-7 p. m.,
chestra; 7-7:30,
th Eddie Ekins
Bulletin current
Crystal Palace
me, Belle; 10:10-
10:30, "Storage Bat-
10-11, Roseland dance or-
Roth and Al Wilson, songs;

12-12:30 a. m., Ted Lewis and his Symphonic Clowns
with the Revue "Intime."
WHO, Des Moines, Ia. (Central, 526), 7:30-9 p. m.,
Garber quartet and entertainers; Alma Garber Bridges,
soprano; Ruth Garber, contralto; Paul Garber, tenor;
Leon Garber, bass; Neil Garber, banjo soloist; M. P.
Garber, tenor; L. T. Bridges, baritone soloist.
WIP, Philadelphia, Pa. (Eastern, 509), 1 p. m., Gimbel
tea room orchestra, Ray Sten, director; 3, recital,
students Frank Oglesby studios; Lois Kershaw, soprano;
8:15, Harvey Marburger and his vaudeville orchestra.
WJIO, Mooseheart, Ill. (Central, 278), 3:30-4:30 p. m.,
music, Mooseheart children; 6:30-7:15, Albert F.
Brown, organist; 7:15-8:15, solos, Mooseheart children;
Mooseheart Novelty orchestra; talk, M. P. Adams;
11:30-12:30, request program, Albert F. Brown, or-
ganist.

WJY, New York, N. Y. (Eastern, 405), 8:15-9 p. m.,
"State Legislative Review," Julius S. Berg; 9-9:30,
"International Book Review," Dr. Clifford Smyth.
10-11, Ace Brigade and his 14 Virginians direct from
Club Monte Carlo.
WJZ, New York, N. Y. (Eastern, 455), 4-4:30 p. m.,
Olga Erlka, soprano; 7-8, Erdody's Park Lane hotel
orchestra; 8:30-8:45, Loosleaf Current topics; 9:30-10,
Sandu Abu, violinist.
WLS, Chicago, Ill. (Central, 345), 12 m., Robinson and
Bernard; 6:30 p. m., Ralph Emerson, organist; 7,
lullaby time; 7:15, Wabash Y. M. C. A. quartet; 7:30,
Isham Jones and his orchestra; 7:45, Wabash Y. M.
C. A. quartet; 9, WLS theater; 9:30, Isham Jones
and his orchestra; 9:45, Robinson and Bernard; 10,
Rudolph Bryant mandolin orchestra; 10:30, Isham
Jones and his orchestra; 10:40, Ford and Glenn.

(Continued on page 14)

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4 p. m., magazine hour, "Happy New Year," 5:30,
children's hour; 6, dinner concert, Minneapolis Athletic
club, C. Eddy Fortler, leader; 7:30, New Year's mes-
sage to business women, Mame Stevens.
WCX, Detroit, Mich. (Eastern, 513), 4:15 p. m.,
music; 6, dinner concert, Book-Cadillac hotel; 7,
musical program.
WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p.
m., the Star's string trio; 6-7, school of the air, piano
tuning-in number on the Duo-Art; Cecile Burton,
reader; the Tell-Me-a-Story Lady; music, Hotel Mueh-
bach Trianon ensemble; 11:45-1 a. m., nighthawk
frolic, the "Merry Old Chief" and the Plantation
players.
WOAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m.,
daily almanac; 12:02 p. m., Stanley theater organ
recital; Arcadia cafe concert orchestra; 2, Arcadia
cafe concert orchestra; "Care of Children," Mrs. Louis
Lover; 4:30, Marcella North, pianist; 7:30, Dream
Daddy's bedtime stories.
WOBY, Chicago, Ill. (Central, 258), 7 p. m., George
S. Schuler, director; Carmen Smith, soprano; Francis
Frederickson, Caroline Cedar, Violet Flodin, Ralph
Briggs, baritone; Carl Blackmore, pianist.
WEAF, New York, N. Y. (Eastern, 492), 6-7 p. m.,
dinner music, instrumental quartet; 7:30-8, Rev. Hans
Dressel, string quartet; 9-9:45, music, lobby of Hotel
Waldorf-Astoria; 11-12, Vincent Lopez and his Hotel
Pennsylvania orchestra.
WEAO, Columbus, Ohio (Eastern, 294), 8 p. m., chimes
concert, Prof. A. P. McManigal; 8:15 p. m., short
story, read by Sada Harbarger, department of English,
Ohio State university; 8:25, program arranged by
Raymond Gawler, violinist; quartet, Gawler, violin;
Clarence Snyder, cello; C. N. Fox, flute; Mildred
Davis, piano; Radio talk, "Wave Lengths and Kilo-
cycles," A. M. Rose.

to be announced.
WMC, Memphis, Tenn. (Central, 501), 12 m., musical
program, from O. K. Houck Piano company; 8 p. m.,
Bedtime story, Uncle Percy; 8:30, classical program.
WOC, Oavenport, Ia. (Central, 484), 12 m., chimes; 7
p. m., sandman's visit; 7:20, Carlisle Evans and his
Colliseum orchestra; 9, Schuster Sisters' California or-
chestra.
WOO, Philadelphia, Pa. (Eastern, 509), 11 a. m., organ
recital, Mary E. Vogt; 12:02 p. m., Wanamaker crystal
tea room orchestra, Robert E. Golden, director; 5:15,
organ recital, Mary E. Vogt.
WOR, Newark, N. J. (Eastern, 405), 7-7:30 a. m.,
WOR morning gym class; 3-3:15 p. m., talk, "The
Ship Model Society," 5:15-6:30, "Radio for the
Layman," Albert E. Sonn; 6:30-7, Tom Cooper's
Country club orchestra; 7:15-7:30, resume of the day's
sports, Jolly Bill Steinke.
WQJ, Chicago, Ill. (Central, 448), 7-8 p. m., dinner
concert, Ralph Williams and his Rainbo Garden or-
chestra; Manuel Rodriguez, Spanish tenor; Lydia
Lochner, contralto; Marion Henry, accompanist; 10-2
a. m., Ralph Williams and his Rainbo Skylarks;
Jerry Sullivan; Harry Gelse; Peggy McClure, "Rainbo
Greetings" company; Rick, Whalen, Garner; Brock
Sisters, harmony singers.
WRC, Washington, D. C. (Eastern, 469), 8:45 p. m.,
children's hour, Peggy Abbon; 7, dinner concert,
Levitow's Hotel Commodore orchestra; 8, talk on
motoring, auspices American Automobile association;
8:15, music; 8:30, talk, auspices of Smithsonian in-
stitute; 9:20, Lee House trio; 10:30, dance program,
Waldorf-Astoria orchestra.
WWJ, Detroit, Mich. (Eastern, 513), 8:30 p. m., Jean
and Themo, song fashions; 10, dance music, Jean
Goldkett's orchestra; 11:30, The Detroit News or-
chestra.

talk, Mrs. Anna J. Peterson; 6:30-7 p. m., children's
bedtime story, Uncle Bob; 7-7:30, dinner concert,
Congress hotel; 9-10, midnight revue; 10-2:30 a. m.,
midnight revue, Coon-Sanders Original nighthawks;
W. Remington Welch, organist.
WAAM, Newark, N. J. (Eastern, 263), 11-11:30 a. m.,
Radio cooking school course, Ada Bessie Swamp; 11:45-
12, Rev. Edmund Hames, John A. Scott; 8-8:15 p. m.,
Ledge Lady Radio Cupid; 8:15-8:30, Ben Friedman,
tenor; 8:30-8:45, Frank Catallo's orchestra; 8:45-9,
dance music; 9:15-9:30, Four Precious Jewels; 9:45-10,
Irving Porter, tenor; 10-11, Little Symphony orchestra
Men's Bible class, direction Fred. G. Smith.
WBAY, Columbus, Ohio (Eastern, 423), 8 p. m., com-
munity concert, artists from South Charleston, Ohio,
directed by W. E. Reveal.
WBZ, Springfield, Mass. (Eastern, 337), 6-7 p. m.,
concert; 7:10, kiddies' bedtime story; 7:15-7:30, lecture,
address; 7:30-8, University Extension course; 10-11:30,
concert; 11:30-12, McEnelly's Singing orchestra.
WCAE, Pittsburgh, Pa. (Eastern, 462), 6:30 p. m.,
dinner concert, William Penn hotel; 7:30, Uncle
Kaybee; 8:30, musical program; 9, B. Fischer & Co.
"Astor Coffee" dance orchestra.
WCAL, Northfield, Minn. (Central, 360), 8:30 p. m.,
book talk, "Mark Twain's Autobiography," Dr. George
Welda Spohn.
WCAU, Philadelphia, Pa. (Eastern, 278), 6 p. m., Meyer
Davis Hotel Pennsylvania dance orchestra; Louis Baer,
director; 7:30, recital.
WCX, Detroit, Mich. (Eastern, 513), 4:15 p. m., music;
6, dinner concert, Book-Cadillac hotel; 8, musical
program; 10, Jean Goldkett's Book-Cadillac hotel or-
chestra.
WOAF, Kansas City, Mo. (Central, 411), 3:30-4:30
p. m., the Star's string trio; 6-7, school of the air,
piano tuning-in number on the Duo-Art; address,

Friday, January 2

(Continued from page 13)

WLW, Cincinnati, Ohio (Central, 423), 12:15 p. m., dance program, House's Brunswick orchestra; 4, recital, pupils Leo Stofren.

WMAQ, Chicago, Ill. (Central, 447.5), 4 p. m., series of talks on English diction, Mrs. J. Elliott Jenkins; 4:30, pupils, Bush conservatory; 5, the lullaby lady, Mrs. Gene Davenport; 6, organ recital, Chicago theater; 6:30, Hotel LaSalle orchestra; 8, weekly Wide-Awake club program, Mrs. Frances M. Ford; 8:30, musical geography; 9, "Lost and Found in Florida," Edward G. Taylor; 9:15, music.

WMC, Memphis, Tenn. (Central, 501), 12 m., musical program, from O. K. Houck Piano company; 8 p. m., bedtime story, Uncle Jerry; 9:30, concert, Britling's Novelty orchestra, Frank Braccante, director; 11, midnight frolic.

WNJ, Newark, N. J. (Eastern, 233), 10:30-12:30 a. m., Frank Dally and his Meadow Brook dance orchestra.

WNYC, New York, N. Y. (Eastern, 526), 7:30-7:35 p. m., police alarms; 7:35-8, resume, meeting of board of estimate, Peter J. McGowan, secretary; 8:30-10, studio program; 10:30-10:35, police alarms; 10:35-12, Ben Bernie's Hotel Roosevelt orchestra.

WDC, Davenport, Ia. (Central, 484), 7:20 p. m., educational lecture, M. H. Calderwood; 8, "Mississippi Hot Spots" dance orchestra.

WDD, Philadelphia, Pa. (Eastern, 509), 11 a. m., organ recital, Mary E. Vogt; 12:02 p. m., Wanamaker crystal tea room orchestra, Robert E. Golden, director; 5:15, organ recital, Mary E. Vogt; 7:30, A. Candelori and his orchestra from Hotel Adelphi; 8:30, Erno Rapee and his Radio Gang from Fox theater; 9:30, WOO orchestra, Robert E. Golden, director; 10:03, A. Candelori and his dance orchestra; 10:30, Vincent Rizzo and his Hotel Sylvania dance orchestra.

WDR, Newark, N. J. (Eastern, 405), 7-7:30 a. m., WOR morning gym class; 3:15-3:30 p. m., talk, Allan R. Cullimore, director Newark Technical school; 6:15-6:30, Rubenstein trio; 6:30-6:15, man-in-the-moon stories, Wm. F. R. McNeary and Josephine Lawrence, courtesy Newark Sunday Call; 7-7:15, Rubenstein trio; 7:15-7:30, resume of day's sports, Jolly Bill Steinhilke of Newark Morning Ledger.

WJL, Chicago, Ill. (Central, 440), 11-12 m., Fred Mann's Sunday dinner menu, Ted Wilmus; 3-4 p. m., "The Evening After," Dorothy McLain, Dickens; "A Trip to the Mardi Gras at New Orleans," Mrs. Harry T. Sanger; 7-8, dinner concert, Ralph Williams and his Rainbo Skylarks; the Rogers boys, Larry and Billy; Nubs Allen, contralto; James J. Whalen, tenor; West Brothers; Monogram trio.

WRC, Washington, D. C. (Eastern, 469), 4 p. m., fashion developments of the moment, Eleanor Gunn; 4:10, Eleanor Glynn, pianist; 4:20, "Beauty and Personality," Elsie Pierre; 4:30, tea music, Meyer Davis' New Willard hotel trio; 6, children's hour, Peggy Albion.

WVJ, Detroit, Mich. (Eastern, 513), 3 p. m., the Detroit News orchestra; 8:30, the Detroit News orchestra; Anne Campbell, News poet; Claudine Secor, soprano; Francis Firth, baritone.

Additional Programs

(Received too late for Classification)

Saturday, December 27

WEBH, Chicago, Ill. (Central, 370), 7 p. m., Edgewater Beach Orlole orchestra; Radio Sunday School lesson; musical bits, Riviera theater; 9-10, Langdon brothers, guitarists; Orlole orchestra; Marie Kelly, reader; 11-12, Orlole orchestra; Cambridge Sisters; Langdon brothers; Banks Kennedy, pianist; Wayne Meyers; Loos Brothers.

Sunday, December 28

WEBH, Chicago, Ill. (Central, 370), 5-6 p. m., twilight musicale; 7-9, artists program.

TABLE FOR MAKING TIME TRANSITIONS

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|------------------------|----|----|----|---|---|---|---|---|---|----|----|----|
| 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.

WSB, Atlanta, Ga. (Central, 429), 11 a. m., First Presbyterian church services; 5-6 p. m., sacred program, Ed and Grae McConnell; 7:30, Wesley Memorial church service.

Monday, December 29

WSB, Atlanta, Ga. (Central, 429), 12 m., Britlings orchestra; 5-6 p. m., bedtime story, Bonnie Barnhardt; 8-9, Vick Myers Melody orchestra; 10:45, Pilgrim quartet.

Tuesday, December 30

WEBH, Chicago, Ill. (Central, 370), 7 p. m., Orlole orchestra; 8, musical bits, Riviera theater; 9, Radio Age program; Dennis Sisters; Dean Emick, pianist; Orlole orchestra; 11-12, Loos Brothers; Riviera revue; Orlole orchestra.

WSB, Atlanta, Ga. (Central, 429), 12 m., entertainment; 5-6 p. m., bedtime story, Bonnie Barnhardt; 8-9, variety program, Mrs. J. T. Dellesseine, director; 10:45, Peerless Entertainers dance orchestra.

Wednesday, December 31

WEBH, Chicago, Ill. (Central, 370), 7 p. m., Orlole orchestra; Riviera theater; Dean Remick, pianist; 9, Langdon brothers, guitarists; Marie Kelly, reader; Frederick Agard, tenor; Bob Cougle, accompanist; Orlole orchestra; 11-12, Langdon brothers, guitarists; Marie Kelly, reader; Edna Solomon, contralto; Orlole orchestra.

WSB, Atlanta, Ga. (Central, 429), 12 m., Britlings orchestra; 5-6 p. m., bedtime story, Bonnie Barnhardt; 10:45, New Years Eve Skylark.

Thursday, January 1

WEBH, Chicago, Ill. (Central, 370), 7 p. m., Orlole orchestra; Dean Remick, pianist; Guy L. Hayne, baritone; John Stamford, tenor; 9-10, golf lesson, Amber Andrews; Belle Forbes Cutter, soprano; John Stamford, tenor; Orlole orchestra; 11-12, Harry Davis, baritone; Loos Brothers; Banks Kennedy, pianist; John Stamford, tenor; late revue.

WSB, Atlanta, Ga. (Central, 429), 12 m., entertainment; 5-6 p. m., bedtime story, Bonnie Barnhardt; 8-9, New Years day program; 10:45, program.

Friday, January 2

WEBH, Chicago, Ill. (Central, 370), 7 p. m., Adrienne De Vere, soprano; Harry Walker, baritone; Orlole orchestra; musical bits, Riviera; 9-10, Orlole orchestra; Frederick Agard, tenor; Rita McFawn, soprano; 11-12, Orlole orchestra; Three Musketeers; Sandy Meek, tenor.

WDS, Jefferson City, Mo. (Central, 441), 8 p. m., address, member of the Missouri State Board of Agriculture; 8:15, musical program, Jameson Conservatory of Music, William Woods college.

WSB, Atlanta, Ga. (Central, 429), 12 m., entertainment; 5-6 p. m., bedtime story, Bonnie Barnhardt; 8-9, "The Honey Moon Couple," Dr. and Mrs. Tom Fowler; 10:45, Landers Brothers quartet.

300 Voices on Air at WHN in Sacred Music Concert

NEW YORK.—A concert of sacred music given by the 300 singers and soloists comprising the Oratorio society of the New York city Christian Science institute, was recently broadcast by Station WHN.

Fraser Grange, baritone, sang several solos as assisting artist. Other soloists, members of the society included Vida Milholland and Kitty Cheatham, sopranos, Harriet Foster, contralto and J. Steel Jamison, tenor. A number of original sacred choral compositions, specially written for the society were heard for the first time.

Alabama Allows Convicts to Tune in Christmas Day

BIRMINGHAM, ALA.—Christmas, 1924, was one of the most pleasant holidays ever spent by Alabama prisoners in the state penitentiary and state convict camps, state officials say.

Radio sets were placed in all the state prisons and state convict camps throughout the state for the entertainment of the prisoners. These sets were installed just prior to Christmas day.

New Long Distance Crystal Gives Remarkable Results

A recent invention in crystals is amazing. Reflex and Crystal Set owners everywhere. It is stated that this marvelous Crystal Detector gets distant stations loud and clear and there is no disagreeable "hunting" for spots because the entire surface is sensitive. Many are finding it far superior for Reflex work and claim it the last word in mounted synthetic crystals.

A Trial Costs You Nothing

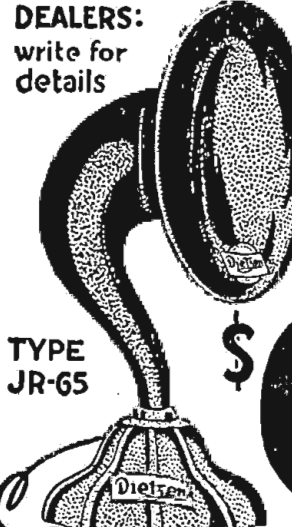
In order to introduce his invention, the owner, Mr. Hick, offers you two \$1.00 Crystal Detectors for the price of one. Sell one, and put the other on your own set without cost to you. Just send name and address to Mr. Hick, Dept. 5, 1018 So. Wabash Ave., Chicago. Pay Postman \$1.00 (plus postage). Unless you are absolutely satisfied write Mr. Hick and money will be cheerfully refunded.

DIETZEN Adjustable LOUD SPEAKER

At the Price of an Ordinary Pair of Head Phones

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SPECIFICATIONS: Diameter of Horn - 9 INCHES Height 17 INCHES



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Full Size Drilling Templates - Loop Aerial Construction

ANYONE who has built a crystal set or single-tuber can follow Mr. Ryan's concise, simply worded instructions and enjoy the range available only from a super-heterodyne. Every wire, every lug, is placed by his directions and you cannot go wrong.

The construction of loop aerials, storage "B" batteries, a charger and even the cabinet are gone into thoroughly. This manual covers the complete installation of a selective, quiet, long range Radio outfit. Send money order, stamps or currency to

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Some designed to operate for wave-length between 125 and 500 Meters.

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P 302

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Some designed to operate for wave-length between 125 and 500 Meters.

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Highland Park, Illinois

Construction of the Six Tube Het-Duo-Gen

Part I—Explanation of the Circuits

By C. E. Brush

THIS circuit is the utilization of the principles presented by different writers in recent issues of Radio Digest. William W. Harper explained principles of regeneration and pointed out how selectivity was gained through its application. John G. Ryan presented an excellent method of utilizing regeneration to sharpen the tuning of a loop antenna, i.e., the split inductance and feedback control condenser.

In heterodyning, we have the greatest aid to selectivity known at this time, the super-heterodyne knows no superior for the separation of broadcasters in Chicago and New York. The only objection to the "super" is the number of tubes used to bring up signal strength for its application to the second detector and the necessity of cutting down on the number of audio frequency stages for economy's sake. If the heterodyne could be kept, a more economical means of increasing weak signals found, and three audio stages used, Radio would have the well-high perfect set.

The writer believes that, in the set to be described, such a receiver has been found. The circuit and constants used were not found by chance; they are the result of hours of study of circuits, building of coils and construction of sets. The idea started with the elimination of one stage of intermediate amplification from a standard super-heterodyne, then two stages and, finally, all three. Naturally, something had to be inserted to make up in sensitivity for the tubes removed, so regeneration was added to the secondary of the coupler by the method usually used on loop aerials.

Then the question naturally occurred, "Why heterodyne to several thousand meters? Why not to a wave length just above broadcasting?" So a new filter was made, redesigned and rebuilt until the tenth one was found to be right. Since all signals were now reaching the second tube on one wave length, and adjustment of regeneration for each new station tuned would not be necessary, it was decided to add regeneration to the "second detector" also.

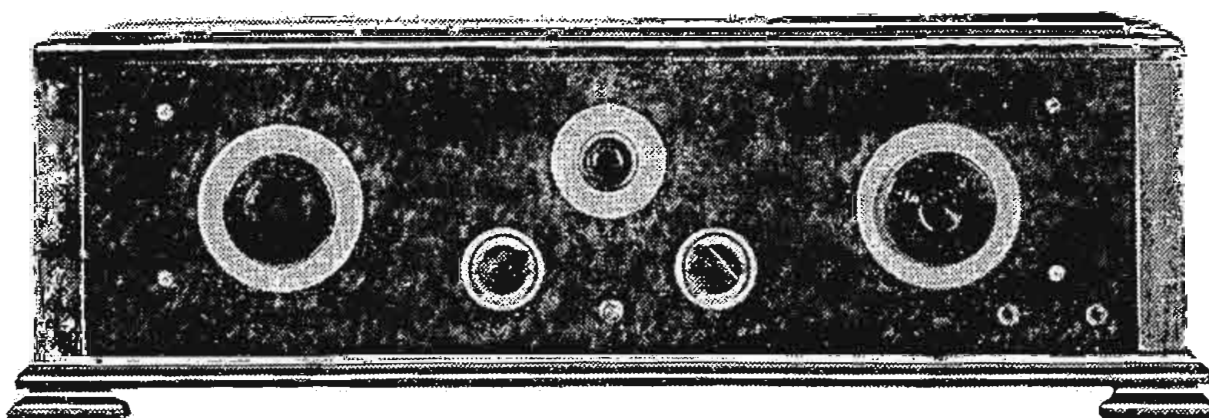


Figure 1

This made necessary the designing of special semi-variable condensers for control of this regeneration, which will be described in detail later. In building this set, the reader can feel assured that everything has been worked out to the smallest detail and that if directions are followed carefully he will have a receiver on which no further experimenting is necessary.

Het-duo-gen, as the name implies, is a circuit combining heterodyne with regeneration, not only on one tube but on two tubes; hence, duo-gen. The cost of making such a set is low, as only one large condenser is used and the inductances must be made by the builder of the set. The three audio stages are there, too, and the faintest whisper that reaches the antenna is amplified to a strength that makes every station a local.

The Mixer Tube

To explain the use of every part we must refer to figure 2. An outdoor or indoor antenna and a good ground are used and connected to the aperiodic primary L-1. This primary is loosely coupled to its secondary L-2 which is tuned by variable condenser C-1. A center tap is taken from L-2 to be connected to the filament circuit while the end of the inductance ordinarily connected to filament is connected to condenser C-2 which, in this case, is a feedback control.

At the grid end of the inductance L-2, a pick-up coil L-3 is inserted which is, in turn, coupled to an oscillator circuit, L-4, L-5. Condenser C-2 can be adjusted to the point where regeneration reduces the resistance of circuit L-2, C-1 to almost zero and the sensitivity and selectivity of that circuit increased 100 per cent.

For the benefit of those readers who have not as yet taken up the super-heterodyne, a short explanation of the word "heterodyne" and the action of tube "U" may be in order. The incoming signals are electrical energy changing its direction of motion millions of times a second, the number of times being called the frequency. In tube V we create more energy changing its direction of travel at any frequency we desire and controlled by condenser C-3.

If these two energies are led to one circuit and mixed in a vacuum tube, the resulting energy which can be taken out has an entirely new frequency equal to the difference between the frequencies of our two original sources of energy. Tube "U" is the one used for this purpose and, while called the first detector, it does not rectify or detect in the usual sense of the word. It should more properly be called the "mixer" tube, or "heterodyne mixer"

just as we call the oscillator, the "heterodyne oscillator."

The Oscillator

The oscillator circuit is very unusual; it covers a wave length range of but 136 meters, yet the receiver as a whole covers the range 200 to 550 meters. To see how this is done, it first must be explained that signals are not heterodyned to any such wave lengths as 3,000 to 10,000 meters; they are raised to one just above broadcasting, let us say, 600 meters. A 200-meter signal has a frequency of 1,500,000 while 600 meters is equivalent to 500,000 cycles. We can set our heterodyne at this end to 2,000,000 cycles or 150 meters. At the other end of the scale we find that 550 meters equals 545,545 cycles, so our oscillator, to be 500,000 cycles different, can be 1,045,545 or 286 meters. Hence the range is but 136 meters.

New? Decidedly!

Having mixed the frequencies and gotten all programs to a wave length of 600 meters in the plate circuit of tube U, we pass them to inductance L-6 which is the primary of a filter coupler whose secondary is L-7. Tube W is the usual detector, or, in the case of a "super," the second detector. At first glance it would appear that these inductances L-6 and L-7 are not tuned and therefore would not filter very much. Inductance L-7, like L-2, is provided with a center tap for filament connection and a feedback control condenser C-4. Here we have a pleasant surprise, because, since all signals come through at 600 meters, our condenser C-4 can be a fixed one and regeneration is kept at maximum on this tube without the need of varying anything.

Double Regeneration Equals R. F.

Detector tube W having rectified programs in the usual way, it is only necessary to pass them into tubes X, Y and Z for amplification at audio frequencies to

(Continued on page 20)

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Radio Digest

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Illustrated

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Going Through Interference

The Most Difficult Trouble Is Being Eliminated

INTERFERENCE, which has kept many potential fans from accepting Radio seriously, is gradually being eliminated. Fans who suffer from local interference have learned how to avoid it by using a selective receiving set, a short aerial instead of a long one, a loop antenna where the design of the receiver will permit, or hooking in a wave trap. Obviously the development of the Radio art, in broadcasting at least, is not solely up to the engineers; it is dependent to a considerable extent on the fans, who must keep posted on developments and make their sets as selective as possible.

There is no simple cure-all for interference. Both natural and man-made interference must be coped with and the former is found the more difficult to overcome. There are many sources of interferences, in the reduction of which we are fast approaching the limit attainable. One is atmospheric electrical disturbances, both natural and artificial, which always exist in greater or less intensity and are particularly troublesome in summer. The Radio public is going to have to learn to distinguish between removable interference and inevitable interference. Science will find ways to circumvent these sources of interference which man cannot remove.

The slight electrical discharges always going on in the atmosphere, similar to very tiny lightning discharges, cause a certain background of noise in a Radio receiving set and these discharges may never be prevented any more than variations of weather can be prevented. They are a sort of a natural limit to what a receiving set can do, for if the waves from a distant station are weaker than the average of these atmospheric disturbances, no increase of amplification in the receiving set can bring in the distant station without the interference. This would mean that there are definite limits to the distance satisfactory reception is possible. To increase that distance higher power must be used in the broadcasting stations.

Value of Radio

Rural Field Is a Big One Undeveloped

NOW is the beginning of the time when Radio relieves the monotony of rural life. Statistics at Washington show that there are more than two and a half times as many sets in use on farms in this country as there was a year ago. The survey was made through county agricultural agents. One quarter of our inhabitants are engaged in farming and it appears as if they were now coming into the market for Radio. Perhaps one reason why the farmer has been slow is that he has not known what to buy or how to build his own set.

This phase of the development of Radio has been a puzzle to manufacturers, for if anyone could make practical use of Radio, it is the farmer. It is not only useful for entertainment but for giving information first hand that it is valuable.

To rural dwellers Radio is the greatest invention of all time. It means an end to isolation. The big future of Radio lies in the farm field.

What You Miss

Everything in Modern Life Covered by Broadcasts

NOT until you have listened to the wonderful performance of some great artist, brought to you by Radio in the quiet seclusion of your home without the accompanying noises of public gatherings or of mechanical reproduction, can you realize the great benefit and pleasure to be derived from a Radio set in your home. Those who do not have the opportunity of listening in on Radio programs are getting to be as much out of date as those who do not read the newspapers.

The fascination, the thrill and the mystery of Radio all make a strong appeal to keep abreast of the times, and the pleasure of having a set in your home and of choosing your own type of program and listening to it, away from the crowd, makes Radio well worth while.

RADIO INDI-GEST

Lower Mathematics

Turkey Creek, Wisconsin.

Indi-Gest Editor, Chicago.

Hon. Sir:

Mebby some of the young fellers will think that an old man 70 years old like me ain't got no business experimenting with Radio. But I don't agree with them. The experiment I just finished was very certain in its results to my mind and may save your readers a lot of trouble.

All the time I been wanting to hear them Night Hawks in Kansas City, and I couldn't never get them yet. So I was talking with Jim Hopkins' boy Newt., from over Thompson's Corners, and he said I orter make a loop, which you got to point where the music is coming from. He told me how to make it, and being pretty handy with tools, I got her all hooked up. But the thing I wasn't smart to, was to find out just exactly where Kansas City is from Turkey Creek. Then I went to the railroad agent who has charge of shipping to all parts of the U. S. A., and sometimes to foreign countries, and asked him where to find Kansas City from Turkey Creek. He figured with me and we calculated about south by southwest.

Tuning in again and getting no results, I decided to buy a compass and put on the loop and aim her exactly south by southwest, but nothing come in. Then last night at half past 12 this morning I changed back to the ant-emma and who should come in but them Night Hawks. I guess I been going to bed too early was the trouble.

But about my loop experiment that is conclusive and nobody need go over my ground. My results may be expressed very simply by a formula like this. $1+1=0$. Now I will explain: the first $1=a$ loop and the second $1=a$ peanut tube and $0=$ the results you get.

Respectfully yours,

DAN'L TUCKER.

Sir Static and the Radio

Sir Static is my name,
I rule the ether waves.
The Radio I shame,
And knock the thing to staves.

When program's coming fine,
I rip and snort and tear;
Right there is where I shine,
And cause the Phan to swear.

When Prima Donna sings,
I rip her voice to shreds,
I give her broken wings,
And see she never weds.

When preacher tries to preach,
Disturbance then I raise,
Turn sermon into screech,
Make senseless finest phrase.

All science I defy,
Break into all hook-ups,
From tube to tube I fly,
And make them howling pups.

I spatter, sputter, spit,
I clutter, clatter, clat,
For all big noise I'm it,
For luck I'm blackest cat.
REV. MARCUS L. GRAY.

Mrs. Partington Speaks Out

Dear Indi: Mizz Partington says Radion' ain't been none too good for the past week so far as she is concerned. She says that whilst she was expertin on a new set for a neighbor she blowed eight perfectly new tubes—something al-lus takes the joy out of life—even to Radio.

She heard the "Merry Old Chief" and his Night Hawks celebrating their two-year-old birthday, and she says she don't know whether the Chief is through cutting his teeth or not, but he has sure learned to talk and can put more of it through the microphones in one night than some others could do between anniversaries. His orchestra can sing, dance, jazz, or play music, whichever the applause telegram requests calls for and they seem like a right cheerful

party at their studio.

KDKA put on another pioneer stunt last night, with the entertainers all in costume and seems like they was visible to be seen by any of the public who wanted to take a peek, and she says that if they look as good as they sounded in her speaker horn, why they was worth looking at.

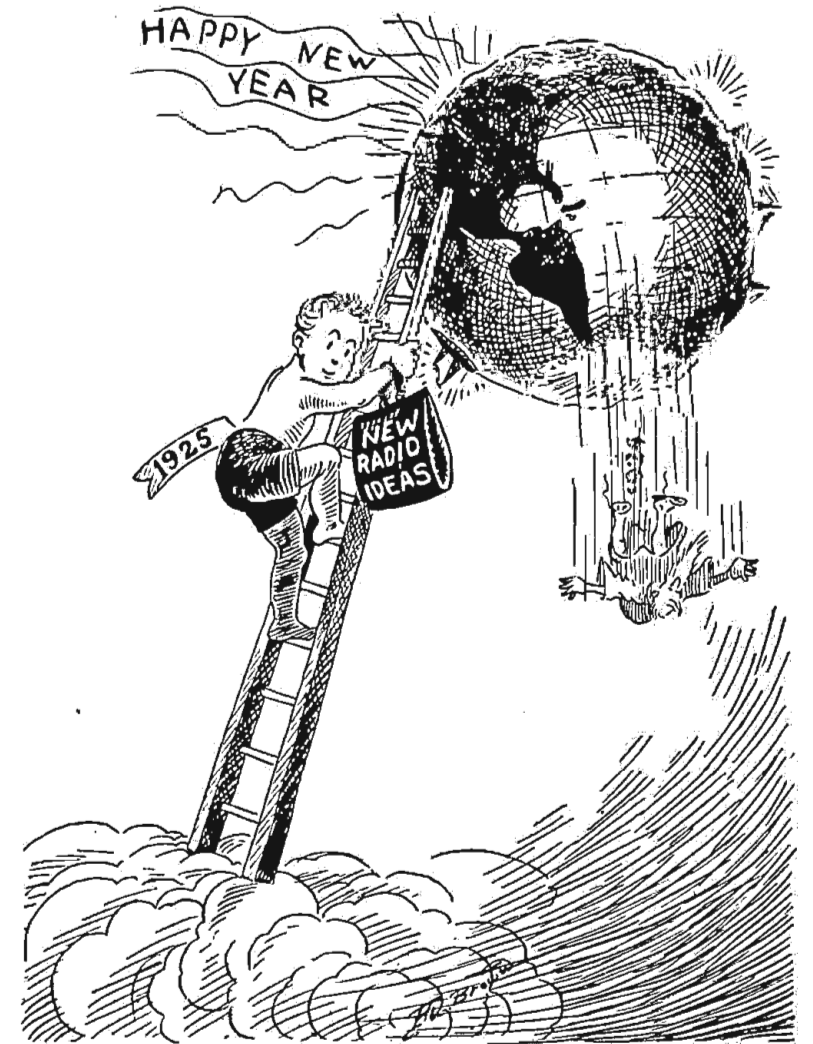
Tonight, she says, she's been listening at a preacher whose text was about his broken leg he's just recovered from, but which is still more interesting than Mrs. Cohens' operation, which she was telling "Abie's Irish Rose" all about. Well, for one thing, she says there is lots in the Bible about broken bones, but not a thing about appendixes.

SIGNING OFF.

Well—Did He Get a Good Ground?

Dear Indi:—The Remington Typewriter band playing at WGY, Schenectady accompanied a church choir singing at Providence, R. I., broadcasting station, according to E. L. Fuller of the latter city. "The band," writes Mr. Fuller, "was playing a medley including 'Massa's in the Cold, Cold Ground,' and the choir was singing the same song at exactly the same time. I made a split on dial settings and could get both. The band kept perfect time for the singing until the last few bars when the band won out." SPIDER WEBB.

The New Arrival



Condensed

By DIELECTRIC

On my first trip to Lansing, Mich., I found a jazz concert going on at a merry rate from the studio of WREO. This is one of the stations that has been on the air only a comparatively short time and yet the announcer hales his unseen audience with the assurance of an old-timer. We shall see what there is to hear when jazz is silent.

WLW had an unusual visitor one evening when the dials snapped into position for the Cincinnati station. It was none other than a singer with the euphonious name of Wendell Hall. You may have heard of him, though I doubt his songs are known to more than a half-dozen regulars—really! The weather has surely captivated this singer's attention, for I heard him say "We're goin' to have weather, whether or not."

Absent minded shifting around for some unknown Radiocast station I discovered myself back in Michigan once more; this time in Saginaw, Station WABN. Here was another jazz band! They certainly do run to the classics out there. All dance; sisters, aunts and cousins.

Then for a happy foil to this mad whirl we chanced on WRC to find the Little Symphony orchestra of the United States Marine band giving a varied and very entertaining musical program. Those service men do feel the spirit of music in their bones and play with a vim.

We differ in tastes in music as in other things and, fortunately for all, Radiocast stations are aware of it. For those who enjoy grand opera, occasions are rare when it may be heard. The more reason then to congratulate WIP for successful miking "Aida," as sung by the San Carlo Opera forces. It is to be hoped that station will secure the response to an appeal which would put grand opera on the air next year.

Seldom indeed do listeners in hear such consummate art as Senor Guerrero displayed at Station WGY, rendering piano works by the masters with interpretative insight and executing legato passages with exquisite charm. Ferdinand Fillion was equally pleasing in his choice of numbers, an evidence of mastery of his instrument—the violin.

There's a station at Mattapoisett, Mass., WBBG, which had an orchestra entertaining the Radio audience very commendably. Although in the Cape Cod district there was no flavor of the piscatorial about their playing at all, in fact scales were not in evidence.

After an absence of some weeks I considered it about time to visit Hastings, Neb., so tuned in KFKX to find a program replete with both instrumental and vocal numbers and varied to meet the requirements of a fastidious clientele. Neither the announcers nor technicians are in need of any advice; certainly not of censure. Having established a certain high standard they mean to maintain it.

Every time WTAM has the sole privilege of holding my attention I feel impelled to congratulate the station on having so nearly perfect transmission. While Spitalny's orchestra is not one to cause enthusiastic comment, the manner in which the various instruments were given their true quality justifies praise for the management of WTAM.

Demonstrating Radio Principles at Home

Chapter III—Types of Aerial Installations

By J. E. Owen

RADIOPHANS inclined to experiment will find in this series of articles, directions for illustrating 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 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.

DEVICES for intercepting Radio waves and converting them into electric waves of Radio frequencies are called aeriels, antennas, loops, and a great many other similar names, these

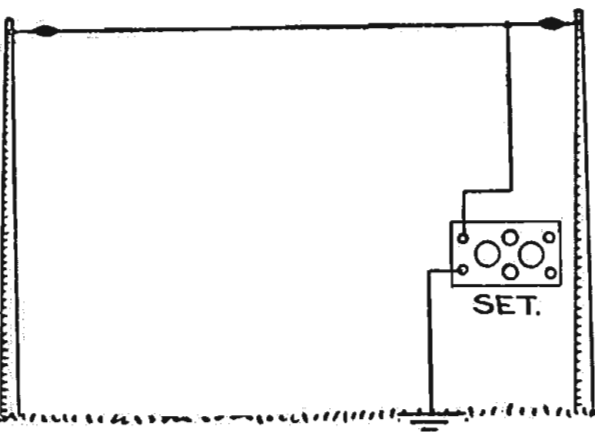


Figure 1

applying to various types of devices. The different types each have their respective good points, but since local conditions determine the relative values of these points of superiority, it is well to consider local conditions before selecting a type for one's own particular use.

A loop aerial has as its most valuable feature its ability to receive directionally, it being possible to change this direction at the operator's will. Signals and static are directional. That is, they come from certain directions like puffs of wind, though unlike winds, they may come from all directions simultaneously. A loop receiver, then, receives static from one

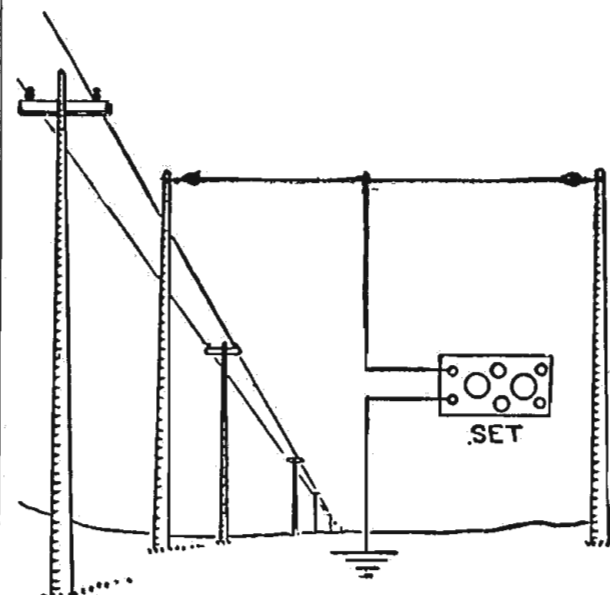


Figure 2

direction principally, most of the static from other directions being eliminated. The loop has a most serious drawback, however. It receives only a very small amount of energy. Its use for distance reception is limited to the most sensitive sets. It is seldom suitable for sets employing as few as four tubes. It will, of course, give some results on one tube, but the range with this type receiver is limited to only a few miles.

Four Principal Installations

For use with the usual type of set, there are four principal aerial installations that will give the utmost satisfaction. Figure 1 is a single wire aerial of the inverted L type using a simple ground connection. Figure 2 is a single wire T

type aerial. Figure 3 is a vertical aerial, consisting of a single wire suspended from a high support. Figure 4 is a combination of the single wire arrangement of figure 1 and a counterpoise. Of course there are cage and other multi-wire antennas, but for the most part, they are modifications of these four types. The counterpoise may be used with either the T or the vertical aerial.

The simplest and often the most satisfactory form of aerial is that of figure 1. The construction of such an aerial is very simple, the cost is low, and the troubles resulting from defective insulators and breaking wires are reduced to a minimum. This form of aerial is somewhat directional, it being that reception is best in the direction in which the aerial lies, advantage being given to the direction at the lead-in end. These directional effects are so low, however, that in ordinary reception it is impossible to tell that they exist at all. The writer has received Glasgow, Scotland, on an aerial of this type lying due north and south. The installation was in western Oklahoma, the set being a three tube regenerative of the writer's own design.

If there is a power line close by, it is advisable to make the installation such that the aerial is at right angles to the direction of the power line. The single wire inverted L of figure 1 may be used, but a slightly better arrangement is the T aerial of figure 2. Were the aerial parallel to the power line, there would be currents induced in the aerial due to the alternating currents in the power line, and these in turn would cause an undesirable hum in the receiving set. By placing the aerial at right angles to this power line, the induced currents are reduced to a minimum, the least hum being present when the T type aerial is used, provided one end is not too close to the power line.

Inverted L Is Directional

The T type aerial is not quite as directional as the inverted L. Too, it gives slightly stronger signals since it inter-

cepts a greater portion of the wave. In installing an aerial of this kind, the horizontal portion should be about twice as long as the horizontal portion of the inverted L. This, for ordinary regenerative sets, should be about 160 to 200 feet. If it is desired to receive on very short wave lengths, it is necessary to reduce this length somewhat. In selecting wire for this form of aerial, be sure to get strong wire since the aerial is not only

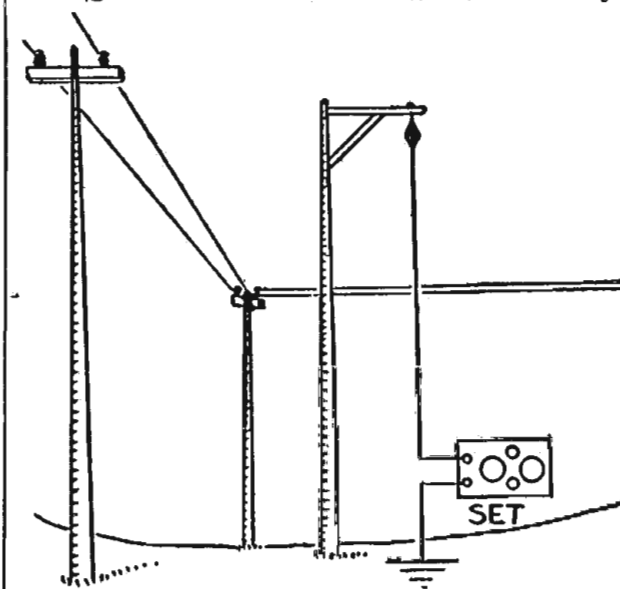


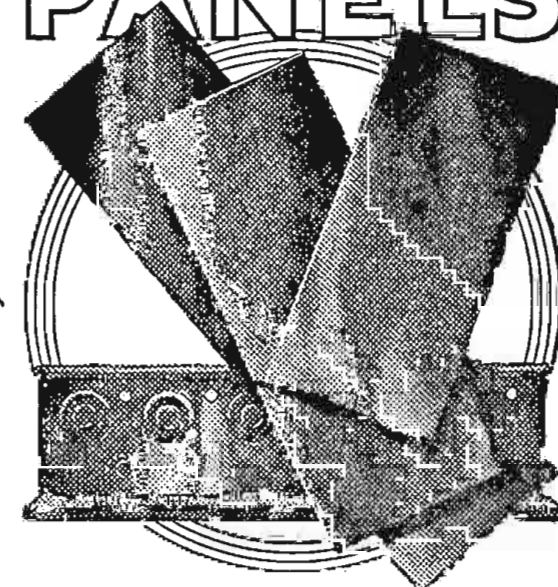
Figure 3

longer than the ordinary type, but in addition, it has to support at its middle the weight of the lead-in wire.

Either of the above installations is very satisfactory with the power line passing by in only one direction, but (Continued on page 18)

In the building of any good receiving set, the panel plays an important part. Therefore, the best can be none too good.

ELECTRASOTE PANELS



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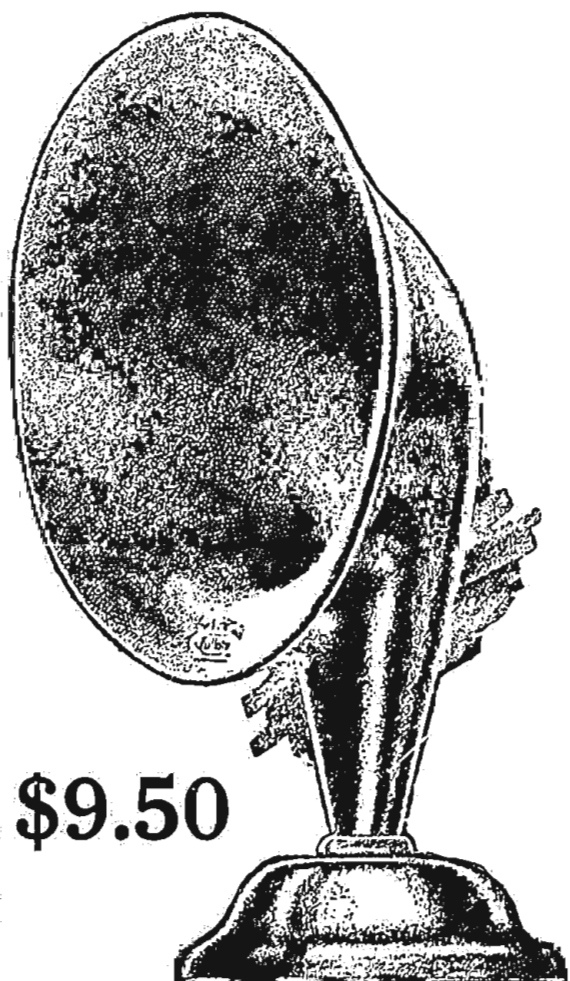
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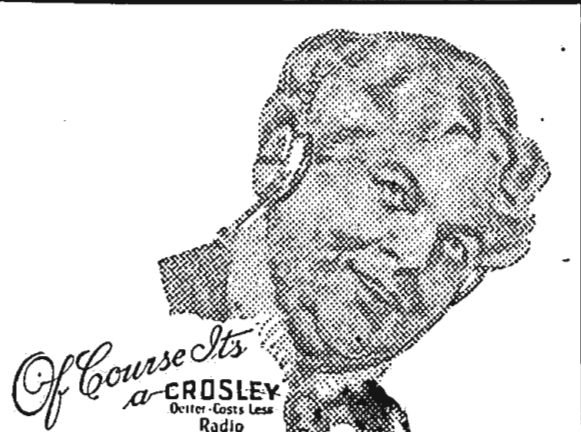
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There can be no gift with greater possibilities for continued happiness than a Crosley set. It carries Christmas along through the year, continually giving new thrills and happiness, and bringing pleasant thoughts of the giver.

It is a delight to operate a Crosley. The immediate response to the turn of the dials; the clearness of reception from far distant points; the real ease with which local stations may be tuned out; all help to make Crosley reception distinctive and exceptionally pleasurable. The very low cost at which this really remarkable radio performance can be obtained places Crosley sets within the reach of all—the ideal Christmas gift.

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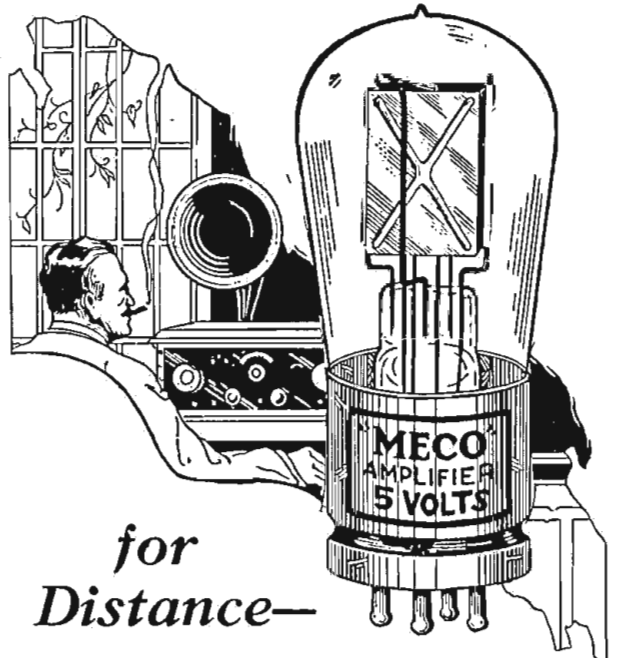
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If you are a "bug" on getting distant stations, try standardizing on MECO Tubes. You will notice an improvement in greater volume together with clear, distinct receptive tone.

A radical improvement in construction gives MECO Tubes longer life as well as other outstanding advantages. Genuine MECO Tubes have MECO stamped on the base. Look for it.

Made in 3 volt and 5 volt sizes with large or small bases. Sold by dealers everywhere at standard prices and distributed by recognized radio jobbers and set manufacturers.

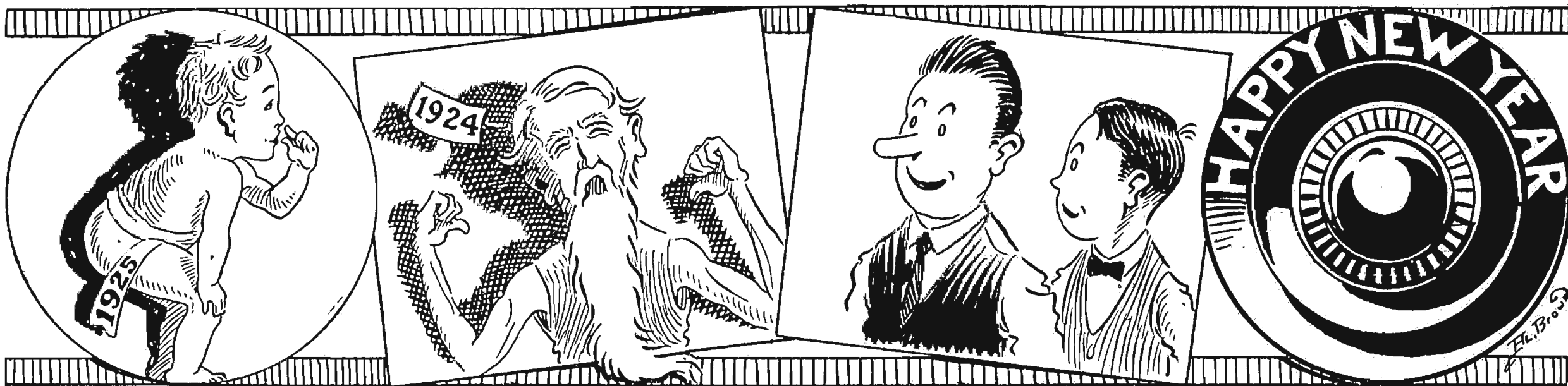
Metropolitan Electric Co.
Des Moines, Iowa



THE ANTENNA BROTHERS

Spir L. and Lew P.

Tune in on the New Year



DEMONSTRATING RADIO

(Continued from page 17)

neither of them will do if two power lines pass at right angles, or the power line makes a right angle turn as in figure 3. By far the most satisfactory way out of this difficulty is to install a vertical aerial, it being that a vertical aerial is at right angles to both directions of the power line. The support may in this case be a single guyed pole, though best results will be obtained when two poles are erected, a wire strung between them, and the vertical aerial suspended from this wire. The whole arrangement will then look somewhat like that of figure 2, the principal difference being that the poles are closer together and there is an insulator between the vertical and horizontal wires. The poles should be at least 6 or 8 feet apart.

The vertical aerial is not directional. This is greatly in its favor. It is very efficient on short wave lengths, this form often being used on both transmission and reception of wave lengths below 100 meters. Because of the small space it occupies, and because of its inherent ability to reduce power line hum to a minimum, it is recommended for city and large town installations. Often it is suspended along the side of a tall build-

ing, the building itself being the support. Results with this form of installation cannot be as good as when the aerial is out in the open.

Aerial Losses

This brings up the problem of aerial losses. An aerial is a condenser. Within the past few months there have been

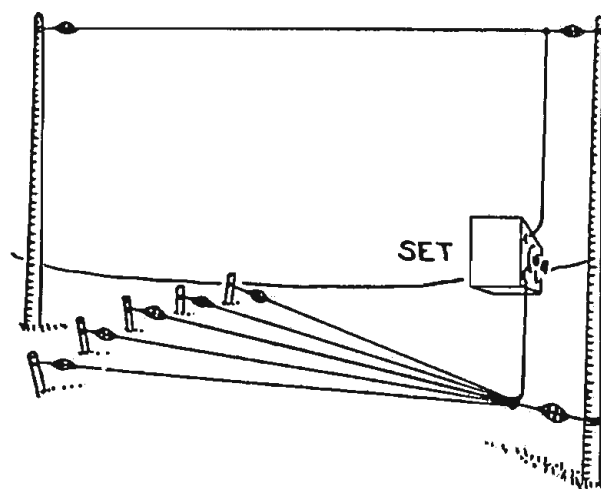


Figure 4

low loss condensers placed on the market, and an examination of the construction of these condensers will enable one to determine just how to install a low loss aerial. The most striking change in the

condenser design is the removal of insulating supports from the electrostatic field within the condenser. This, in fact, is practically the whole story of low loss condensers, and if it applies to condensers within the set, it most certainly applies to condensers without the set. Since the aerial is a condenser, in order for it to be low loss, the space between the aerial and the ground (the ground representing one plate of the condenser) must be free from trees, buildings, and the like; the guy wires must be kept as far as possible from the aerial; the lead-in wire must be kept as far as possible from the building, and in passing through the wall must be very short, and the ground and aerial lead-in wires must be separated by a considerable distance.

Counterpoise Installation

The fourth type of installation is more complicated, but in many cases it is advisable. Often in dry climates the ground will be very dry several feet from the surface. A number of earths have high ohmic resistances when they are dry. There may be no water system which can be used for a ground. In such cases it is always advisable to install a counterpoise. One may be made by placing a number of wires 3 to 6 feet above the ground and insulating them from their supports. They may be arranged fan-

shaped as shown, or they may be placed parallel, their ends being joined with another wire. All joints should be soldered. All insulators must be of the highest type. Good glass insulators are always satisfactory for Radio work when they have a sufficiently high tensile strength. When possible, the counterpoise should be as long as the horizontal portion of the aerial.

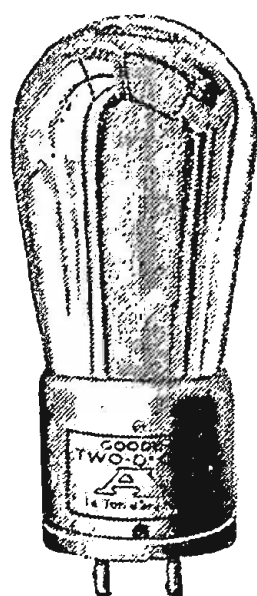
The action of a counterpoise is very simple. It is very common for a receiving set to have a condenser in series with the aerial, either above or below the tuning coil. With it below, one plate is connected to the tuning coil and the other to the ground. This is exactly the arrangement when a counterpoise is being used. The counterpoise is the plate connected to the tuning coil, and the ground is itself the other plate. It is therefore unnecessary to make any connection to the ground. There is one fundamental difference in counterpoise and simple condenser action, however, and that is the wires of the counterpoise in reality are aerials, this, of course, giving the advantage to the counterpoise.

(Mr. Owen will present the subject of devising new circuits in the next article and will give some idea of an engineer's problems in designing new things for Radio.—Editor's Note.)

The "Goode" Two-o-One

A

Le Ton d'argent



Guaranteed

BY MAIL ONLY

\$2.39

Postpaid

QUARTER AMPERE AMPLIFIER-DETECTOR RADIO TUBE

GUARANTEED SATISFACTORY

All "GOODE" Tubes Sold Direct to the Consumer—No Dealer Profits

ONE—"Goode" Detector-Amplifier..... \$2.39
THREE—"Goode" Detector-Amplifiers..... 6.42 (All postage prepaid)

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

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Follow their lead
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THORDARSON
Super
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Experience has convinced the leading set builders that Thordarsons are the best. Made and UNCONDITIONALLY GUARANTEED by the world's oldest and largest exclusive transformer manufacturer. Follow the lead of the leaders—build or replace with Thordarsons. Audio frequency, 2-1, \$5. 3 1/2-1, \$4. 6-1, \$4.50. Power Amplifying, pair, \$13. Interstage Power Amplifying Transformer, \$8. All dealers. Write for latest bulletins. Thordarson Electric Mfg. Co., Chicago.

Hansen "BIRD-CAGE" Radios



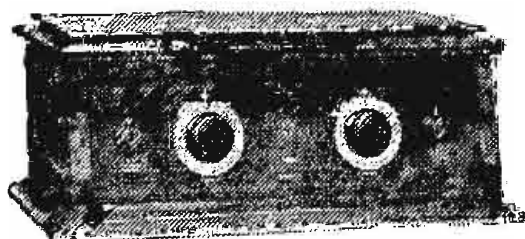
4-Tube Receiver
NIGHTINGALE\$32.50
A wonderful little set.

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

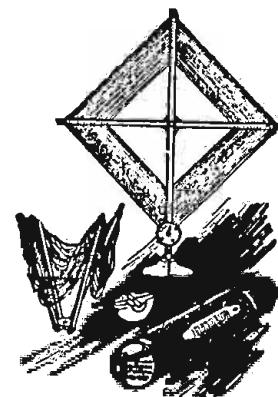


Bronze panel and Gold dials—Beautiful Mahogany Cabinet with space for B Batteries. This set looks and performs like a Million Dollars. We cannot offer anything better.

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

RADIO DEPARTMENT
HANSEN STORAGE CO.
"THE MILLION DOLLAR WAREHOUSE CO."
120-134 JEFFERSON ST., MILWAUKEE

Lincoln
RADIO PRODUCTS



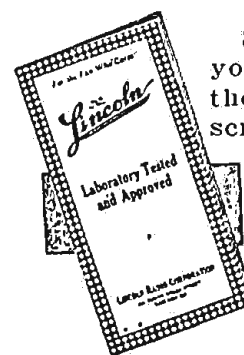
Tapped Loop.. \$8.00
Center-tapped Loop, \$6.50

If your dealer cannot supply you, order direct giving your dealer's name.

Record Breaking Collapsible Loop Aerials

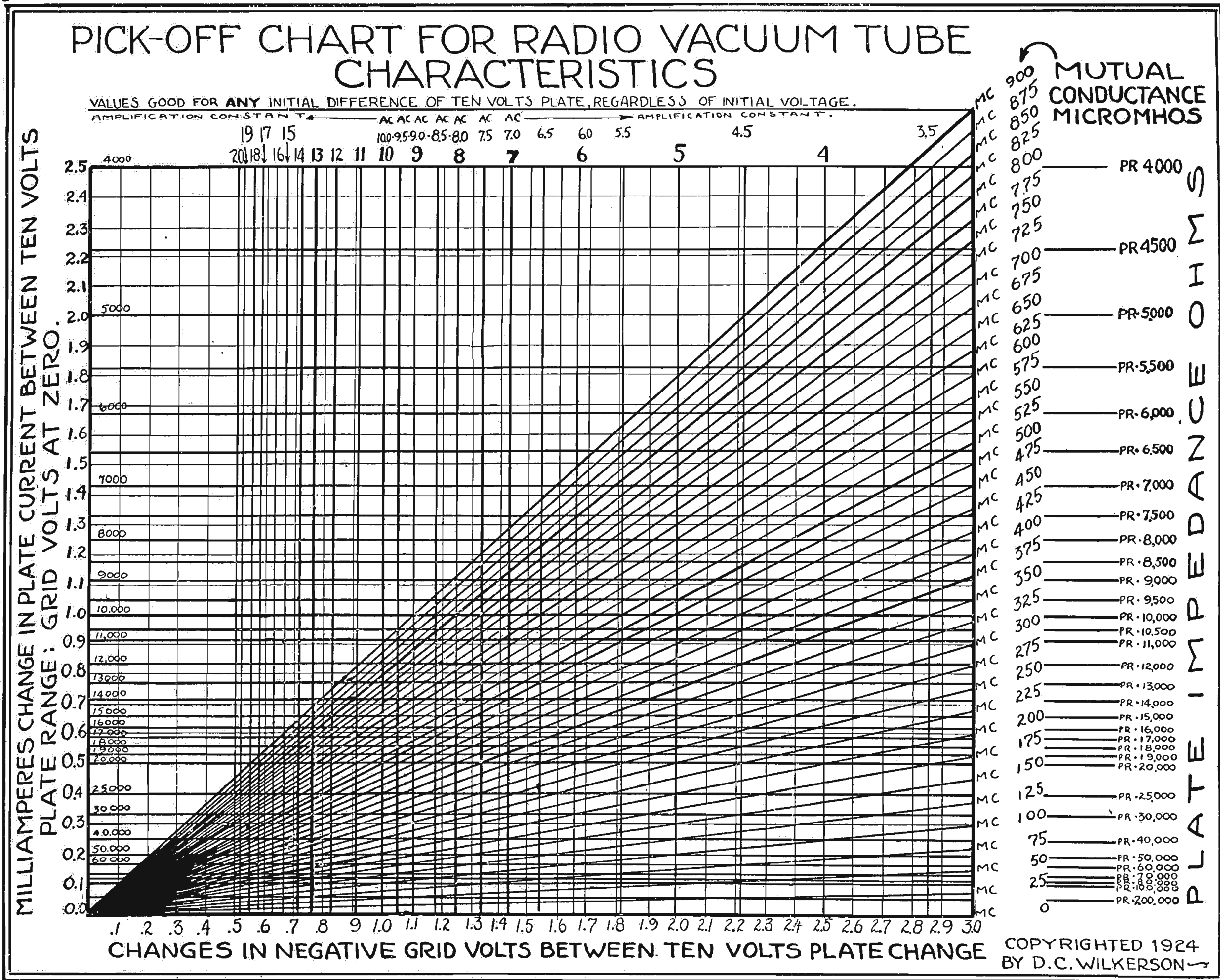
Lincoln Collapsible Loop Aerials are breaking sales records everywhere. As one fan tells another of Lincoln Loop performance Lincoln is daily growing in popularity. Quality reception... greater selectivity... simplicity... and beauty of finish... these are the reasons for Lincoln Loop leadership. Built by radio engineers... Lincoln Loops are scientifically correct. Fine for all Neutrodyne and other radio frequency sets. The 4-point tapped loop will improve your superheterodyne. Sold by leading dealers.

Write for Catalog



Send your name and your dealer's name for the Lincoln Catalog. Describes Lincoln Loops, Lincoln Low-Loss Condenser, Lincoln "Long 45" Tuner, Lincoln Kit, and Lincoln Oscilloscope. Shows 6 interesting hook-ups.

Lincoln Radio Corporation
224 North Wells Street, Chicago



Matched Tubes Improve Set

Part II—Vacuum Tube Characteristics

By D. C. Wilkerson

WHERE the electrical characteristics of a tube depend then upon such infinitesimal and delicate factors, it is no wonder that tube manufacturers are unable to provide tubes of exactly identical characteristics. Here is where troubles begin, for in the unbalanced conditions in a Radio set, because of tubes of diverse characteristics working there, we are forced to resort to external balancing condensers, potentiometers, choke coils, and the so-called "losser methods" in order to control regenerative effects which spoil reception.

The above refers, of course, to types of sets using Radio frequency stages of amplification, such as neutrodyne, super-heterodyne and special multi-tube hook-ups.

Qualities of Transformers

Most neutrodyne and super-heterodyne kits, for the make-his-own fellow, contain Radio frequency transformers which are properly made, and which possesses identical qualities, stage to stage. The directions of wiring such kit-sets are usually written by a technician who designs the whole with an idea of balance, and low-loss placement of the various units.

The factory-built multi-tube set employing Radio frequency stages also follows this idea of identity and balance as far as possible.

In the first critical test of such a set, when it is placed in its future home for the first time under operating conditions, ninety-nine times out of a hundred, when the tubes are placed in their sockets, no thought is given to the electrical qualities of the tubes themselves. In other words, in a well-balanced Radio set, its first trial is with a set of unbalanced tubes which, by their very natures, cannot function properly in an amplifying Radio frequency unit.

Five or six tubes bought at the ordi-

nary Radio store, or in other Radio market places, will, upon inspection, show marked differences from each other in electrical characteristics. How can we expect the tubes or the sets to produce their best results under these conditions?

The answer is, try to obtain a set of tubes for your Radio receiver all of which possess equivalent characteristics. If it is impossible to get a whole set of equivalent tubes, be sure to use in the Radio frequency stages tubes whose characteristics are approximately identical. This includes also the detector tube. For example, if you have a five-tube neutrodyne set, get three matched tubes and place two of them in the Radio frequency stages, and use the remaining one as a detector. You will find that it will be possible to disconnect the neutrodons and do without them in nearly every case.

Distortion in Super-Heterodyne

In an eight-tube super-heterodyne set brought to the writer lately for adjustment, the distortion and regenerative squealing were extraordinarily marked. The set was partially re-wired where inductive effects were noticeable, and a whole set of matched tubes was installed, in audio, Radio, detector and oscillator sockets. On a two-foot loop, stations a thousand miles away began to come in with remarkable clarity and without distortion.

Believing that there was some catch in it, the writer tried out this stunt in six more sets, three neutrodynes, one Radio frequency reflex set, and two six-tube sets having Radio frequency, detector and audio frequency stages, with increased performance and gratifying results in every case.

The addition of the matched tubes turned the trick. It was found also that Radio frequency control in every case was

not critical enough for potentiometer use. The elimination of the potentiometer from the Radio frequency circuit naturally brings greater volume.

Another desirable feature in owning a set of matched tubes, is that should the tubes by accident or design be changed around, from socket to socket, it is not necessary to readjust units, re-tune or otherwise fiddle with the external controls in order to get the receiver to working properly.

When the tube industry is able to turn out exactly uniform tubes, the Radiophan can look for tremendously better Radio results in distance, selectivity and volume.

Equipment for Matching Receiving Tubes

Many Radio clubs, dealers, distributors, experimental laboratories and manufacturers desire to properly test out Radio tubes, but thus far no rapid means for doing the job is known.

A test set composed of meters of differ-

ent types must be procured. A photograph of one type of test set built for the general market was shown in Part 1. One can build his own if he desires.

The operation of such a set is simple, and with ordinary intelligent handling, real worth-while information can be had at small cost.

If you want to make your own, get the following meters and units:

One voltmeter with central zero point 10-0-10 volts for the grid circuit.

One milliammeter 0 to 10 milliamperes for plate current.

One special voltmeter 0 to 150 for plate circuit.

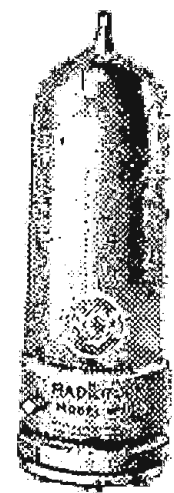
One filament voltmeter 0 to 7 volts.

One filament ammeter 0 to 2 amperes.

One potentiometer for regulating grid volts, 300 ohm.

One potentiometer for regulating plate volts, 400 ohm.

(Continued on page 20)



Radiotron UV-199

A Small Tube That's a Big Performer

Radiotron UV-199

for detection or amplification

\$4.00



This symbol of quality is your protection.

The new UV-199 is proving a mighty popular member of the Radiotron family, particularly for portable sets.

For quiet operation—great ruggedness—uniform operation Radiotron UV-199 is unsurpassed. Each new Radiotron has marked a big step in radio advancement. The RCA mark is the foundation of radio growth—and your protection when you buy. Ask for Radiotrons—and look for the mark.

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Radiotron

REG. U. S. PAT. OFF.

NOTE THREE AUDIO STAGES IN SIX TUBE HET-DUO-GEN

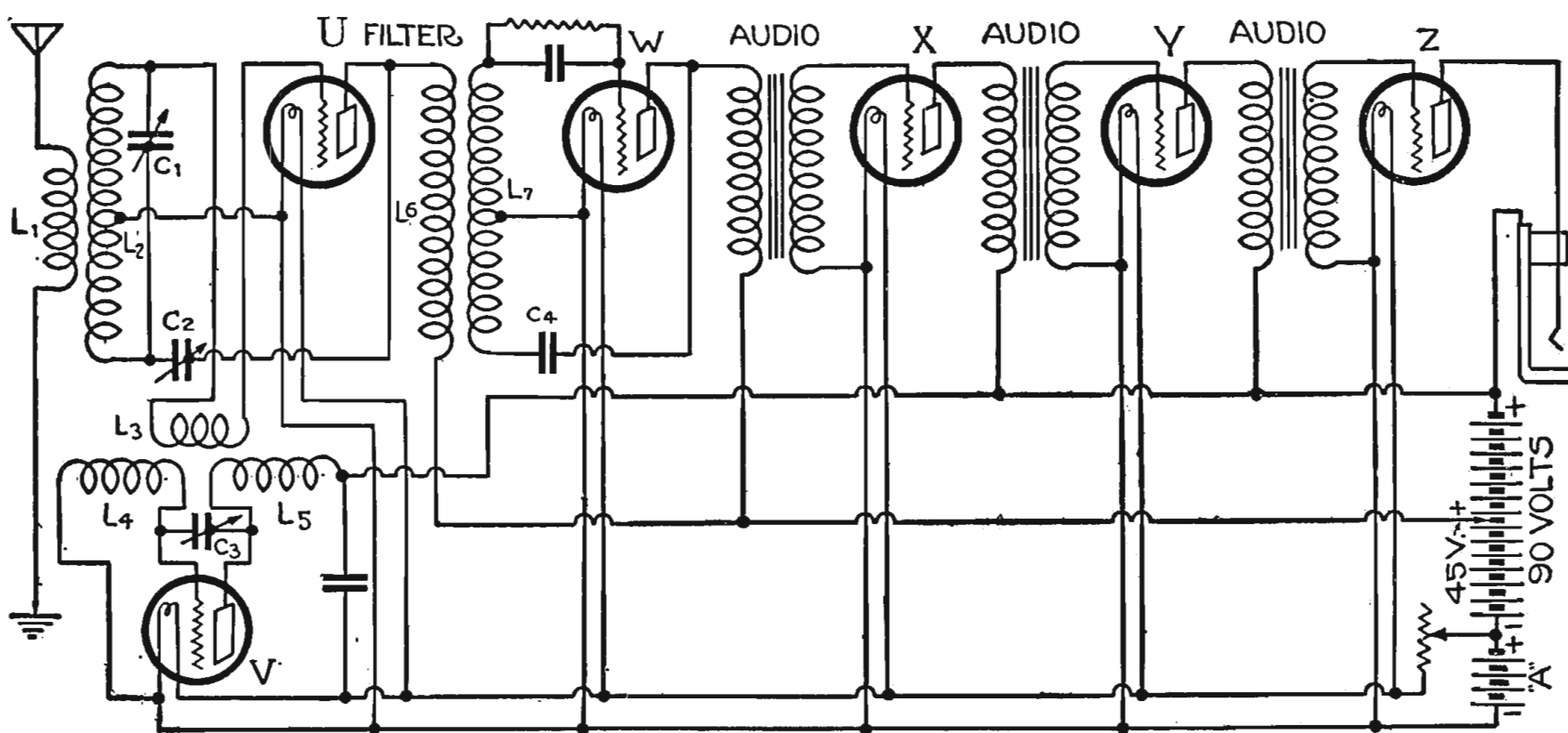


Figure 2

SIX TUBE HET-DUO-GEN

(Continued from page 15)

any strength desired. Many will wonder why there are no "intermediate" amplifiers between tubes U and W. In the writer's opinion, the amplification in tubes U and W, due to regeneration reducing the resistance of these circuits, is fully equal to the amplification at Radio frequencies obtained from "intermediate" stages as ordinarily built and operated. Due also to regeneration and low resistance, the tuning is knife-like in its sharpness. Condenser C-2 can be reduced for ease in finding stations within a few hundred miles and then brought up to not only eliminate interference, but act as a volume control. Tuning is primarily done on C-1 and C-3 with the action from C-2 as described. Stations can be logged and returned to at will.

When demonstrating this receiver to Radio Digest, one het-duo-gen was located within three-quarters of a mile of WQJ and one mile of WEBH, two of the most powerful stations in the middle west. WLS, WMAQ, WGN and KYW were but five miles away. With all of these stations going full blast, het-duo-gen went through and brought in at will WJY of New York, WIP of Philadelphia, WTAM of Cleveland, WMC at Memphis, WDAF in Kansas City, WFAA in Dallas and KGO at Oakland, California, by the log sheet. Then, just to prove that location and long aerial were not responsible, tests were shifted to another het-duo-gen in Evanston where the same list was heard and KFI of Los Angeles, WOAI of San Antonio and WOR of Newark added. All tuning was done on the loud speaker as anything that gets on the antenna of this set is immediately at loud speaker volume. One can tune with head receiver plugged-in at first stage, but why do it?

Beginning next issue, Mr. Brush will give the panel drilling layout and full details of the construction of the inductances so that anyone can duplicate this set and its remarkable results.—Editor's Note.)

"X" NEUTRALIZATION

(Continued from page 7)

the diagram figure 2. It may be found that there is no tap. Count the turns from the F end at which the tap is taken on L and L-1 and count this number from

F on L-0. Slip a knife point under that turn just enough to raise the wire slightly and slip a piece of cardboard under the wire at that point. Remove the insulation and solder to that point as the connection for the aerial.

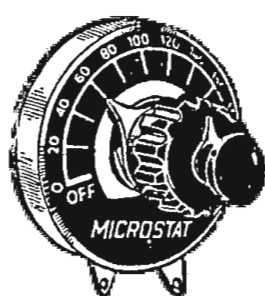
An item that will be new to many is the .5 mfd. condenser shown. This is a by-pass condenser that is essential to good tone and clearness of reproduction. If this condenser is not included, the high resistance of the B batteries would tend to cut off part of the wave train component of the Radio frequency. By inserting this capacity, a path is provided that offers but little resistance to the Radio frequency oscillations and their audio frequency trains or ripples. The third neutrodon is an adjunct that has been overlooked for a long time by most writers and experimenters although one manufacturer of complete sets has been using it with success for some time, while two more have recently added it.

How to Make Rubber Rotor Shafts

It is quite difficult to purchase the right size hollow fiber tube for use in making rotor shafts. When I could not find the right size I purchased a rubber stirring rod at a photographic store, sawed the ends off and drove out the aluminum rod. This gave me a 1/4-inch hollow rubber rod that has no capacity effects.—E. E. Alden, Rochester, N. Y.

Cotton Instead of Paper

I have found that in neutralizing a neutrodyne set that it is a good plan to place a little cotton on the prongs instead of the paper. The cotton sticks better and is good insulation.—Milton Witt, Ida, Mich.



PREMIER Microstat
THE SLIDING SCALE VERNIER RHEOSTAT

FINE TUNING MADE EASY

Premier "MICROSTAT" is a wonder for tuning in the distant stations. Stands alone in its fineness of adjustment and minute control. Two resistor units—one six ohms and one forty ohms—connected in parallel. Vernier adjustment on high resistor. Noiseless in operation. Insures freedom from sputtering and scratching.

Premier "DUOSTAT" combines two rheostats in one. Provides all necessary control of two tubes with one panel mounting.

Premier Double Disconnect Potentiometer is the last word in plate current control. Its special feature, a double break switch, automatically disconnects "A" and "B" batteries when lever is off. Prevents battery waste and tube burn out danger.

All three above instruments are typical in design. Each requires only one hold in panel. Bakelite moulded, silver etched dials. Many other superior features. All one price, \$2.50 each.

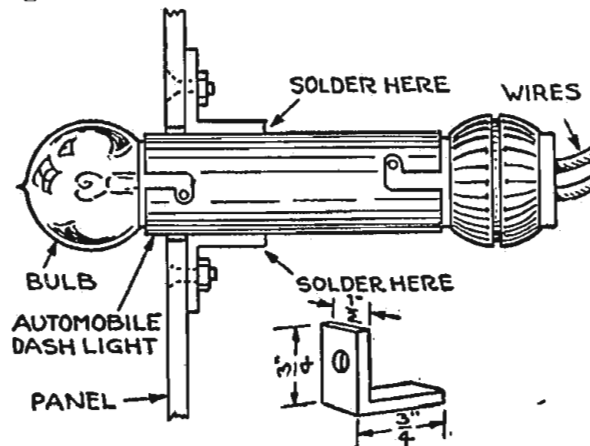
Write for Free Bulletin No. 94 showing complete line of Premier Quality Radio Parts. Ask your dealer if he has Premier free hook-ups. If not, send his name and receive a set free.

Premier Electric Company
3810 Ravenswood Ave., Chicago

PREMIER
Quality Radio Parts

Panel Light for Set

The illustration shows an arrangement for lighting the panel on a portable set; however, the same thing may be used on any set. It consists of an automobile light and socket fastened to the back side



of the panel with angles, the globe protruding through a hole drilled in the panel. The 6-volt automobile light will give sufficient light for operating the dials and it can be run from the regular storage A battery.—Willie Stagner, Harts-ville, S. C.

Set-O-Six Radio Socket Wrench

\$1.25

A solidly-built wrench for every radio need. Reaches and fits every round and hexagon nut on any set; works with a fast, screw-driver turn. Compact, light, and handy.

If your dealer cannot supply you order from us

THE PERRY-FAY COMPANY
Screw Machine Products
ET. YRIA, OHIO

Erla precision parts get the best out of Erla

SUPEREFLEX

circuits; most powerful, tube for tube. Ask for Bulletin 24.

Electrical Research Laboratories, Chicago

E R L A

MATCHING TUBES

(Continued from page 19)

One 25-ohm rheostat for regulating filament temperature.

One mounting panel to accommodate the above.

One cut-out switch for grid circuit batteries.

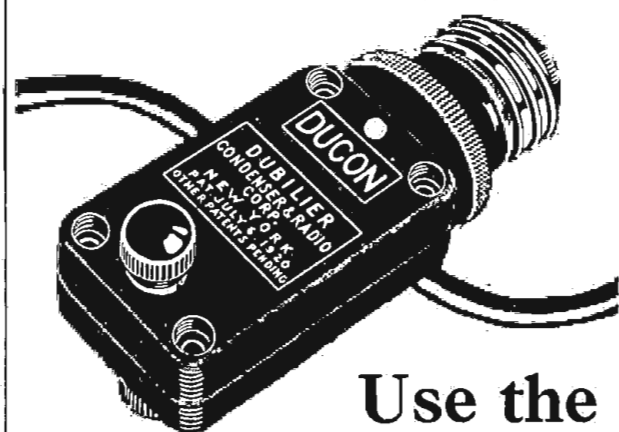
One cut-out switch for B battery circuit. Necessary binding posts, bus bar wire, solder, etc.

A wiring diagram was shown in Part 1, and the procedure for operating the test set with the pick-off chart is as follows:

With 40 volts in the plate circuit of the tube, and zero grid volts, read the plate current in milliamperes. Let us say you get 1.4. Then, with grid volts still at zero, raise the plate volts to 50, or, in other words by 10. Read plate current again in milliamperes and, let us say, you get 2.1.

Subtracting 1.4 from 2.1 leaves .7, which represents the milliamperes change of plate current for a corresponding change of 10 volts plate voltage. Now, change the grid volts to negative until the plate current is the same as before; that is 1.4. Then read the grid volts required to produce this change; say 1.25 volts was required. Referring now to the chart, figure 3, enter the left vertical column with .7 and enter bottom horizontal line with 1.25. From their point of intersection, marked for this example with a small circle, read up to top margin. Here you find 8. This is the amplification constant.

From this same small circle read diagonally up to the right, and you find that the mutual conductance is midway between 550 and 575, which is 562 micromhos. Now read straight right from the original intersection and you find that the plate resistance is between 14,000 and 15,000 or about 14,250 ohms.



Use the **DUCON**

No antenna—just screw the Ducon into your electric light socket and tune in. A great saving in expense and labor—and great results with your set.

PRICE \$1.50

Sold on a 5-day trial basis by all reliable dealers

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CONDENSER AND RADIO CORPORATION

over 500

interesting items in our new catalog, just off the press. Featuring all that is new and best in Radio.



WRITE FOR YOUR COPY TODAY

R. S. PROUDFIT CO.
LINCOLN, NEBR.

Jobbers of Radiodyne Freshman Masterpiece Echophone and Kodel Sets

Two tubes do the work of five

THE Shamrock-Harkness two-tube set that has this amazing pulling power is described in "Shamrock Radio Builder's Guide Book." Before building your set, send 10 cents for this wonderful booklet. It will save you money.

SHAMROCK MANUFACTURING CO.
Dept. 22-C, Market St., Newark, N. J.

SHAMROCK
FOR SELECTIVE TUNING

SHAMROCK MANUFACTURING CO., Dept. 22-C, Market St., Newark, N. J. I enclose 10 cents (U. S. Stamps or coin) for copy of "Shamrock Radio Builder's Guide Book," containing diagrams and complete instructions for building 10 sets at prices ranging from \$15 to \$50.

Name
Address
Dealer's Name

Automobile Coil Aids Loud Speaker

Output of Receiver Not in Series with Battery

It is a well-known fact that unless connections are properly made to the telephones or loud speaker, the direct current from the B battery tends to neutralize the

WORKSHOP KINKS EARN A DOLLAR—

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

RADIO KINKS DEPARTMENT
Radio Digest,
510 North Dearborn St., Chicago

magnetism in the permanent magnets and thus destroy their sensitiveness and ultimately their usefulness.

The accompanying sketch and explanation describes a method whereby the B batteries are not connected in series with the loud speaker, and only alternating current passes through it.

The Ford spark coil, which has so often thrown itself in the breach and won the battle for general economy with the amateur, is again called to the front.

The condenser is used as it is, care being taken to see that it has not been burned out or punctured.

One of the secondary coils is carefully removed and heavier wires soldered to the ends. These wires are covered with spaghetti.

Cut a circle about 1 1/4 inches in diameter, crimp the edges of one end so that the hard rubber disk will not push through

Your Crystal Set

will work 400 to 1,000 miles if made by my plans. No tubes or batteries. Copyrighted plans \$1.00; or furnished FREE with complete parts for building set, including special coil and panel correctly drilled for only \$5.00. Satisfaction guaranteed or money refunded. Satisfied customers everywhere. Particulars free.

LEON LAMBERT

501 Kaufman Bldg. - Wichita, Kansas

STAR-ITE THE STAR-ITE CRYSTAL

Because many people have had good results with the STAR-ITE CRYSTAL 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.

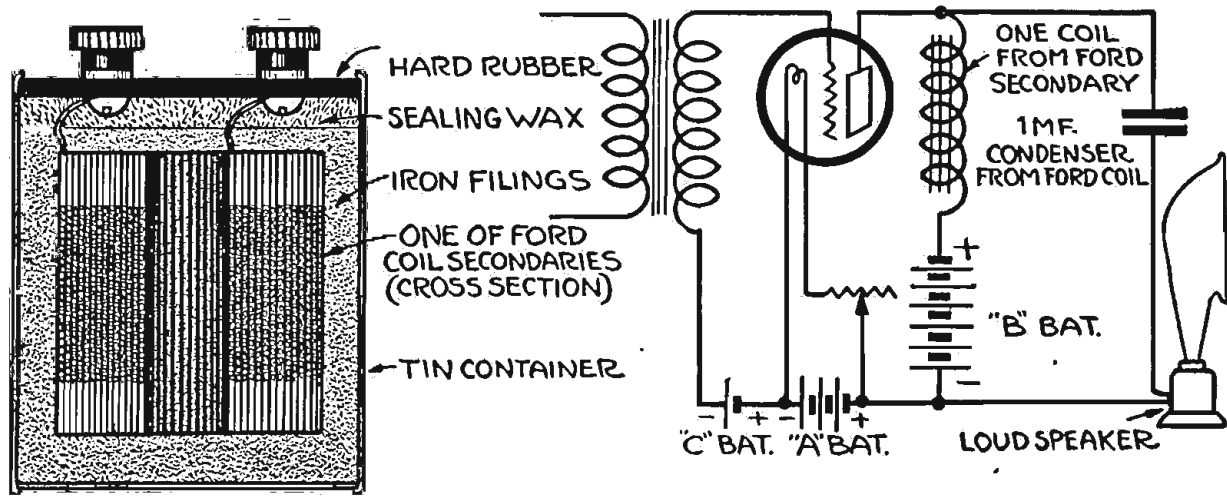
We have secured oscillation with crystals in a laboratory fashion, but would not attempt to sell the STAR-ITE to take the place of amplifying tubes.

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-generative tube sets, and are glad to support our belief by making it extremely easy to try for yourself.

As this crystal is a new one put out by an old firm in the crystal business your dealer may not have it, but try to get him to order one for you, on our money back guarantee. If he does not wish to do so send us his name with a \$1.00 bill at our risk, and we will send you one with the understanding that you may return it, and we will refund you the \$1.00 at any time within 30 days. Gold Cat Whisker in Each Package

Star Crystal Co
147 N. 525 Woodward Avenue
DETROIT - MICHIGAN

IMPEDANCE UNIT IN CIRCUIT



and place the disc in the end with the coil inside the tube. Pour melted sealing wax or paraffin to cover the binding post screws.

Take a strong permanent magnet to the nearest machine shop and pick up a quantity of iron filings around the emery wheel.

These filings are to be tightly packed in the tin tube, completely surrounding the coil and filling the center.

Cut a tin circle to fit the bottom and solder it in place. Connect as shown in the accompanying diagram.

The improved quality of reception will well repay the effort.—Geo. B. Hostetter, Freewater, Oregon.

Placing the Receiver

Noises in a set are often picked up as a result of placing the receiver in the magnetic field surrounding lighting wires running behind the wall, and the receiver should therefore be moved to another part of the room to make sure that the iron cores of the inter-valve transformers are not picking up interference from this source.

EVEREADY Radio Batteries -they last longer

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

NATIONAL CARBON CO., INC.
Headquarters for Radio Battery Information
New York San Francisco
CANADIAN NATIONAL CARBON CO., LIMITED
Factory and Offices: Toronto, Ontario

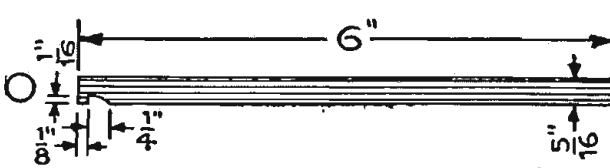
Advertisement for Star-ite Crystal, including a star logo and detailed text about the product's performance and availability.

Star Crystal Co
147 N. 525 Woodward Avenue
DETROIT - MICHIGAN

Advertisement for FADA Radio, featuring a diagram of a 5-tube Neutrodyne receiver and text describing the FADA set of knock-down parts and the new FADA book.

Socket Clip Tool

The spring clips in a socket will need some adjustments from time to time in order to make a good contact with the points on the tube. To do this with the fingers or pliers is difficult and if the battery current is on a tube in the circuit may be blown. The tool illustrated



is a great help in making the adjustments. It is made from some kind of insulating material such as wood, fiber or rubber. When the notch is placed under the spring clip the latter can be easily raised into position without fear of making a high voltage contact.—William A. Schulz, Astoria, L. I.

When a 22 1/2-volt dry B battery drops below 17 volts it should be discarded.

Three advertisements for Hudson-Ross radio products, including 'SUPER HETERODYNE', 'REFLEX', and 'HUDSON-ROSS' sets, with addresses in Chicago.

Advertisement for Bluebird Radio Tubes, featuring a diagram of a tube and a list of standard types and their prices, including a 250-cent price for Type 402 5 Watt Transmitters.

Inexpensive Homemade Charger for B Batteries

With the coming general use of storage B batteries the question of charging them is a problem to many set owners. If you have direct current then it is quite easy to charge a battery, but with alternating current, a charger must be used to rectify the current. I have found that an excellent charger can be made from a cheap toy transformer and a Radio tube socket, using one of the 201A tubes from the receiving set as a rectifier. The

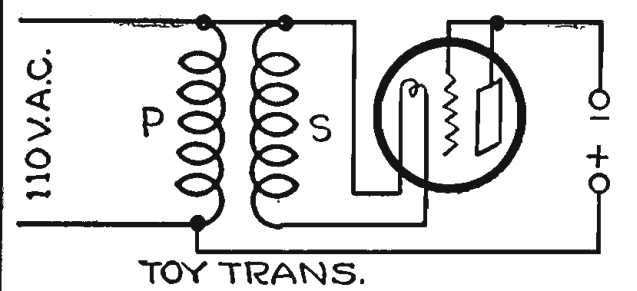


diagram is self-explanatory. Be sure the voltage of the secondary of the transformer is 6 and not 10, as some of them are designed for higher voltages and would burn out the tube.

The tube is used as a two-element rectifier by connecting the grid and filament together. Using the plate only it will pass about 1/20 ampere, but using both plate and grid I have found some tubes that would pass almost 1/4 ampere without heating or damaging the tube in any way. Most tubes will pass about 1/6 ampere. All the parts can be purchased for from \$1.50 to \$1.75.—Chas. Middleton, Laporte, Ind.

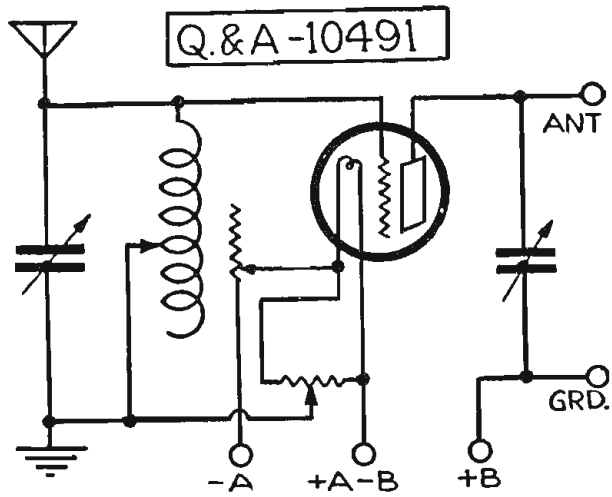
The life of the "C" battery is from six months to a year.

Advertisement for representatives wanted, featuring a large number '8' and text about an opportunity to earn up to \$500 per month selling radio apparatus.

Advertisement for Fahnestock Radio Products, featuring a diagram of a display case and text about the new Fahnestock Display Case and the company's 200% profit margin.

Questions and Answers

Radio Frequency on Weagant Circuit (10491) WGO, Kirbey, Saskatchewan, Can. I have a honeycomb coil set using the Weagant hook-up and have tried to use Radio frequency as shown in your issue of January 6, 1923, but I could not make



it work until I removed the condenser from the tickler coil. I do not care to do this as it saves the trouble of moving the coils in tuning. Will you please tell me the way to add Radio frequency to the Weagant hook-up?

Will the use of a potentiometer shorten the life of a dry cell A battery, or is one needed with peanut tubes? I am building a four tube set as shown in the January 3, 1923 issue and I desire to get more volume with four tubes. What is the best way to proceed?

A.—We are advising in your inquiry that the Weagant circuit is in a sense the "daddy" of the Reinartz tuner and has many of its characteristic qualities and attributes, one of which is a debatable advantage of using Radio frequency amplification. We would not recommend it except from an experimental standpoint and certainly not at the sacrifice of two

Will trade new 1-A Greflex Kodak (Tessar Series Lens) for Grimes 3-X P Official Laboratory model Inverse Duplex Unit. Investigate the above at your local dealer and then address Box H, Balfour, N. D.

SEND NO MONEY!

YOUR OWN Name and Address Printed Free on Thank You Cards. Clear what YOU like. Stations are glad to put on numbers at your request. We print Special cards that get ATTENTION. All the RAGE. Cards (Printing FREE) 100—only \$1.35; 200—\$1.85; 300—\$2.35, plus few cents postage. Order TODAY. **MONEY REFUNDED** if Not Delighted. Quality cards. High grade printing.

FREE with 1st order: log for YOUR set. Shows stations, dial positions, etc. Heavy rippled cover. Send no money—just pay postman when you get cards. Order NOW! RADIO PRINTERS, 49C, Main St., MENDOTA, ILL.

We are authorized distributors of Freshman Masterpieces, Fada, Timmons, Kellogg, Frost, Eveready and a hundred other nationally advertised radio manufacturers. **If It's Radio We Have It GERSHON ELECTRIC CO.** 1816 Walnut St. Kansas City, Mo.



Perfection Coil Antenna
Eliminates the Outside Aerial
Just stretch it across a room
Price \$2.00 Postpaid
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WRITE FOR OUR NEW CATALOG
It lists and illustrates absolutely dependable, guaranteed sets and parts. Give your customers what they want—when they want it; but buy it so that you can make a good profit. We're supplying hundreds of radio dealers satisfactorily every day. Write for catalog and discounts sheet. YOU'LL BE ASTONISHED AT THE PRICES QUOTED.
Ask for catalog No. 8A

W.E. Fuettner Radio Supply Co.
Send for our latest catalog
23-25 Locust St. St. Louis, Mo.

stages of audio frequency amplification. This can be worked out on that basis by connecting your Radio frequency stage between your tuner and your detector tube, output to input. We are giving herewith a diagram of a simple method of adding Radio frequency to meet your requirements without disturbing your present arrangement.

In the common method of connecting a potentiometer there is a drain on the A battery, which although slight is undesirable, particularly when non-recharging dry cells are used. The objection can be overcome by connecting one side of the resistance of the potentiometer to the positive of the filament battery and the other (instead of the usual to negative) is connected to the filament side of the rheostat. If the arm of the rheostat is connected to the filament and the resistance itself to the negative side of the battery the potentiometer connection goes to the arm side of the rheostat. This method enables the potentiometer to be cut out of the A battery circuit by turning off the filament rheostat, which simultaneously breaks the potentiometer connection on one side and prevents any flow of current through the resistance.

Code Practice Circuit (9878), LP, Holden, Alta., Canada.

Will you kindly publish a circuit for Radio code practice using a high-toned buzzer and receivers?

Does the length of battery leads make

Write for Our Free Book on Patents—Munn & Co. 643 Woolworth Building, New York City; 518 Scientific American Bldg., Washington, D. C.; 407 Tower Bldg., Chicago, Ill.; 360 Hobart Bldg., San Francisco, Calif.; 215 Van Nuys Bldg., Los Angeles, Calif.

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

BRING IN DISTANT STATIONS NEW WONDER BEAN CRYSTAL SET

Enables you to tune out local when used with audieny set. Gets Stations far away when used alone—nothing like it on the market. **NEW WONDER BEAN GROUND** works wonders on any crystal set. **PERMANENT FIXED DETECTOR.** Guaranteed 60 days—should last a year. Stays put—Hot. Write for description of Set, Ground and Fixed detector.

NON-SKID CRYSTAL MFG. CO. 5601 E. 15TH ST. KANSAS CITY, MO.

WHOLESALE FOR DEALERS AGENTS WANTED

DEALERS—We make a specialty of stocking new dealers and radio departments. Our large price list will be mailed free to you on request. Good discounts and prompt deliveries.

THE RADIO SHOP OF NEWARK, INC. 76 Springfield Ave., Dept. H. Newark, N. J.

Mason, Fenwick & Lawrence TRADE MARK and PATENT LAWYERS

Washington, D. C. New York Chicago
Established over 60 years. Write us.

REFERENCES:
National Confectioners' Association, Chicago; National Canners' Association, Washington, D. C.; Life Savers Inc., Port Chester, N. Y.; Bon Ami Co. and U. S. Cigar Co., New York City; Hershey Chocolate Co., Hershey, Pa.; Stephen F. Whitman & Son, Philadelphia, Pa., and many others.

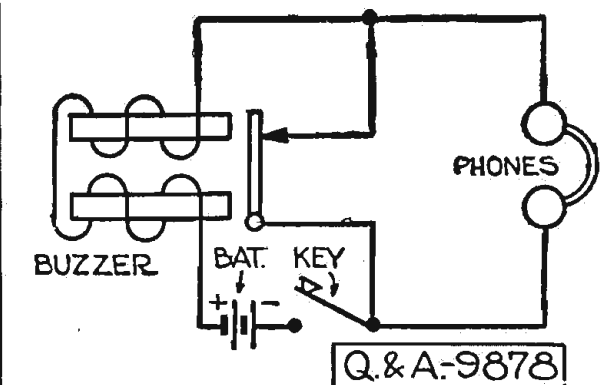
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DEALERS

SUPER-HETERODYNE KITS
Complete Parts and Information
Send For Catalogue

Complete Stock of Nationally Advertised Merchandise

any difference in the volume of signals?
A.—The illustration is of circuit that will meet your requirements for code practice.



The length of battery lead is not important in the matter of effect on volume if the wire is sufficiently heavy to carry the required current.

Transmitting (10710) DV, Atlanta, Ga.

Please answer the following questions in regard to phone transmission:
I have a 10-watt transmitter using loop

Send me your burned-out or broken Power tubes—50 watts or over. Will pay liberally. W. Baker, 36 West 20th Street, New York City.

Air Line Radio Map and Log

Best all purpose Radio map published. Movable mile scale. Monthly supplemental service. Complete in every way. At Your Dealers or Sent Prepaid

50 Cents
Dealers and Jobbers Write
M. M. CO., 3600 ST. JOHN, KANSAS CITY, MO.

For Sure Results, Solder Up Your Set with SOLOX

The scientific soldering solution that makes sound metallic joints a certainty, with freedom from acid, messy grease or resin. Easy and clean in use and cannot corrode. Most effective and economical of all preparations. Of your dealer or mailed for 50c by the inventors and manufacturers. The D. X. Radio Research Laboratories; Crugers-on-Hudson, N. Y. Money back guarantee. Dealers: Write for attractive proposition to our national distributors.

THE CHARLES RADIO CO., 154 Nassau St., N. Y. C.

CABINETS

of Quality—Easy to build your Set with NATIONAL Cabinets. Latest styles in Knocked-down type and leatherette covered. Write for prices and descriptive matter.

NATIONAL Cabinet Co., 8 Cinn. St., Dayton, Ohio

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Write for Discounts on
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PREMIER BURNS
FROST SHAMROCK
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SHAMROCK-HARKNESS
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PRAIRIE STATE RADIO CO.
39 West Adams St. Chicago, Ill.

SOLVED!

—The "B" Battery Problem

Throw away your "B" Batteries and install a Kellogg Trans-B-former. It gives you "B" Battery current direct from your electric light socket at the trifling cost of one-fifth of a cent per hour. Gives better reception—no interferences. Write for details.

KELLOGG SWITCHBOARD & SUPPLY CO.
Trans-B-Former
1066 W. Adams St., Chicago, Ill.

modulation, and as the phone does not work very satisfactory this way I would like to have you advise me of a different method for modulating without any additional cost. How will a grid modulation work, or do you know a better method? I want to use the 1D Heirant.

Please advise me how to make a magnetic modulator. Also a sensitive microphone suitable for transmission of music.

A.—If you will procure the pamphlet Number 423 from the bureau of standards you will find a discussion that will greatly aid you in your troubles. This is available through the government printing office, Washington, D. C., for 10 cents.

A motor bus running between Colchester and London, England, has installed a receiving set and fourteen headsets for the use of the passengers.

Men to build radio sets in spare time. Leon Lambert, 501-H Kaufman Bldg., Wichita, Kansas.

PATENTS

Write for my free Guide Books "How to Obtain a Patent" and "Invention and Industry" and "Record of Invention" blank before disclosing inventions. Send model or sketch of your invention for instructions. Promptness assured. No charge for the above information. Clarence A. O'Brien, Registered Patent Lawyer, 2005 Security Bank Building, directly across street from Patent Office, Washington, D. C.

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FREE Simply send name TODAY for big 48-page catalog of latest radio goods at Wholesale. Live dealers and agents wanted. **STANDARD RADIO CO.,** 106 East 13th, Kansas City, Mo.

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JOBBER and DEALER
Now direct to you. Large 4500 M.A.H. Storage B. Battery, with heavy glass jars, Rubber caps and tray, 24 Volts, only \$3.25 ea. Pay expressman after examining or 3% for cash in full with order. Prompt deliveries.
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ALL the latest improved apparatus is listed in our monthly bulletin: "The American Radio Transmitter." If it's new we have it. **Lowest Prices in U. S.**
Our prices to dealers are the lowest in the United States. All nationally advertised goods at discounts that make you real money. Dealers, get your name on our mailing list. Simply send name today for latest, big monthly bulletin showing 75 nationally advertised factory lines and 4,850 items.
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ROICE Radio Tubes

Economical and Powerful
GIVE your tube expenses in HALF. Here's "Roice," an efficient and durable tube that gives longer service and greater satisfaction. Powerful; increases range and volume with maximum clearness. We sell direct only. You save by this plan; that enables us to sell "Roice" at this low price.

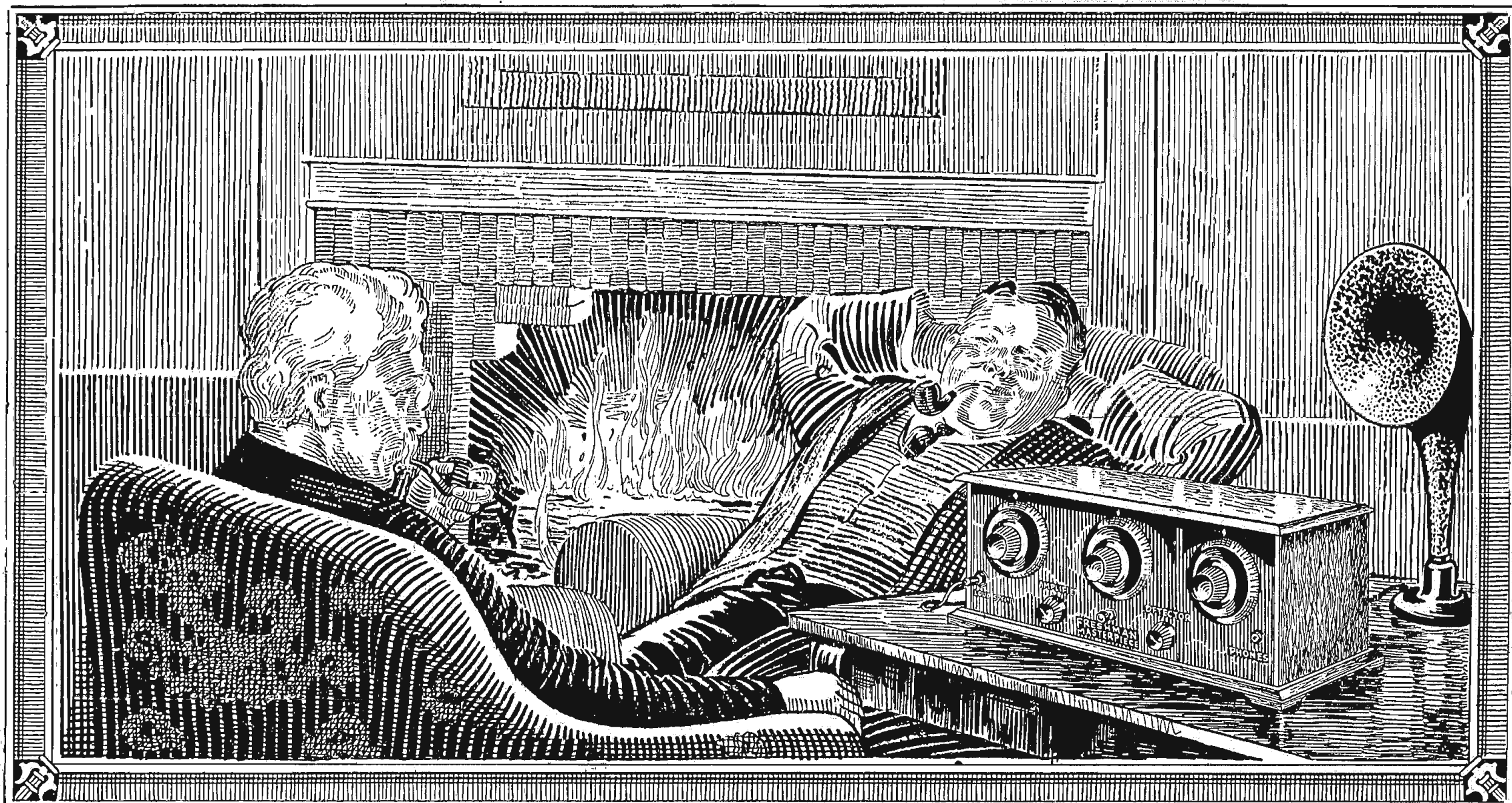
Type 00—5 Volts, 1 Ampere Detector Tube
Type 01A—5 Volts, .25 Ampere Amplifier and Detector
Type 99—3-4 Volts, .06 Ampere Amplifier and Detector
Type 99A—3-4 Volts, .06 Ampere with Standard Base Amplifier and Detector
Type 12—1 1/2 Volts, .25 Ampere Platinum Filament Amplifier and Detector

ALL STANDARD \$2.50
Shipped Parcel Post C. O. D. TYPES

Type 02 5-watt Transmitters, \$3.00

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to give best results in Radio Frequency. Also for high-powered circuits such as Neutrodyne, Reflex and Super-heterodyne sets.
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When Winter Winds Blow Cold



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The Greatest Value Ever Offered In A Radio Receiving Set!

A 5 TUBE TUNED RADIO FREQUENCY RECEIVER, made of the finest low loss materials and in a beautiful genuine solid mahogany cabinet, that is attractive enough for the most pretentious room, and at sixty dollars, economical enough for the most modest.

Combines all points 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 dials, whenever you want it. And what's more,

It Is Mighty Easy to Operate

\$60

Have Your Dealer Install One in Your Home!

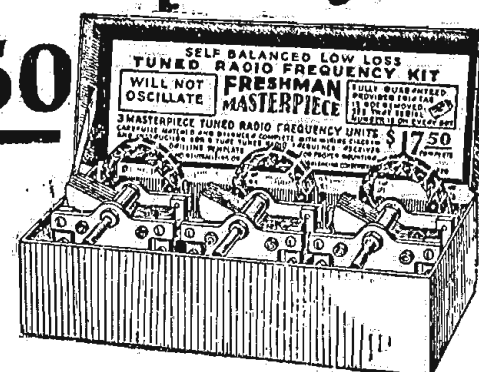
All genuine Freshman Masterpiece Sets have a serial number and trademark riveted on the sub-panel. The Receiver is not guaranteed if number has been removed or tampered with.

Chas. Freshman Co. Inc. Radio & Condenser Products

Freshman Building, 240-248 W. 40th St., New York

Tuned Radio Frequency Kit

\$17.50



It's Easy to Build

a five tube radio frequency receiver when you use the Freshman Masterpiece Kit. The result will be a receiver that will bring in even the most distant stations with the volume and clarity of locals. The equal of any 5 tube set in selectivity, simplicity of operation and all around efficiency. Write for interesting literature.

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