

Improved Style Advance Programs This Issue; Internal Spider Web Mount; Electromagnetic Coupling Phenomena Explained; Taking Care of Batteries

Radio Digest

EVERY WEEK

PROGRAMS Illustrated

TEN CENTS

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

Vol. XI

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SATURDAY, NOVEMBER 8, 1924

No. 5

OPERA TO BE BROADCAST

WWJ PAYS SPECIAL SELECTED ARTISTS

DETROIT PLANT CONFORMS PAY PLAN TO SINGERS

Have Won Fame on Two Continents—Detroit News Orchestra Helps Keep Fans Enthralled

DETROIT, Mich.—Station WWJ, the first station to broadcast musical programs in the United States in conjunction with its paid orchestra of celebrated artists, has recently added a number of artist-vocalists.

The artists who have won favor on two continents are: Templeton Moore, tenor; T. Stanley Perry, tenor; Jane Robinson, contralto; Claudine Secor, soprano; Graeme Gillies, bass and Thaddeus Wronski, baritone, all of whom are paid for their singing at this station.

Ever since the opening of WWJ, three years or more ago, it has added something new each year until now it is operating one of the finest broadcasting stations in the country, notwithstanding hundreds of others who have also entered the field.

Along with these celebrated artists, is the famous Detroit News orchestra. They have been furnishing the finest and highest type of musical programs obtainable.

Hears Station KFNF While in Middle of Pacific Ocean

SHENANDOAH, Iowa.—Station KFNF located in this city thought that they had about reached the limit of reception when they heard from Alaska, Porto Rico and Mexico, but Mr. Field, owner of the station recently received a letter which was mailed at Balboa, Canal Zone.

The operator on board the S. S. Heffron, when 1,000 miles out from Honolulu, heard the program distinctly. "The music came in loud and clear," he said, "but the weather was cloudy with occasional showers." A commercial receiver was used with detector and one step of audio frequency amplification.



CHICAGO CIVIC OPERA STARS TO GO ON AIR

Sing at Three Stations

WGN, WMAQ and WEBH Announce Treat for Listeners in as Season Opens

CHICAGO.—Especially selected operatic arias, picked from the repertoire of the Chicago Civic Opera for the ensuing week, will be broadcast weekly Sundays by WGN, beginning with the reopening this week of the opera season here.

The best numbers for broadcasting will be sung by the popular stars.

Coupled with the WGN announcement comes the news that WMAQ and WEBH, Daily News and Edgewater Beach Hotel stations here, are also planning to feature operatic numbers sung by principles of the Civic Opera company.

Plans for broadcasting the opera direct from the Auditorium theater, where it is being held, are under consideration. One proposal, made

(Continued on page 2)



Left, Miss Gertrude Smallwood, organist and pianist of local reputation. Miss Smallwood's recitals from WRC, particularly her interpretations of Liszt and Chopin, have gained her a high rank among pianists. Above, Ruth A. Malcomson, better known as Miss America, who was adjudged as the most beautiful girl in America and recently heard from WIP. Right, Ruth Williams, charming soprano, who has recently been added to Roxy's gang. She sings in the Capitol theater program, broadcast every Sunday evening from Station WEAJ.

BEGIN PROGRAMS AT TWIN CITY STATION

SPECIAL FOOTBALL BOOTH INSTALLED IN STADIUM

Start Reguar Concert Programs at New St. Paul-Minneapolis Radiocast—Legion Program on Air

MINNEAPOLIS.—From a glass broadcasting booth built especially for the Gold Medal Station WCCO in the University of Minnesota's new million dollar stadium, reports of the home games of the Minnesota football team are being broadcast.

It is believed that the Minnesota stadium is the first to include among its other facilities a booth from which Radio reports of the contests there may be sent out. All home games of the Minnesota team which will be broadcast from the Gold Medal Station. In addition to these reports, the Gold Medal Station will send out reports by quarters and halves of all the important football games in the United States every Saturday.

Musical Entertainment Starts

Regular musical entertainments are now being broadcast from the station. A concert by the famous Shrine Band or Osman Temple, St. Paul, will be given on November 7. This band has won numerous prizes in competition at various Shrine conventions. This will be the first time one of their concerts has been broadcast for a year.

Another attraction is the Warmelin Ensemble of Minneapolis, composed of ten prominent Twin City musicians interested in chamber music, who have been working together now for about eight months. They will give a concert on the evening of November 19 at 11 o'clock. Corinne Faulk Bowen, soprano, will be the soloist.

Broadcast Legion Program

The broadcasting of a complete American Legion program on Armistice Day, November 11, with talent provided by entertainers from the Legion and Legion Auxiliary of the Twin Cities, is planned. Among the features will be a concert by the Hennepin County Auxiliary Glee Club, which won fame by its singing during the recent national American Legion convention at St. Paul.

Experiment with Telepathy on Air

Speaker Acts as Agent and Listener In as Percipients Results Are Questionable

COLUMBUS, Ohio.—An experiment to determine the possibility or impossibility of telepathy, or thought transference, was conducted at Station WEAO, Ohio State university here, as a part of the evening program, October 30.

In this experiment the speaker served as the agent and the listeners in as percipients. The former concentrated on certain numbers, cards, etc., and the latter attempted to determine of which he is thinking.

The results are being collected by post-card and tabulated to determine whether there is a higher percentage of correct judgments on the part of the percipients than could be accounted for by mere chance. The results, together with those of various laboratory studies of telepathy will be discussed in a subsequent lecture from the station, November 30.

CELEBRATED STATION ANNEXES NEW STUDIO

Opens in Conn National School of Music

CHICAGO.—Station WTAS, owned by Charles Erbstein, famous attorney, recently opened a new studio at the Conn National Studio of Music in this city. The studio is connected by wire to the WTAS transmitter at Elgin, Ill.

Conn artists broadcast two or three times weekly and are a feature on the Sunday afternoon Villa Olivia star concerts. Exponents of various brass musical instruments who are affiliated with the C. G. Conn company are featured nightly.

America's leading bandmaster will go on the air through WTAS early this month when he appears at the Auditorium.

TO BROADCAST OPERA

(Continued from page 1)

by Miss Judith Waller, program director of Station WMAQ, the Daily News, is to have various local stations in turn broadcast the performances every Monday night at the opera when all seats are always sold out.

In case the suggested plan is accepted, Chicago's silent night will be changed from Monday night to some other night of the week during the opera season

JACK NELSON HEADS CALL OF THE MOOSE



Jack Nelson, former announcer at WDAP and WGN, is now directing the destiny of WJJD, the new station of the Loyal Order of Moose at Mooseheart, Illinois.

Each mast of the new 100-kilowatt station at Rugby, England, will stand on a 5½ foot block of granite.

MOOSE OPEN NEW RADIOCAST—WJJD

Jack Nelson, Director-Announcer, Makes Hit with Radiophans—Home Non-Sectarian

MOOSEHEART, Ill. — "Howdy, Pap!" This was the greeting that Radiophans heard when listening in at 7 p. m. October 27, on 278 meters wave length. The owner of the voice was none other than Jack Nelson, former announcer at Stations WDAP and WGN.

Prominent among the notables present was James J. Davis, secretary of labor and founder of the home for children located here. He talked at length, telling the public just what they were trying to accomplish at this celebrated home. Mooseheart is the miracle city of all history. It has received the unstinted praise of people of all religious beliefs as it is non-sectarian.

Congratulations Pour in

Following Secretary Davis' talk, Jack Nelson then introduced the far-famed Terrace Gardens orchestra, playing at the Hotel Morrison in Chicago. This was followed by Little and Shea, well-known Radio entertainers of national repute.

Jack Nelson, director-announcer of this new station, has with him behind the scenes Ralph Shugart, formerly chief operator at WDAP and WGN, but now chief engineer of WJJD.

Thousands of letters of congratulation were received at the station on their opening night, also many telegrams and phone calls from people in all walks of life.

Classical Music from KGO

OAKLAND, Calif.—On Sunday, November 9, Wagnerian music will be contrasted with the orchestral works of Italian composers at Station KGO. Rossini's overture, "William Tell," will be described by Arthur S. Garbett. Short passages from the overture, played by the orchestra, will illustrate his remarks.

CONTENTS

Radio Digest, Illustrated, Volume XI, Number 5, published Chicago, Illinois, November 8, 1924. Published weekly by Radio Digest Publishing Company, 510 N. Dearborn Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign Postage One Dollar additional; single copies Ten Cents. Entered as second-class matter at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

All the Live News of Radio.....	1 to 3
Just an Old Fashioned Station—KENE.....	5
Operating and Trouble Shooting for the Owner of a Michigan MRC-4 Receiver.....	9
An Evening at Home with the Listener In, a chart showing when to Listen in for your favorite stations.....	10
Advance Programs for the week at the Larger Stations.....	11 to 14
Batteries, Their Use, Abuse, Care and Upkeep, Part II—Construction of Electrolytic Rectifier, by William Fenwick.....	15
Editorial; Indi-Gest; Cor used by Dielectric.....	16
Secrets of Selectivity and Regeneration, Part IV—Stray Electromagnetic Coupling Phenomena, by William W. Harper.....	17
Helpful Hints to Get the Most from Radio, Chapter VIII—Grid Leaks and Biasing, by Thomas W. Benson.....	19
Internal Spider Web Coil Mounting, by R. Compton.....	21
Questions and Answers.....	22
Radiophone Broadcasting Stations—Part IV.....	23

Looking Ahead

The Largest Issue of Radio Digest Ever Published, Packed Full of Valuable Information, Will Appear Next Week. Forty pages of technical and semi-technical articles, broadcasting station news and features, advance program and station information, will satisfy every taste. The supply of copies will not be unlimited.

Beginning: "How to Build the Simplest Possible Super-Het," by John G. Ryan, Next Week. A full page could be devoted to telling of the superlative merits of this easy-to-make, inexpensive, simply operated "Rolls Royce" set. The model which the series describes, has been built from standard parts and tested for ninety days by Radio Digest technicians, but every test has proved it to be a blue ribbon receiver.

Low Loss Tuners, Condensers and What Not are very much in the public eye. What of them? Read the articles soon to appear which will tell what low loss means and what can be gained by the use of low loss parts when used PROPERLY.

Jacks and Jack Switches, What They Are and How to Use Them, is the topic of Thomas Benson's next "Helpful Hints" contribution. Learn how to connect jacks in a circuit.

How to Make a Storage B Battery and Its Charger, sounds interesting. This will be William Fenwick's next article on batteries. He also discusses C batteries.

KYW, Midwest Pioneer, Will Be Described in Word and Picture next issue. This popular Westinghouse station, home of the "World Crier" and many other original features, will be shown behind the scenes.

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

Of Course It's a CROSLLEY Better-Costs-Less Radio

For ease of tuning, selectivity and long distant reception, you can't beat a Crosley. Actual performances prove this day in and day out.

Here are what a few of the happy Crosley users say:

Apponag, Rhode Island. "I purchased my Crosley one tube No. 50 around the first of August and I think it is my duty to express my satisfaction of its performance during the warm spell. Have heard New York, Boston, Pittsburg, Cincinnati, Chicago, Detroit, Ottawa, Canada, and many other stations."

Dallas, Texas. "The set, Model 51, has already surpassed my greatest expectations. On the night of September 13th, Oakland, California, was received with sufficient volume to be clearly heard throughout seven rooms. Kansas City, Chicago and many other stations were received with respectively greater volume."

Chicago, Illinois. "My Trirdyn has done all that you claimed for it. The first silent night, Monday, September 22nd, using only two tubes, I pulled in twenty-eight stations. On the following night with most of the Chicago stations going full blast, using two tubes, I pulled in Memphis, Cincinnati, Dallas and Omaha."

(Names upon request) These are only a few of the thousands of unsolicited letters that come to us. You, too, can enjoy similar results with a Crosley. And the cost of any Crosley is remarkably low.

BEFORE YOU BUY—COMPARE YOUR CHOICE WILL BE A CROSLLEY

Crosley Regenerative Receivers are licensed under Armstrong U. S. Patent 1,113,149. Prices West of the Rockies add 10 per cent

For Sale by Good Dealers Everywhere



Crosley Trirdyn Regular \$65.00 With tubes and Crosley Phones, \$80.75

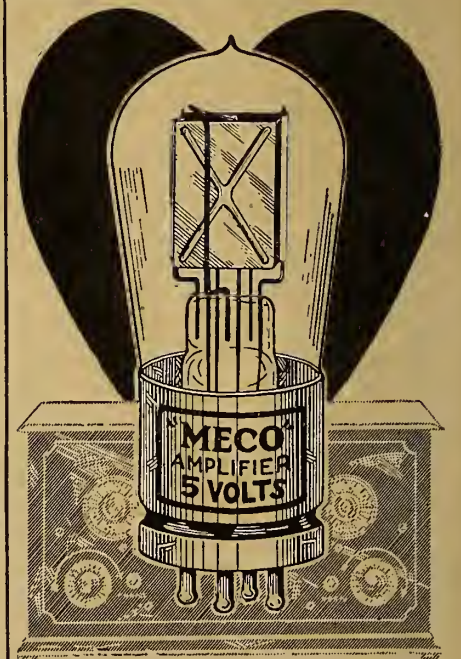
Write For Complete Catalog

The Crosley Radio Corporation

Powel Crosley, Jr., President

11492 Alfred Street Cincinnati, O.

Crosley Owns and Operates Broadcasting Station WLW



Has Your Radio "Heart Disease"

Here is good news to all who have receiving sets with "heart disease." Replace the weak tubes—the heart of your radio—with MECO TUBES and bring distant stations as clear and strong as "locals." The radical improvement in the construction of MECO TUBES gives longer life, and greater volume without hindering clear receptive tones. Made in 5-volt and 3-volt sizes with small or large base.

Sold by dealers everywhere at the standard price of \$4 and distributed by recognized radio jobbers and set manufacturers.

Metropolitan Electric Co. Des Moines, Iowa



POWER INCREASE IS SANCTIONED BY U. S.

STATIONS TO ADD WATTS IN SMALL STEPS

Government Radio Supervisors Must Approve Each Increase—Radiophans Will Be Judges of Feasibility

WASHINGTON.—Experimental increases in the power of broadcasting stations, beginning at 1,500 watts and increasing gradually in steps of 500 watts until a maximum power of 5,000 watts is reached, has been sanctioned by the department of commerce.

Radiophans need have no fear of "super power."

The increases in power will be allowed step by step under the direct supervision of the Radio supervisors of the commerce department only after the previous step increase has been shown to have been accomplished satisfactory to the public interest.

Blanketing of neighboring low power stations will not be allowed. The Radio supervisors will be responsible for the checking of the step-by-step increases in power.

No Super Power Requests Yet

No applications for stations of 25,000 to 50,000 watts power have been received at the department of commerce. The Radio Corporation of America is planning an experimental 50-kilowatt installation, but all experimentation will be under the direct supervision of the Radio section of the commerce department.

At any time should an increased power or super power station prove objectionable to the public, the offending station will be decreased in power allowance.

The increased power sanctioning comes as a conclusion to the third Radio conference.

Radiophans are asked to comment critically on the experimental increases in power, so that the Radio section may know its effect.

UNION MUSICIANS RESCIND; TO PLAY

Omaha Music Makers Withdraw Free Radio Service Bar Set May 15

OMAHA, Nebr.—After forbidding its members from playing over Radio without the full union pay, since May 15 last, Omaha Musicians' association, Local No. 70, reconsidered its action at the last meeting and voted unanimously to withdraw the Radio "ban."

There was considerable discussion on the subject, with an Omaha bass violinist leading the attack on the broadcasters. When the matter was put to a vote, however, those who favored playing for Radio for advertising, in return, overwhelmed the nays with their votes.

Station WLW Treats Fans to Novel Election Returns

CINCINNATI, Ohio.—Radiophans who tuned in on Station WLW election night found the air afire with the latest returns from all states and territories. Instead of the regular reading of the numerical tally, the audience imagined themselves to be in Squire Terwilliger's grocery emporium at Punkin Center listening to the returns.

To this gathering came Senator Shultz, who was visiting his mother-in-law's old home. Wholesome fun interspersed with the actual returns kept the invisible audience highly amused for the evening. But one can always expect to be highly entertained when listening to WLW.

NIGHTHAWKS' MERRY OLD CHIEF



Leo Fitzpatrick, director-announcer at Station WDAF, is winner of fourth place in the first annual Gold Cup Award, recently made by the Radio Digest for the world's most popular announcer. He is known to thousands as the "Merry Old Chief" of the Kansas City Nighthawks.

STATION WEW OPENS WITH NEW SCHEDULE

Sunday, Tuesday and Thursday Evenings Selected

ST. LOUIS, Mo.—Station WEW, the new St. Louis university Radio station is now broadcasting three evenings each week on a wave length of 280 meters. Sunday, Tuesday and Thursday evenings have been selected.

On Sunday evenings, beginning November 21, lectures on religious topics will be given, and on Tuesdays during Advent, Rev. James J. O'Regan, S. J., professor of philosophy at St. Louis university, will broadcast his Advent sermons.

The Thursday evening programs (only) will be of a light nature. This station was the first to broadcast in the Mississippi valley.

Lutheran Churches Broadcast

CHICAGO.—The evening celebration of the Lutheran churches of America on Luther Day, October 30, was broadcast by Westinghouse Station KYW here, and picked up by Lutheran congregations throughout the country.

Football Radiocasts

November 8

- Butler-Iowa at Iowa City, WHAA (484).
- Harvard-Princeton at Cambridge, WBZ (337), WCAP (469), WEAJ (492).
- Illinois-Chicago at Chicago, KYW (536), WMAQ (448).
- Indiana-Ohio at Columbus, WEAQ (294).
- Minnesota-Ames at Minnesota, WCCO (417).
- Northwestern-Michigan at Ann Arbor, WWJ (517).
- Pennsylvania-Georgetown at Philadelphia, WIP (509).
- Pitt-Geneva at Pittsburgh, WCAE (462).
- Washington-California at Seattle, KFOA (455).
- Yale-Maryland at New Haven, WGY (380), WJZ, (455).

November 15

- Harvard-Brown, WBZ (337).
- Michigan-Ohio at Columbus, WEAQ (294).
- Minnesota-Illinois at St. Paul, WCCO (417).
- Nebraska-Notre Dame, WGN (370).
- New Mexico-State College, KOB (360).
- Northwestern - Chicago at Chicago, KYW 536, WMAQ (448).
- Princeton-Yale at Princeton, WEAJ (492), WGY (380), WJZ (455).

CONGRESSIONAL EYE ON RADIO SITUATION

WILL RECEIVE ATTENTION AT NEXT SESSION

Representative White of Maine Was Constant Attendant at Recent Conference—Hoover Changes Mind

WASHINGTON, D. C.—That the Radio situation is going to receive attention at the forthcoming session of Congress seems an assured fact in view of statements made here of late by various government officials.

Representative White of Maine, sponsor of the Radio bill in the House of Representatives, was a constant attendant at the third Radio conference and it is believed that he got considerable ammunition to unload at the coming session. He came away from the conference feeling more strongly than ever that some Radio legislation is needed.

On the other hand, while absolutely no statement has been made at the department of commerce it is thought that Secretary Hoover is not nearly so anxious to push the Radio bill for action as he was during the last session of Congress. The reason for his apparent change of mind on this question is not known and he is not disposed to discuss the situation at this time.

CAPE COD BOASTS UNUSUAL STATION

Rustic Old New England Farm House Serves as Shelter for WBBG

MATTAPOISETT, Mass.—WBBG is probably the most unusual station in the world; located in the country the poet Whittier wrote about.

Located in Mattapoisett, a small village about seven miles from New Bedford, the towers of WBBG afford a striking contrast to the rustic scene as they point skyward from the grove of trees which shelter the old fashioned, rambling New England farm house in which the station is located.

One of the front rooms has been turned into the broadcasting studio. On a mantelpiece near the great open fireplace stands the "mike." From this room wires lead to the upstairs, where a 500-watt transmitter, built entirely by Mr. Irving Vermilya, the station's owner, is located. Power is furnished by storage battery.

A wave length of 248 meters is used. The antenna ammeter registers five amperes when the station is in operation and the "Voice of Cape Cod" can be heard from Florida to Wyoming.

With the experimental call letters, 1ZE and 1XAL, Mr. Vermilya, who is New England division manager of the American Radio Relay League, has been heard in England and France. Although regular programs are sent out only once a week, on Wednesday evenings, WBBG will soon be on the air three or more nights.

"When you hear us," says Mr. Vermilya, "remember, we are not on the top of some jazzy hotel roof, but tucked away, far from the maddening crowd, in an old fashioned farmhouse on old Cape Cod."

Cotterill Sisters on WOAW

OMAHA, Nebr.—The three Cotterill sisters—Bess, Florence and Alice—who are best known to Radiophans on the west coast, stopped in Omaha last Saturday night for a program from WOAW. They entertained with vocal selections, piano-logues, etc. They played last winter at The Mary Louise, one of Los Angeles' exclusive cafes, and also from KHJ, the Times station.



Celebrated orchestra, the feature of the Little Jesse James show company, which plays regularly from Station WIP. This orchestra has created quite a sensation in Radio circles, and WIP has received numerous requests to have them on their program. Ole Olesen, pianist, is the leader of this remarkable orchestra.

INSTALL RECEIVERS AT ARMY HOSPITAL

HOPE TO OBTAIN SETS FOR
MORE HOSPITALS SOON

Employ Receiver with Powerful Amplifier to Operate 3,000 Head-Sets and Six Loud Speakers

WASHINGTON.—Radio is gradually taking its place in the modern hospital as one of the most valuable adjuncts of curative medicine.

At the Walter Reed Army hospital here, a receiver with 1,500 headsets has been provided for the wounded and sick veterans. Six loud speakers have been placed in the assembly halls. This outlay is directly due to the effort of S. L. Rothafel, managing director of the Capitol theater in New York and his staff of artists. They have been engaged for some time in an effort to provide all military service hospitals with apparatus.

The general system employed in the use of the hospital receivers is this: One receiving set is used for the reception of broadcasts. A powerful amplifier, capable of supplying 3,000 headsets in parallel and a number of loud speakers, is employed. Each of the headsets can be turned off and on at the will of the listener.

Use Local Stations

One man is required to be in charge of the set at all times. Although the outfit is capable of tuning in stations at great distances, because of interference local stations are used except on special occasions. In the four months the set has been used at the Reed hospital, the results have been highly satisfactory.

With the aid of a staff of government experts assisting technically, numerous campaigns are now being made to equip every government hospital with similar apparatus for the entertainment of the shut-in men.

La Follette Objects to Treatment at WHO

Claims Stations Are Trying to
Keep Him Quiet

WASHINGTON.—Because Station WHO at Des Moines, Iowa, refused to allow him to broadcast his speech, Senator La Follette recently appealed to Secretary of Commerce Hoover, claiming that a monopoly had been formed to prevent him from going on the air.

Mr. Hoover has declared that Senator La Follette obtained more favors from the Radio section of the department of commerce than any other candidate running for office.

"Station WHO is a privately owned station," Secretary Hoover said, "and it is up to the individuals who own it whether or not a person may broadcast his views on the political situation."

STEAMER HEARS KFGZ NEAR HOLLAND COAST

Michigan Station Is Frequently
Heard, Dutch Operator Says

BERRIEN SPRINGS, Mich.—New laurels have been won by KFGZ, "The jazzless broadcasting station." Word brought from Europe last week by Director Paul N. Pearce states that the "Radio Lighthouse" was picked up by the Marconi operator on the S. S. "Batavia" while it was plowing the chilly waters of the North Sea.

Mr. Pearce was traveling from England to Holland, on the "Batavia," when the Dutch operator mentioned incidentally that he had frequently heard the station which Mr. Pearce represented.

Lectures on Personality

CHICAGO.—Appearing on the Saturday program of Station KYW, Miss Pauline Dunstan Belden has just recently resumed her lectures on "Personality" from the Congress hotel studio.

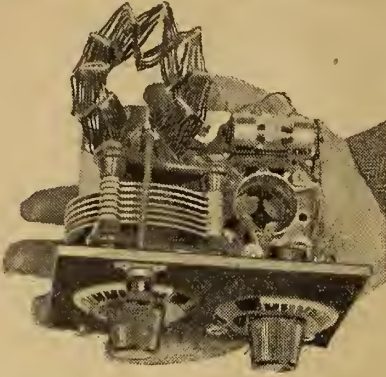
She is giving a series of six weekly talks, which will continue until November 29. Miss Belden has been giving lectures on the subject at twenty-eight of the largest local institutions and has aroused considerable comment.

British Boost Radio Week

LONDON.—In British Radio circles great interest is being evinced in the proposal for an international Radio week, which it is hoped to arrange from November 23 to 30.

The Radio stations in Germany are encountering the inevitable problem of how to pay for broadcasting. Berlin proposes to resort to paid advertising to help.

Baby One Tube Set



This miniature one-tube regenerative receiver built by Fred C. Mathews of North Bergen, N. J., is of splendid workmanship and design. An unusual low loss coil permits it to cover great distances.

When Station 2LO London, recently broadcast card games, the people voiced their disapproval and it was immediately stopped. No one has ever kicked about the checker games which are broadcast.

NATIONWIDE INTEREST RESULT OF NAVY DAY

Twenty-Seven Stations Broadcast
Songs and Sea Lore

WASHINGTON.—Twenty-seven broadcasting stations, well distributed throughout the country, treated the Radiophans to a real salty concert, Navy day, October 27. Sea-going songs and lore of the sea predominated.

Navy day, unlike defense day which the Army held recently, was to show and tell what the Navy can and does do, at the same time providing an evening of entertainment.

Noted Debate Broadcast

CEDAR RAPIDS, Iowa.—A debate between Oxford university's team and Coe college of Cedar Rapids was broadcast recently through WJAM, Evening Gazette-Iowa Railway and Light company station here, by remote control from Coe chapel. Malcom MacDonald, son of Prime Minister Ramsey MacDonald of England, is a member of the Oxford team.

WLS Heard in Hawaii

CHICAGO.—Another long distance reception record was announced today by Station WLS, located here. Director Edgar L. Bill received a letter from W. I. Harrington of Wailuka, territory of Hawaii, which stated that at approximately 8:05 p. m. Honolulu time, September 30, he heard WLS.

KFDM Plans Increase in Program Schedule

Magnolia Petroleum Station at
Beaumont Plans Expansion

BEAUMONT, Texas.—Far down in the southern oil country KFDM is located.

This station, owned and operated by the Magnolia Petroleum company, is a 500 watt transmitter and operates on 306 meters and 980 kilocycles.

It is located on the top of the administration building of the refining company and uses the slogan, "Kall For Dependable Magnolene." Magnolene Mike is the chief announcer. H. H. Ziller is the director and Dr. Harry Cloud is leader of the company band and musical director. C. B. Trevey is the operator.

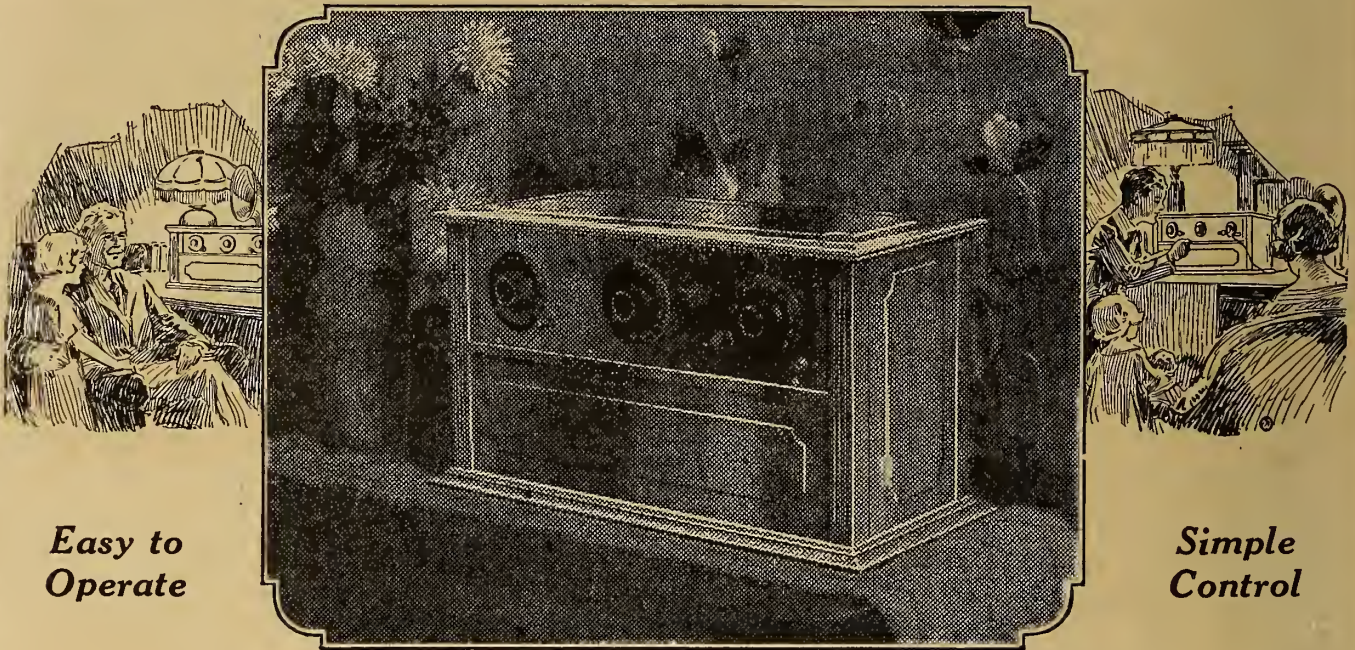
A varied musical is given every Tuesday evening and on Friday a band concert. It is expected that the station will soon increase its broadcasting schedule.

Station WEO Gives Prize for Most Popular Slogan

COLUMBUS, Ohio.—"Willing, Energetic, Athletic Ohio."

This is the winning slogan in the football motto contest conducted by WEO, Ohio State university. H. M. Young, of Urichville, Ohio, was winner. The prize was two tickets for the Chicago-Ohio football game.

The slogan is being used by WEO in broadcasting of games from Ohio stadium.



Easy to
Operate

Simple
Control

WHEN you own a Radiodyne you can tune in on broadcast programs without wasting time tinkering. The Radiodyne shuts out interference from nearby stations. By simply adjusting the dials as indicated on the Radiodyne chart you can select the stations you wish to hear. All batteries are enclosed in the beautiful two-tone mahogany cabinet that will harmonize with your other furniture.

Uses a 25 Foot
Lamp Coil for
Summer Reception

Radiodyne

Wife Gets Good
Results After Two
Minutes Instruction

"We are getting constant reception this summer from stations 500 to 1000 miles away on loud speaker with a 25 foot length of lamp coil. I got Los Angeles, San Francisco and Cuba."

Bernard S. Slay, Minneapolis, Minn.

"I gave my wife two minutes instruction and left her alone with the set. When I came back she said that signals had been roaring in all evening and had a log to prove it."

Robert Seldon Rose, Marquette, Mich.

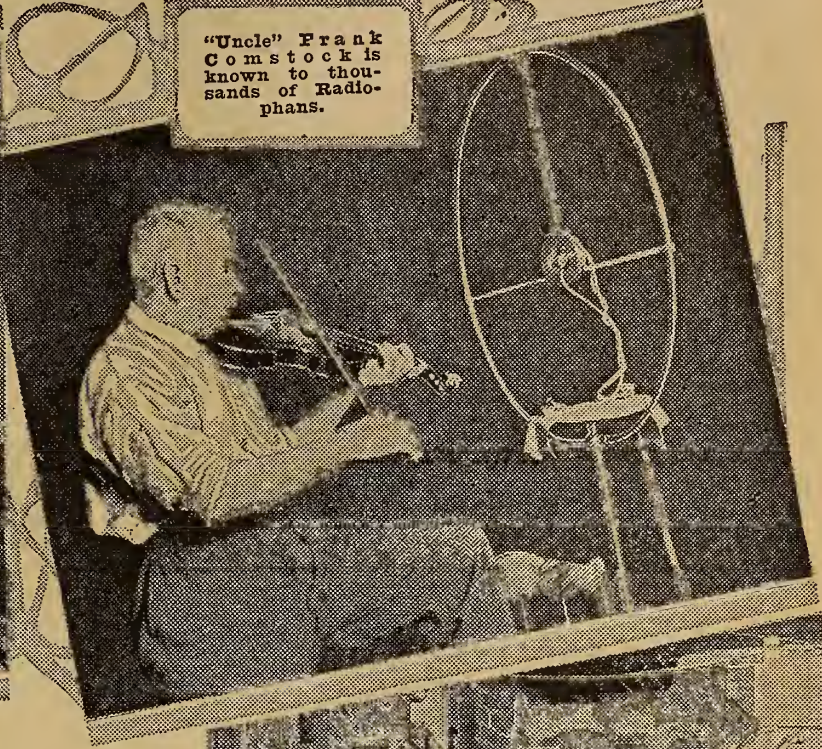
Write for illustrated folder which describes the Radiodyne in detail.
If you buy a radio before you have a demonstration
of the Radiodyne you will surely regret it.

Western Coil & Electrical Co., 312 Fifth St., Racine, Wis.

It's Just An Old Fashioned Station—KFNF

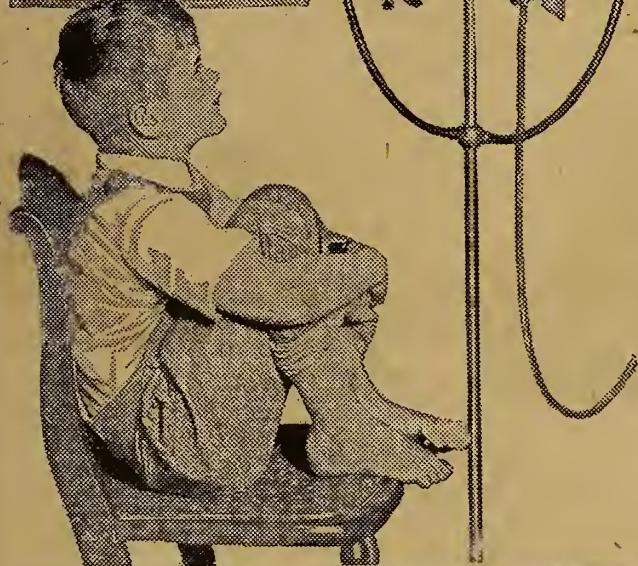


Characteristic pose of Henry Field before the microphone. Shirt sleeves are permitted in this studio.



"Uncle" Frank Comstock is known to thousands of Radio-phans.

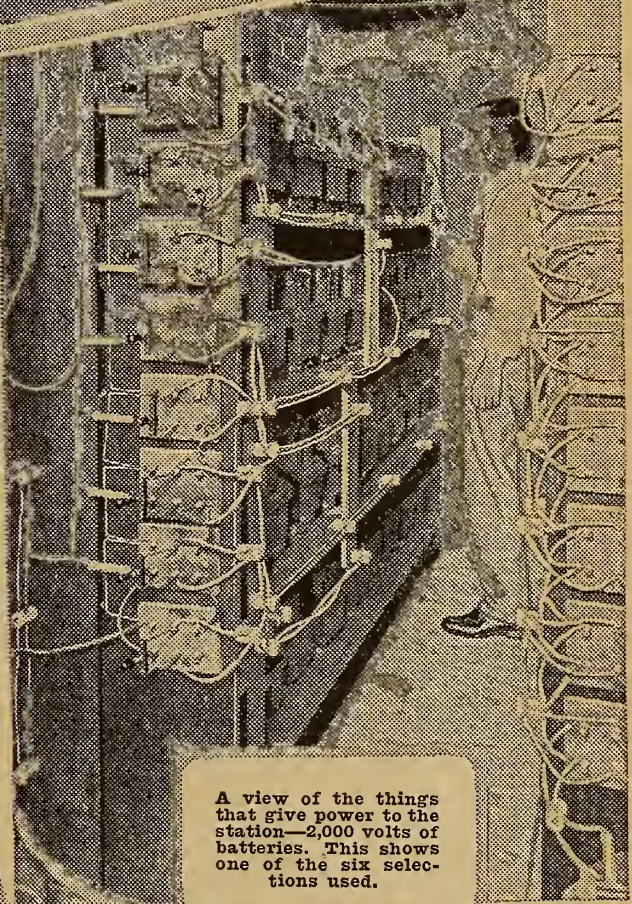
Here's one reason KFNF is "different" from other Radiocast stations throughout the nation. The bare-footed boy, generally with stubbed toe, is always welcome.



predominate. The more old-fashioned they are, the better, because KFNF is a station catering to a Radio clientele which loves the old-time tunes.

The story of how KFNF's idea was conceived, is of interest. Henry ("Himself") Field, owner and operator of the station became interested in Radio several years ago. There were some two or three hundred stations on the air, and every one of them, without exception, Mr. Field avers, featured the shrill of the cornet, the teasing note of the saxophone and the thunder of drums,—jazz, jazz, jazz!

"For Heaven's sake, give us an old-fashioned tune once in a while" was the message Mr. Field sent to the various stations. To several, he expressed phonograph records (records were played a great deal in those days) of music such as "Casey Jones," "Turkey In the Straw," "We Shall Gather at the River," "Lead Kindly Light," (Continued on page 8)



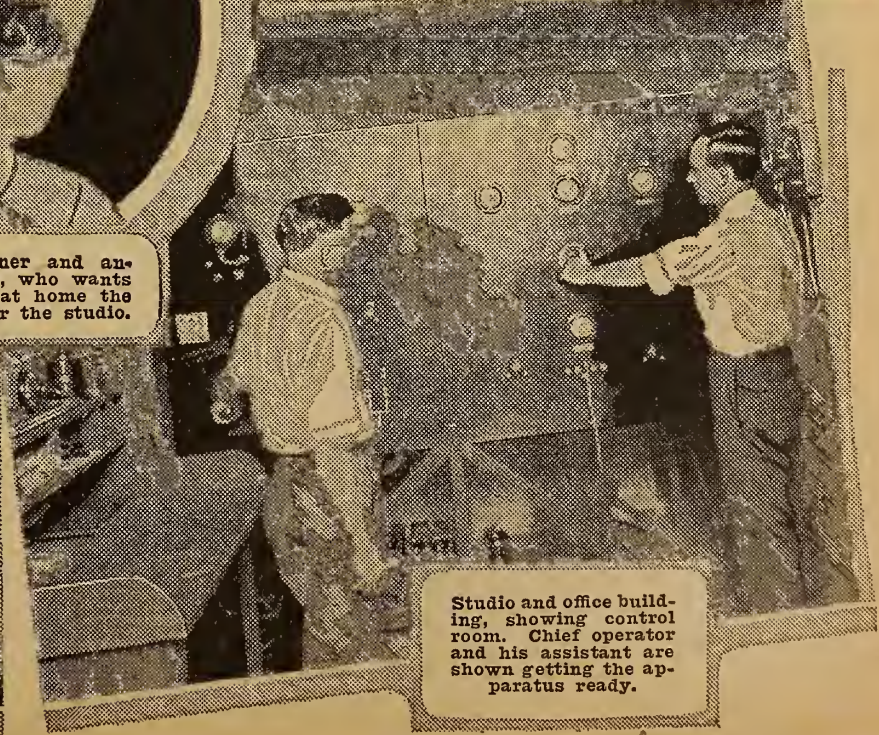
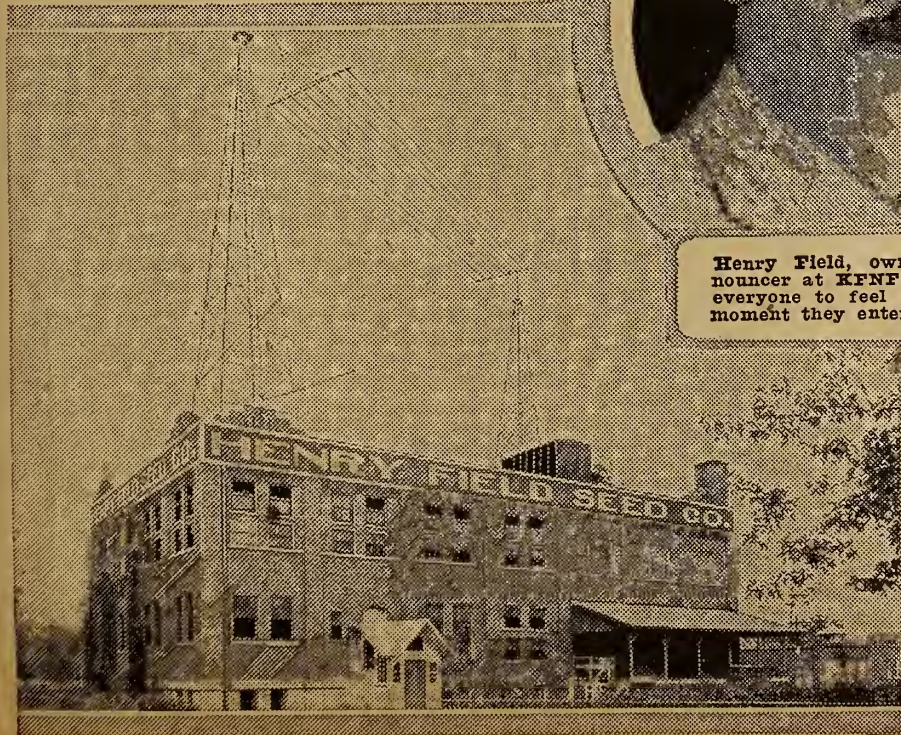
A view of the things that give power to the station—2,000 volts of batteries. This shows one of the six selections used.

A PIANO is about the nearest thing to a jazz instrument they have at KFNF, the Radio-casting station of the Henry Field Seed Co., at Shenandoah, Iowa, unless old-time fiddling is to be considered jazz.

KFNF is one of the stations of the country in a class by itself. There, the old-fashioned melodies which used to come from the foot pedal organ,



Henry Field, owner and announcer at KFNF, who wants everyone to feel at home the moment they enter the studio.



Studio and office building, showing control room. Chief operator and his assistant are shown getting the apparatus ready.

PACIFIC NORTHWEST HAS LARGE STATION

LOCATED IN MOUNT BAKER DISTRICT OF SEATTLE

Studio and Offices Located in Downtown District—Connected to Operating by Private Wires

SEATTLE, Wash.—Station KFQX, the first 1,000-watt station on the Pacific Northwest coast, enters the broadcasting field and bids fair to be the largest of them all.

Located in the Mount Baker district of this city on a high bluff overlooking Lake Washington, this station, operating on 233 meter wave length, has been heard throughout the country with wonderful success.

The studio and offices are located in the downtown district and are connected to the operating room by private telephone lines. Considerable time has been spent on the accoustic treatment of the studio to make it perfect in every detail.

A remote control line has been completed to the Bagdad cafe, where a celebrated orchestra plays for the Radiophans every evening. Other remote control lines to various points throughout the city are under construction. The station intends to introduce to the public something heretofore unattempted, according to a statement made by its general manager.

French Want Own Terms

PARIS.—Commandant Rene Mesny, famous short wave expert of the military service here, complained that French amateur Radiophans should not use such words as "fading," "speaker" and numerous others of American origin. The French should originate a Radio vocabulary of their own, instead of lazily sitting back and using other's words.

CROSS WORD PUZZLE CHAMPION



Mrs. Ruth Von Puhl, who recently won the world's crossword puzzle championship, is shown putting her first crossword puzzle on the air at WAHG, A. H. Grebe company, station. This was her first appearance before the microphone.

Roxy's Gang on Stage

NEW YORK.—Capitol theater Radio artists, better known to the Radiophans as "Roxy's gang," made a hit recently when they produced upon the legitimate stage an ensemble number called "In a Song Shop." The artists held a reception for their Radio friends backstage every afternoon throughout the week.

Broadcast Coolidge Address

WASHINGTON, D. C.—President Coolidge's address on October 23 to the eastern division of the Chamber of Commerce of the United States was nationally broadcast. Arrangements for the broadcasting of the talk were made by Station WCAP.

In Which Auto Racer Quails Before "Mike"

Famous Driver Loses His Head for First Time

SALT LAKE CITY.—Many a brave man who faces death in his work quails when he faces the microphone.

Witness Babe Stapp, famous automobile racer. Stapp, one of the best known drivers on the Pacific coast, visited Station KDYL during a recent race here. With him were Tony Morosco and Eddie Hearn, more race celebrities.

When Stapp asked to announce the results of the race and order some parts for his machine from Los Angeles, his request was gladly granted. Stapp started to talk as though he was speaking to someone in the room, and with the usual gestures. Suddenly he backed away from the "mike" as though it would bite him and he muttered and stuttered. Finally his courage came back and he finished. Even the station attendants were convulsed with mirth.

Fifteen minutes later a telegram arrived saying that every word Stapp said had been clearly heard. The automobile parts would be sent immediately.

"That sure is fine," said the racer, "but I think I'll stick to the tracks in the future."

Celebrated Athletic Coach Gives Weekly Sport Review

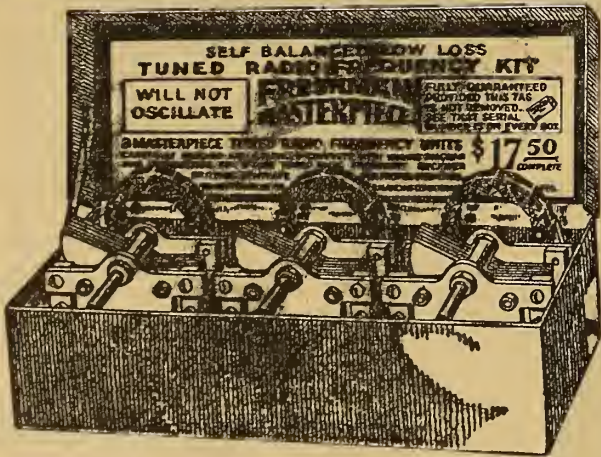
SCHENECTADY, N. Y.—Harold Anson Bruce, director of physical training and athletics at Union college, this city, will give a weekly sport review every Monday evening at 6:30 o'clock from WGY.

Mr. Bruce is known throughout the athletic world as "king of minor college track coaches," and is famed as being the man who developed J. Alfred Leoney, world 100-yard dash record holder.

FRESHMAN MASTERPIECE

It's Easy to Build

a five tube radio frequency receiver when you use the Freshman Masterpiece Kit



No Neutralizing or Balancing Condensers Required

when you build with this kit to produce a radio frequency receiver that will bring in even the most distant stations with the volume and clarity of locals. So selective that stations can be brought in day after day at the same dial settings. A set that will be the equal, if not the superior, to any 5 tube receiver on the market, and what's more, it's the easiest set in the world to operate.

Kit consists of 3 Masterpiece Tuned Radio Frequency Units carefully matched and balanced. Complete with wiring diagram and instructions for building any 5 tube tuned radio frequency receiver and also drilling template for proper mounting....

\$17.50

Each and every Freshman Masterpiece Coil bears a serial number and Trademark—our guarantee of electrical and mechanical perfection. Every genuine Freshman Coil is made of specially insulated wire to prevent short-circuiting, so often caused by inferior coils. For your protection demand only the genuine.

At your dealers, otherwise send purchase price and you will be supplied without further charge.

CHAS. FRESHMAN CO., INC., 106 Seventh Ave., New York.



Insist on the Gold Seal HOMCHARGER \$18.50 at your dealer (in Canada \$26)



You needn't have "battery trouble"

14 Gold Seal HOMCHARGER Features

- 1—Simple; needs no care.
- 2—Efficient; costs about 5c to charge the average battery, much less than bulb or liquid types of charger.
- 3—Quick; brings battery up to full charge overnight.
- 4—Tapers charge; cannot injure the battery.
- 5—Clean; no bulbs to break, no liquids to spill or produce fumes.
- 6—Dependable; adjusted and sealed at factory.
- 7—Lasts forever; only one moving part, the Tungsten contact, which can be replaced at \$1 after many thousands of hours of use.
- 8—Fool-proof; charges automatically, no matter which clip is attached to which battery terminal.
- 9—Safe; approved by Fire Insurance Underwriters. No danger of shock or fire.
- 10—Beautiful; sturdy metal case finished in mahogany-red and gold.
- 11—Universal; made in types for all voltages of alternating and direct current. Charges all radio "A" and "B" batteries, and automobile batteries.
- 12—Quiet; its faint hum cannot be heard in next room.
- 13—Unqualifiedly guaranteed.
- 14—Popular price — sold everywhere for \$18.50; in Canada \$26 Complete, no extras to buy.

TWO things will make your enjoyment of radio free from battery trouble. First, any good storage Battery. Second, that excellent, simple, automatic charger — the new, silent Gold Seal Homcharger.



Such a combination means minimum care and maximum results, with no trouble at all. Then you can use your set all you want. If the battery becomes weak right in the middle of a program, screw the Homcharger plug in any lamp-socket, snap two spring clips over the battery terminals, and go right on listening at full power. Leave the Homcharger connected overnight, and in the morning the battery is charged again.

Everybody says this is the handsomest charger ever seen. The Gold Seal Homcharger is finished in mahogany-red and gold. It has rubber feet and so cannot mar polished floors, tables or cabinets. Safe—approved by the Fire Insurance Underwriters. Can't injure anything.

When buying a set, get storage battery tubes. They give most volume, and in many cases better results in distance, too. Make sure the battery you buy is charged, then you can listen in for a week to a month before you buy your Gold Seal Homcharger. Price only \$18.50 complete; \$26 in Canada. Absolutely guaranteed.

FREE! Ask your dealer or send direct for our interesting free booklet, "The Secret of Distance and Volume in Radio," containing valuable information on this subject and fully describing the GOLD SEAL HOMCHARGER.

Insist on the Gold Seal Homcharger—ask your dealer.

The AUTOMATIC ELECTRICAL DEVICES CO.
Under the same management as the Kodel Mfg. Co.
215 W. Third Street, Cincinnati, Ohio
Largest Manufacturers of Vibrating Rectifiers in the World

Canadian Government Ship "Arctic" Hears Broadcasts Sent from KDKA

Over Three Degrees Above Arctic Circle, Making Reception of Messages Through Static and Storms Remarkable—
Now Entering the Zone of Perpetual Daylight

MONTREAL, Quebec. — Complete and perfect reception of over 200 messages sent from Pittsburgh's powerful new short wave station, KDKA, by the Canadian government ship "Arctic" has been reported to amateur Station 4FV of Regina, Sask.

The "Arctic" established communication with 4FV after no word had been had for several weeks. Several other stations, namely 3CO, 3VH and 9AL also communicated with the "Arctic."

The boat is at present over three degrees above the arctic circle making the reception of the messages through terrific mid-summer static and storms remarkable. At this point near MacMillan's winter headquarters, the "Arctic" is in the zone of perpetual summer daylight. This added greatly to the difficulty of good reception.

In 1923 as an experiment the Hudson's Bay company installed eight Canadian Westinghouse company receiving sets at various outposts from St. James Bay, in camps on the Labrador coast and to points far above the Arctic circle. Remarkable results were achieved and sets were installed at various other posts and on both of the Hudson's Bay company's boats, the "Nascope" and the "Bayeskimo."

Plan Great Season at CYK, Winnipeg Plant

Artists Now Booked for Mid-Summer Programs

WINNIPEG.—With artists booked for entertainment far into mid-summer, Station CKY of the Manitoba Telephone system, promises its most brilliant and successful season.

There will be programs Radiocast by the leading music houses and choir concerts from several churches co-operating in local broadcasting. Rebroadcasting of programs from long distance stations will be an added feature due to perfection of remote control apparatus recently installed.

BOLL WEEVIL FINDS NEW DIFFICULTIES

WASHINGTON.—Consider the lot of the much abused boll weevil. When he goes into the country he is sprayed with poison. In the city he is driven by hunger and lack of proper food to eating electric wire insulation. Now Radiophans have complained against him and the bureau of standards is concocting a spray to cover insulation with metal on which the weevil will break off his beak. And all because when he eats he makes short circuits.

Chesapeake Telephone Co. Threaten to Quit WCAP

WASHINGTON, D. C.—The Chesapeake and Potomac Telephone company is threatening to abandon its station, WCAP, unless the Public Utilities commission of the District of Columbia permits it to include the upkeep of the station as an operating expense in considering telephone rates. While the difference has not reached a critical point, the matter is left to the decision of the company itself, inasmuch as the commission has stated that this upkeep cost absolutely will not be allowed.

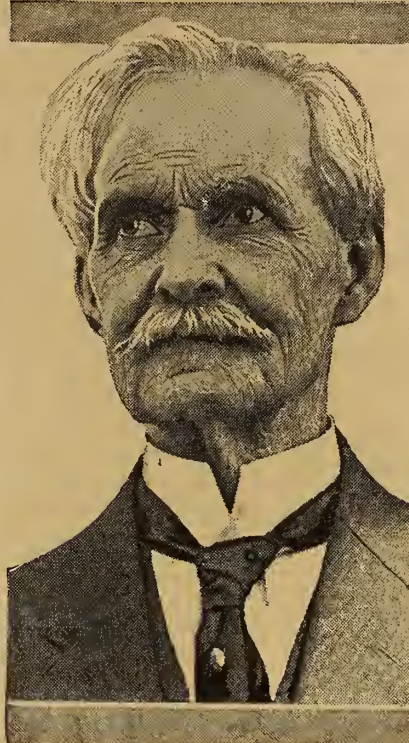
U. S. Cruiser Hears Shenandoah

WASHINGTON.—Signals sent out by the naval dirigible Shenandoah, while moored to her mast at San Diego, using her low power short wave set, were picked up by the U. S. S. Canabus cruising in the Pacific 4,400 miles away.

New Station in South Africa

CAPETOWN, S. A.—The Broadcasting committee of the Cape Peninsula association, which holds an exclusive broadcasting privilege of the Cape province, has accepted a tender of the Marconi company for the installation of a six-kilowatt plant.

FAMOUS INVENTOR WINS PATENT SUIT



WASHINGTON, D. C.—A three years dispute has just been settled by the District of Columbia Court of Appeals between Dr. James H. Rogers an inventor of this city and the government regarding a submarine Radio patent. The opinion reverses three decisions made by the patent office which have been unfavorable to Dr. Rogers. In the court's decision he was declared to be the original inventor of the submarine Radio which was perfected prior to the entrance of the United States in the World War and which was used during the war.

John A. Willoughby and Percival D. Lowell, former employees of the Bureau of Standards filed a claim in the patent office on behalf of the government, and stated that the submarine Radio was the result of their joint efforts. Their claim, however, was overruled by the court.

A SPLIT INFINITIVE? ASK THE SPECIALIST

TO REPAIR VOCABULARIES; BROKEN DOWN SPEECH

Mrs. Wilda Wilson Church to Give Course in Language Instruction from Station KGO

OAKLAND.—Now comes that a Radio hospital for broken down vocabularies and defective parts of speech has opened its doors. Any listener may write to KGO and describe his struggles with grammar and words.

From the General Electric Pacific Coast station, it is announced today that Wilda Wilson Church, director of audio players in drama, the language doctor in charge. It is intended that the school be kept free from as much of the purely academic as possible.

"Listeners are invited to write me giving their troubles," said Wilda Wilson Church, "and I will develop my course of instruction from the requests that come in the mail."

What's Your Trouble?

So there you are. If you are having any trouble with idioms, synonyms, antonyms, nouns, pronouns, or derivations, or should your case have been diagnosed as split infinitive, just write W. W. Church a letter. She will prescribe.

That the course will also aid parents who are unconsciously, in many instances, teaching their children the English language is apparent. "When a child learns to say 'ain't' at home," continued Mrs. Church, "it is very difficult to get him to change even after several years in school."

WEAF Adds Capitol Theater Organ Recitals to Program

NEW YORK.—Arrangements made whereby the Capitol theater broadcasts weekly organ recitals as part of its Radio activities. The recitals are scheduled for Tuesday and Friday mornings at 11:30 Eastern time, with Dr. Melchiorre Mauro-Cottone at the console of the Capitol Grand organ.

The music is sent out direct from the theater through Station WEAF.

A little sealing wax dropped on the edges of the windings of a coil will usually prevent the wires from slipping.

Why it is Better

"MASTER of Every Note in the Orchestral Range" is the proven claim of the Federal No. 65 Audio Frequency Transformer!—Volume without distortion is the basis for the beauty of Federal Tone.

From its oversize locking nuts to its heavy brass mounting feet the Federal No. 65 Transformer incorporates the same engineering skill that has made Federal the recognized leader in electrical communication apparatus since 1890.

Insist upon Federal parts for your "pet" hook-up. There are over 130 standard parts bearing the Federal iron-clad performance guarantee.

FEDERAL TELEPHONE & TELEGRAPH COMPANY
BUFFALO, N. Y.

Boston New York Philadelphia Pittsburgh Chicago
San Francisco Bridgeburg, Canada



Federal

Standard RADIO Products

Oversize locking nuts, slotted for screw driver, eliminating use of pliers to tighten

Large laminated silicon steel shell type core.

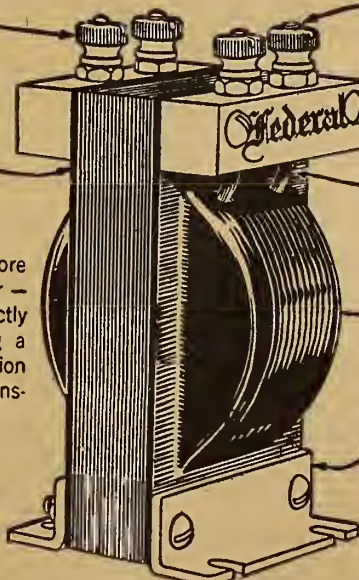
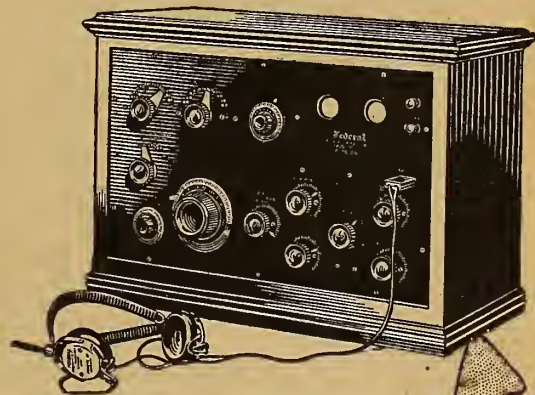
In general the larger the core the better the transformer—Federal No 65 weighs exactly 1 1/4 pounds—guaranteeing a tonal quality and modulation pre-eminent among transformers

Primary and secondary fed thru hollow screws and dip-soldered making complete protection against breakage or shorts.

Only highest grade genuine varnished cambric tubing used

Black enameled shield completely surrounding windings

Heavy nickel plated brass mounting feet—2 screw slots and 2 screw holes for mounting.



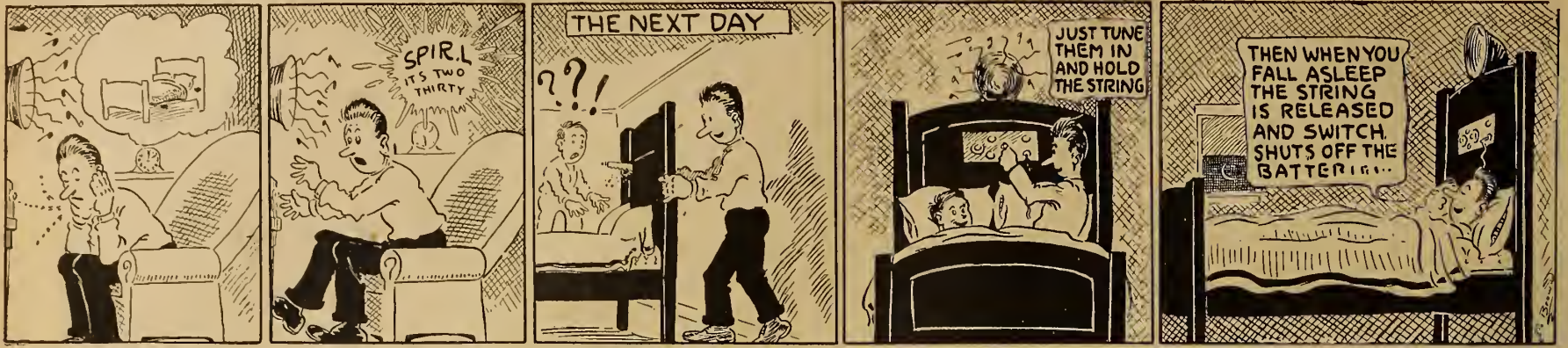
Look for this sign



THE ANTENNA BROTHERS

Spir L. and Lew P.

BED Signing Off—Good Night



OLD FASHIONED — KFNF

(Continued from page 5)

"Juanita," and the like. And still they ignored him. They would play his records once and then throw them away. It was while he was in this frame of mind that Mr. Field conceived the station featuring old-time music for old-fashioned folks, and last year KFNF was the result.

The first piece of furniture put in the studio was one of those old-fashioned organs, like the one you used to see at grandma's house in the country. Then came the fiddlers, the country girls singing hymns and other melodies popular twenty years ago until today KFNF has the most complete list of old-fashioned entertainers of any station in the world. It leads in this respect.

KFNF has some unique studio rules, written by Mr. Field, after his early experiences in listening to other stations, to-wit:

No child prodigies permitted before the microphone.

No speeches over five minutes in length.

We reserve the right to pull the plug on any speaker who gets mean or tiresome. (We to be the judge.)

Dedication of numbers prohibited.

The sight of a dress suit or other formal wear about KFNF probably would cause such a commotion that the roof of the studio would tumble in.

"Radio listeners can't see us, so why shouldn't we dress comfortably," argued

Mr. Field. And as a result, entertainers (male) in their shirt sleeves and female songstresses wearing aprons, or sunbonnets, are quite the thing.

Mr. Field fairly radiates personality when he announces from KFNF. Everything that goes on within the studio is permitted to go to the ear of the Radiophan listening somewhere. When Mr. Field turns from the "mike" to inquire of "Uncle" Frank Comstock what is next number is to be—all the conversation goes onto the air. If Henry "Himself" gets a whiff of something which makes his nose itch and he has to sneeze—why, that goes out, too!

Mr. Field's Radio mail, if it can be taken as a criterion, indicates that there are old-fashioned folks all over the Union. They are to be found in the big cities—New York and Chicago—just as they are in the "Main Street" towns and on the farms.

The composite report from a KFNF listener would read something like this: Your programs are wonderful. "Annie Laurie" brought back pleasant memories last night when one of your girl singers sang it so sweetly."

"So if we can make folks happy and feel like that, we are accomplishing something," is the psychology of Mr. Field.

Finland has had for some time several Radio stations in operation for commercial purposes. They are using 5,700, 2,000 and 1,500 meters wave length.

New Radiocast Opens in Hollywood; KNX

Wonderful Display as Station Goes on Air First Time

HOLLYWOOD, Calif.—At last! The capital of the silver-sheet industry now has an avenue of expression through which it may reach the world, "The Voice of Hollywood," or, as it is better known, Station KNX.

Amid a colorful setting and with a galaxy of prominent moving picture stars, this station started its career with a wonderful program, as a myriad of kleig lights played on the outside of the building, with ever changing colors.

Milton Sills, one of screenland's leading representatives officially opened the new station. Mr. Sills' greeting to the invisible audience was a word masterpiece and brought favorable comment from thousands of Radiophans.

A Hudson Falls, N. Y. resident who has lost the address of a relative living in a western state recently asked Station WGY, Schenectady, to broadcast a request to the sister to write soon.

New Wave Allocation Soon to Take Effect

Lengths Cannot Be Changed Until Licenses Expire

WASHINGTON, D. C. — Suggestions made at the recent Radio conference including the new zoning of the United States and assignment of wave lengths will be put into operation as soon as practicable.

One of the matters which will take considerable adjustment is that of the assignment of new wave lengths because the present wave lengths cannot be changed until the license period is up, unless done voluntarily. In addition it will be necessary, in order to keep from conflict, to make all wave length changes simultaneously. It is not probable that the new wave length assignments can go into effect for the next few months.

The Indian government is prepared to enter into an agreement and grant licenses to a private concern in India for the establishment and operation of Radio service as a part of the Indian link to the British Radio imperial scheme.

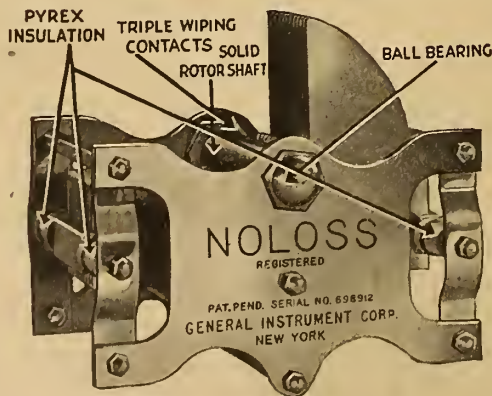
It's Easy to Understand Why

these condensers overcome losses and give power to your set. Air, Isolantite, Pyrex, Corantum and Quartz are the only recognized zero or minimum loss insulations in existence. General Instrument Corporation insulates with AIR, ISOLANTITE, PYREX, CORANTUM and QUARTZ. Thus you are certain of greater distance, increased selectivity and clearer reception.

NOLOSS

TRADE MARK

Insulated with Pyrex



Type	Maximum Capacity	Minimum Capacity	Price
51X	.00025 mfd.	9 mmfd.	\$6.00
51A	.0003 mfd.	11 mmfd.	6.00
51D	.0005 mfd.	13 mmfd.	6.50
51F	.001 mfd.	20 mmfd.	7.00
52D	.0005 mfd.	13 mmfd.	9.00
52F	.001 mfd.	20 mmfd.	9.50

At your dealers or direct from

GENERAL INSTRUMENT CORP.

423 Broome Street
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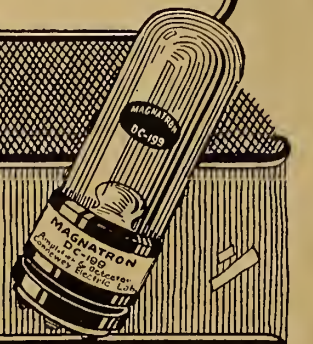
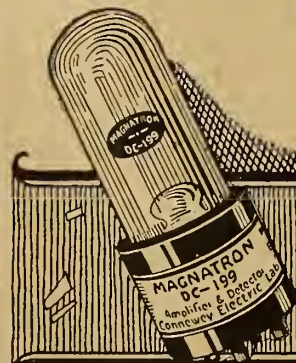


MAGNATRONS

THE improved MAGNATRON available to you today knows no equal in the vacuum tube field. It is the most sensitive detector, the most powerful audio amplifier and the most stable Radio amplifier we have ever developed.

The improved MAGNATRON far surpasses even the original MAGNATRONS upon which we have built our reputation. That, in itself, is saying enough.

The improved MAGNATRONS are tipless. This feature prevents breakage. The price is low. The MAGNATRON DC-201A, the MAGNATRON DC-199, and the MAGNATRON DC-199 with large base all list at only \$4 Your dealer sells them!



CONNEWAY ELECTRIC LABORATORIES

309 Fifth Ave., New York City

OPERATING AND TROUBLE SHOOTING

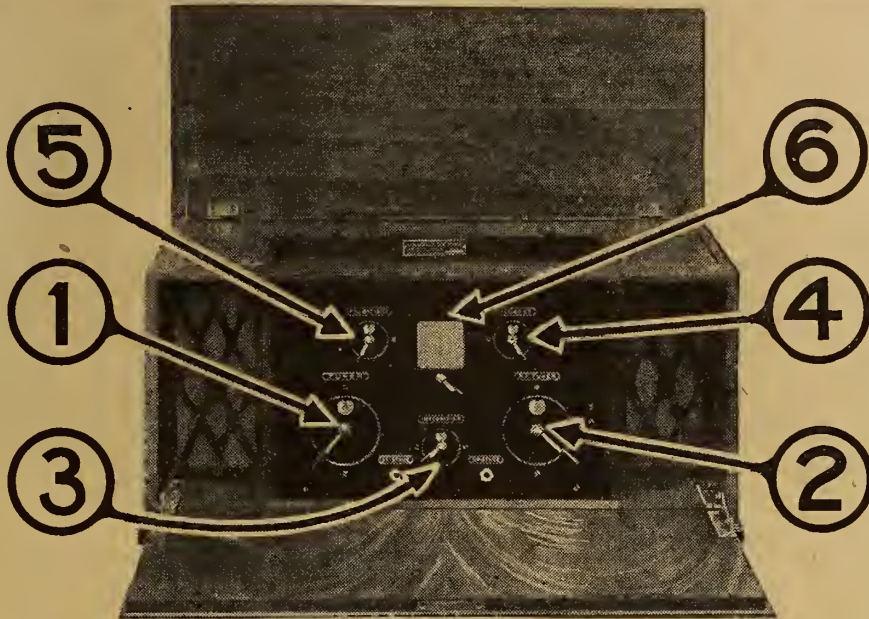
For the Owner of a Michigan MRC-4 Receiver

OPERATING and Trouble Shooting" is a Radio Digest feature whose purpose is to study the late models of various standard receiving sets and to show the newly initiated Radiocast listener, who has purchased such a set, how he can operate it to get the best there is in it, and how he can overcome minor difficulties which may be causing some trouble. This week Michigan Four Tube MRC-4 Receiver is described. Radiophans with other sets will also find these worth while reading, particularly the notes on trouble finding.

THE MRC-4 is made to operate equally well on UV-199, C-299, UV-201A or C-301A tubes. The sockets, it will be noted, are of special design, mounted in gangs on a rubber supported Bakelite shelf. This construction will be especially appreciated when using 199 or 299 tubes. Although the sockets are for standard base tubes, they will accept practically any adapter which may be used for a dry cell tube.

Connecting Set

Before hooking up this set it is wise to have the filament switch, Number 5, on "Off" position, to leave it there while making connections, and to put the tubes



in their sockets only after all connections are made and checked, not before. Reading consecutively from left to right, when facing the receiver, it will be noted that the connections are to be made to the binding posts respectively, as follows: Antenna, Ground, C minus, C plus, A minus, A plus, B minus, 22½-volt B plus, 60 (to 90) volt B plus, and the last two posts for loud speaker.

Antenna

The antenna should be a single wire from 50 to 100 feet in length, supported at each end by insulators and, preferably, soldered to a lead-in wire. Excellent results may be obtained on a comparatively short antenna. It should, however, be well insulated and precautions as to insulations should be observed on the lead-in. Where this goes through the wall or window frame, a porcelain tube should be used.

Batteries

It is not absolutely necessary to use a C battery with this set, but it is strongly recommended, since louder signals can be secured thereby. In addition to this fact, the B battery consumption is considerably lessened by the use of the C battery. If no C battery is used, a wire connection should be made between the C minus battery post and the C plus battery post. When using the C battery, remove this wire and connect the negative C battery terminal to post marked C minus and the positive C battery terminal to post marked A, C plus. The C battery should be 3 or 4½ volts.

When using UV-199 or C-299 tubes, three dry cells connected in series, or six dry cells connected in series parallel may be used. Never connect more than three dry cells in series, as the result will be burning out of tubes.

When A tubes are used, it is preferable to use a 6-volt storage battery since the current consumption on the A tube is ¼ ampere instead of .06 ampere as on 199 or 299 tubes. If it is desirable to use a storage battery with the 199 or 299 tubes, only 4 volts or two cells of the 6-volt battery should be used.

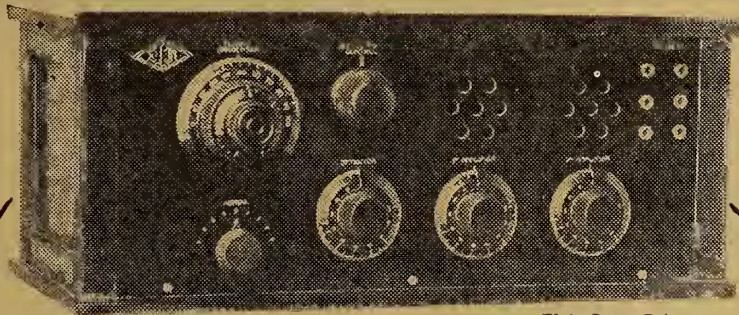
The MRC-4 may be operated successfully with a total of 67½ volts of B battery, although 90 volts is recommended. All of the B batteries are connected in series and the wire from the negative end of the series goes to the B minus battery post, a wire running from the first 22½ volt battery tap to the post marked 22½ B battery, and a wire running from the positive end of the series to post marked B plus 67½ volts. Some experimenting should be done to discover the best voltage to use on the detector tube. This is the voltage secured between the B minus and 22½ B plus battery posts. It may be advisable to use as much as 45 volts on this tube. The MRC-4 cabinet is designed for using size B batteries.

If standard base tubes are used, put tube in the socket so that the pin in the base will slip into the slot in the rim of the socket, using caution that the tube contacts fit properly in the hole in the Bakelite panel, press down on the tube and turn to the right. The tube is now in the socket in the operating position. If 199 or 299 tubes are used, place the tubes first in adapters and then put into the sockets in exactly the same way as described above.

Loud Speaker

Attached in, and made a part of the MRC-4, is an in-built loud speaker having an adjustable unit. This unit is set at the factory in the best operating position but because of an unusual jar or some other strain the loud speaker unit may be out of adjustment. Through the left hand grill it is possible to easily make any adjustments necessary. Great care should be exercised to adjust the speaker to that position which will produce the greatest volume of sound and best quality of tone. When once adjusted, there should be little cause for further adjustment unless some unusual happen-

(Continued on page 20)



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.

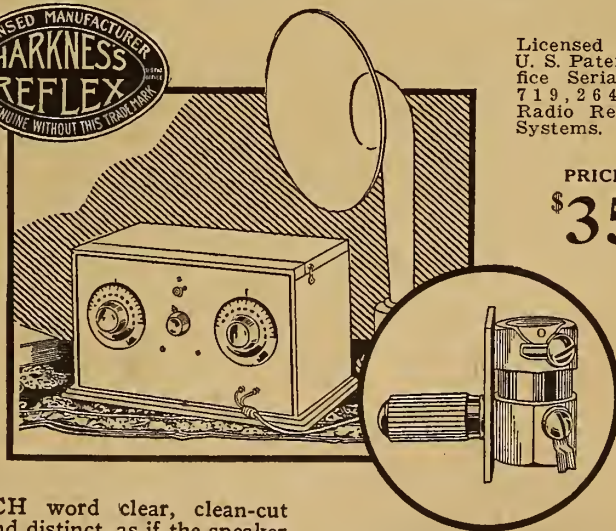
Send at once the working drawings of the ELGIN SUPER-REINARTZ, 2LO MODEL TUNER—The Set That Heard London. I am enclosing stamp to cover postage.

Name

Address

(PLEASE PRINT IN PENCIL)

Every word as clear as crystal



Licensed under U. S. Patent Office Serial No. 719,264 for Radio Receiver Systems.

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EACH word clear, clean-cut and distinct, as if the speaker were standing at your elbow. Just one unit is responsible for the Reflex's well-known tone clarity. That is the crystal detector.

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

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods 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 with columns: Meters Call, Meters Call, Meters Call, Meters Call, Meters Call, Meters Call. Lists stations ordered by wavelength.



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the unusual sweetness of one of the artists broadcasting from a large station. Today this same artist, Huston Ray, is playing for the Hotel Alamac as a result of his playing over the Radio.

"ETERNAL YOUTH" AT WBZ TUESDAY

Saturday, November 8

Silent night for: KFAE, WEEI, WGR, WHB, WJAX, WJY, WOO.

CKAC, Montreal, Can. (Eastern, 425), 7 p. m., kiddies' stories in French and English; 7:30, concert orchestra, Mount Royal hotel; 8:30, special entertainment, La Presse studio; 10:30, Joseph C. Smith and his Mount Royal hotel dance orchestra.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45 p. m., dance orchestra; 8-9, vocal concert, featuring Virginia Flohr, coloratura soprano; 9-10, instrumental and vocal recital; 10-11, Radio club concert; 11-12, Ambassador hotel Cocanut Grove dance orchestra.

KFKB, Milford, Kansas (Central, 286), 8-9 p. m., band concert; 9-10, KFKB orchestra; 10-11, Jubilee boys' orchestra; lecture, Dr. J. R. Brinkley.

KFNF, Shenandoah, Ia. (Central, 266), 10:30 p. m., midnight frolic, Seedhouse bunch.

KFOA, Seattle, Wash. (Pacific, 455), 2 p. m., Washington-California football game.

KFSF, Los Angeles, Calif. (Pacific, 278), 3:30-4:30 p. m., Gray studio program featuring talented tots from children's church; 7:30-9:30, auditorium service, "divine healing," Aimee Semple McPherson; altar call; music by temple choir; Marion McGlashen Muller, Salvation Army soprano.

KGO, Oakland, Calif. (Pacific, 423), 4-5:30 p. m., concert orchestra, Hotel St. Francis; 8, Roosevelt High School orchestra; Charles P. McCan, tenor; Marie Partridge Price, soprano; Hawaiian Club of San Francisco; Studebaker Hawaiian orchestra; M. Keau, tenor; "The Music of Hawaii," H. H. Yost; Maude V. Allen, mezzo-soprano; Charles P. McCan, tenor; Dorothy H. Edwards, pianist; Obapesla quartet; Marie Partridge Price, soprano; Hawaiian club; 10-11 a. m., Henry Halstead's orchestra.

KGW, Portland, Ore. (Pacific, 492), 10 p. m., dance music, George Olsen's Metropolitan orchestra.

KHI, Los Angeles, Calif. (Pacific, 395), 12:30-1:30 p. m., concert; 2:30-3:30, concert presenting Charlie Wellman, tenor and Helen Smith, pianist; 6-8:30, Art Hickman's concert orchestra, Edward Fitzpatrick, director; 6:30-7:30, children's program, "American History," Professor Walter Sylvester Hertzog; bedtime story, Uncle John; 8-10, program presented through courtesy, Dr. A. Zimmerman; 10-11, Art Hickman's dance orchestra, Earl Burnett director.

KPO, San Francisco, Calif. (Pacific, 423), 1-2 p. m., Rudy Selger's Fairmont hotel orchestra; 3:30-5:30, E. Max Bradford's Versatile band; 8-12, Art Weidner's dance orchestra; tango lesson, Ethel Suhl.

KSD, St. Louis, Mo. (Central, 546), 8 p. m., St. Louis Symphony orchestra, Rudolph Ganz, conductor; 11:30, Varsity Club orchestra.

University of Minnesota football game; 8, sectional American humor, John Seamon Garris; 8:15, canned food week, Carey Emerson; 8:30, musical program; 9, weather; 10:30, Dick Long's Nankin cafe orchestra.

WCX, Detroit, Mich. (Eastern, 517), 4:15 p. m., musical program, Nicholas King Wah Lo cafe orchestra; 6, dinner concert broadcast from Hotel Tuller.

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; address, member of the editorial staff of the Star; the Tell-Me-a-Story Lady; music, Hotel Muehlebach Trianon ensemble; 11:45-1 a. m., Nighthawk frolic, the "Merry Old Chief" and the Plantation players.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., daily almanac; 12:02 p. m., Stanley theater organ

soprano and pianist; 8-9, Radio show direct from Grand Central palace; 9-9:30, John Ryan and Arthur Hall singers; 9:30-9:45, Rudolph Joskowitiz, violinist; 11-12, Vincent Lopez and his Hotel Pennsylvania orchestra.

WEAO, Columbus, Ohio (Eastern, 294), 11 a. m., Marguerite Manley Seldel School of Music artists; 1:15 p. m., Gladys Poston Pickett, pianist; Decane Spaulding, tenor; Seldel school; 2:30, play by report, Ohio State-Indiana football game direct from Ohio stadium.

WEBB, Chicago, Ill. (Central, 370), 7-8 p. m., Edgewater Beach Oriole orchestra; Radio Sunday school lesson, Dr. Herbert W. Virgin; musical bits, Riviera Hunter; 9-10, yellow, red and orange tales, William H. Hunt; Edgewater Beach Oriole orchestra; Marie

Davis Bellevue Stratford concert orchestra; 3, Loretta Kerk, pianist; 3:45, dance music; 6:30, Meyer Davis Bellevue Stratford concert orchestra; 7, Sunny Jim, the kiddies pal; 8, University of Pennsylvania band concert; 10, playlet, "Starlight Players," direction Walter Gray.

WGBS, New York, N. Y. (Eastern, 316), 10 a. m., timely talks with Torese; 10:10, Josephine Pauline, soprano; 10:20, "Rugs and Their Making," Susan Salt; 10:30, Josephine Pauline, soprano; 10:40, "Current Events," Elsie Irvine; 10:50-11, Josephine Pauline, soprano; 1:30 p. m., Christine Thompson, pianist; 1:45-2:15, Melo dance orchestra; 2:15-2:30, Christine Thompson, pianist; 3, talk, Mrs. Thomas J. Vivian; 3:10-4, music and talks, Gretchen Dick; 6-6:30, Uncle Geebee; 6:30, Ray Hunter, baritone; 6:50-7:30, May Arno recital, William Stone, bass; Milton S. Schradmick, pianist; 9:30-10:15, Wagner operatic program, English Grand Opera company; 10:15, Lawrence K. Downey, baritone; 10:30, Anne B. Tyndall, soprano; 10:45, Lawrence K. Downey; 11, Anne B. Tyndall; 11:15-12, Bud Fisher's Happy players.

WGN, Chicago, Ill. (Central, 370), 1:40 p. m., luncheon concert; 2:30, Rocking chair time; 5:30, Skeezix time; 6-6:30, organ recital, Lyon & Healy; 6:30-7, 8-8:30, dinner concert; 8:30-9, classical concert; 10-11, special dance music.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1 p. m., George Albert Bouchard, organist; 2:30, Buffalo Courier and Enquirer musical program; 6, dinner music, Hallpyrd string quartette.

WGY, Schenectady, N. Y. (Eastern, 380), 1:45 p. m., Yale-Maryland football game; 9:30, dance music, Phil Romano's orchestra.

WHAA, Iowa City, Ia. (Central, 484), 2 p. m., Iowa-butler football game.

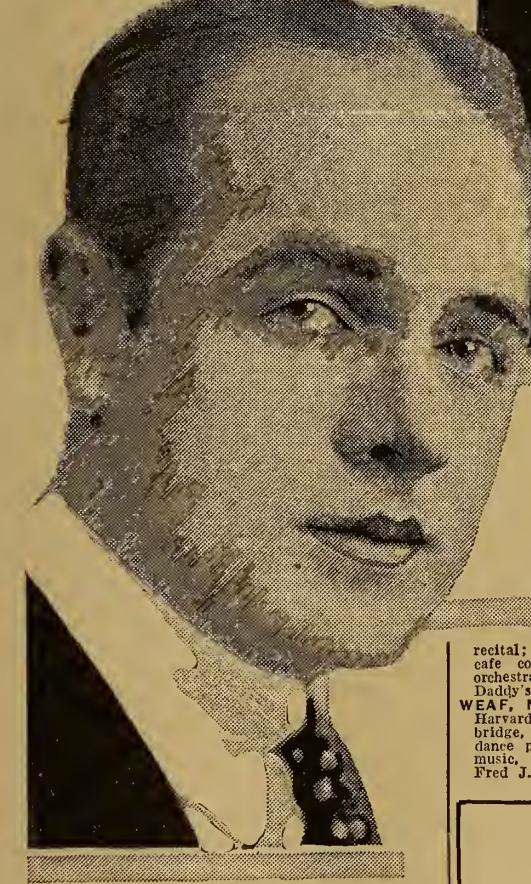
WHAS, Louisville, Ky. (Central, 400), 4-5 p. m., Alamo theater orchestra; 7:30-9, Sylvian trio, Fannie Elizabeth Stoll, director; Myrl Chrisman, flutist; Evelyn Kaiser, pianist.

WHK, Cleveland, Ohio (Eastern, 283), 6 p. m., Margorie Moore's Melodious Maids, Grebe's Rathskeller; 8, Bellhops orchestra, Dean Smith, director; carnival night, with Alice Crandall, Jessie Semple, Bobbie and Dede Fitzpatrick, Ethel Rhode, Billie Bugbee, Lucille Phillips, Violet Owens, Scotty Middleton, Art Cooke, John Paul, Dean Smith, John Peattie, soloists; 10 p. m., Ray Stillwell's orchestra.

WHN, New York, N. Y. (Eastern, 360), 2:15-2:30 p. m., Cooper and Bourne, songs; 2:30-2:45, Victor Wilbur baritone; 2:45-3, Nassau Ramblers; 3:45-4, Ellen Montague Cross Concert company; 4:10-4:20, Burton Levy, 12-year-old pianist; 4:20-4:30, boys' period, Kiwanis club, Wm. J. Stuart; 4:30-5, recital, Genevieve Williams, coloratura soprano; Alice Rinck,



Scott Blakel, who sings the ballads of his native Scotland, will be a regular feature of the Capitol theater programs from WEAF Sunday nights. He sings dressed in full Scotch regalia, kilts, bagpipes and all. Virginia Flohr will sing again from KFI, Los Angeles, Saturday, November 8. Harry Miller (right) is the new literary editor of WLS. Every Wednesday evening he will broadcast the latest news of books and authors.
Photo, Virginia Flohr, Witzel studios.



recital; Arcadia cafe concert orchestra; 2, Arcadia cafe concert orchestra; 4:30, Cotton Pickers dance orchestra, direction Wilbur DeParis; 7:30, Dream Daddy's bedtime stories.

WEAF, New York, N. Y. (Eastern, 492), 2-4 p. m., Harvard-Princeton football game direct from Cambridge, Mass., Graham McNamee announcing; 4-5, dance program, Clifford Lodge orchestra; 6-7, dinner music, Waldorf-Astoria hotel; 7-7:30, boys' stories, Fred J. Turner; 7:30-8, Marie and Adolph Opfinger,

Kelly, reader; Langdon brothers, Hawaiian guitarists; 11-12, Oriole orchestra; Marie Kelly, reader; Langdon brothers, Hawaiian guitarists.

WFAA, Dallas, Tex. (Central, 476), 12:30-1 p. m., "The Influence of Language," Prof. Harvey Branscomb; 8:30-9:30, Mrs. H. A. Cunningham, composer; Mary Allen Pritchett, soprano; Mrs. George McClellan, whistler; 11-12, Adolphus hotel orchestra; Trent's Happy sycopators.

WFI, Philadelphia, Pa. (Eastern, 395), 1 p. m., Meyer

violinist and Lillian Spitzer, pianist; 5-6, Bert Reith's Southern Harmonists; 6:30-7, Huston Ray's string quartette; 7-7:20, Huston Ray's Alamac orchestra; 7:30-8, Hotel Carlton Terrace concert orchestra; 8-8:05, "Goodnight Children," Elizabeth Morrison-Jones; 8:05-8:15, Jimmy Flynn, tenor; 8:15-8:30, Baroaro Weil, soprano; 8:30-9, "The Gothamites," Charles Shreiber, director; 9-9:10, Alfred Dulin, pianist; 9:10-9:20, Metropolis trio; 9:20-9:30, Carrie S. Hirsch, soprano; 9:30-10:15, Elrige Ladies' trio; 10:15-10:30, Harry Harris, tenor; 10:30-11, Clarence Williams and his Radio trio assisted by the Blue Five orchestra; 11-11:30, Jimmy Clarke and his entertainers.

WIP, Philadelphia, Pa. (Eastern, 509), 1 p. m., organ recital, Karl Bonawitz; 3, play by play description of Pennsylvania-Georgetown university football game, direct from Franklin Field; 6:05, Hotel St. James dinner orchestra; 7, Uncle Wip's bedtime stories; 8, talk, Sydney K. Allman; 8:05, talk, "Home Lighting Education"; 8:15, Philadelphia Police band, direction Lieutenant Jos. Kiefer; 9, Mme. Dormont, soprano, Russian Grand Opera company; Fabian Levitsky, bass violin; 10:05, Harvey Marburger and his Vaudeville dance orchestra from Cafe L'Aiglon; 11:05, Karl Bonawitz, organist.

WIZ, New York, N. Y. (Eastern, 455), 1:15 p. m., Orlando's Hotel Roosevelt orchestra; 1:45, Yale-Maryland football game; 7, Waldorf Astoria dance orchestra; 8, Hunter Sawyer, tenor; Henry Ackley, accompanist; 8:30, Estrella Mandolin quartet; 10:30, Hotel Astor dance orchestra.

WMAQ, Chicago, Ill. (Central, 447.5), 2 p. m., football game; 6:30, Hotel LaSalle orchestra; 8, program; 8:40, "Angor Wat," Mrs. Carter H. Harrison, travel lecture; 9, weekly theater revue.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., concert, Memphis Plectrum orchestra; banjo solos; mandolin solos; Russell Robinson and Al Bernard, Dixie stars.

WMH, Cincinnati, Ohio (Central, 309), 10 p. m., popular songs, Melvin Bettinger, Bob Surran, solos, Angela Devoto, Eugene Parazzo, accompanist; piano solos, Edward H. Schoelver; 11, Hotel Alms orchestra.

WOAW, Omaha, Neb. (Central, 526), 6 p. m., Francis Patter's mandolin quartet; Mrs. Francis Potter, soloist; 6:45, Baxter's orchestra; 9, G. R. Radio orchestra, A. Lupo, director; 11:15, Wow! frolic, Frank Hodek, Jr., and his Omaha nightingales.

WOC, Davenport, Ia. (Central, 484), 12 m., chimes; 7 p. m., sandman's visit, Val McLaughlin; 7:30, International Sunday school lesson, Rev. M. A. Getzendaner; 9, the Palmer School Radio orchestra; Ralph W. Fuller, baritone.

WOI, Ames, Iowa (Central, 360), 12:30 p. m., college chimes; "The School Lunch is Here to Stay," Prof. Florence E. Busse.

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; 5:10, sports results and police reports; 5:15, organ recital, Mary E. Vogt; J. W. C. I. band concert.

WOR, Newark, N. J. (Eastern, 405), 7-7:30 a. m., WOR gymnasium class, Arthur E. Bagley; 2:30-

A Program Improvement

BEGINNING with this issue, Radio Digest, at the request of thousands of its readers introduces an improvement in the method of giving broadcast programs. Heretofore the programs have been published for the week beginning on Wednesday. Many of our readers were unable to buy Radio Digest on the newsstands until Thursday, Friday or Saturday.

To accommodate these subscribers, the programs, starting with this week, are to begin with Saturday, the date of issue, and continue until the following Friday. By this improvement, Radio Digest will really give advance programs to all of its readers.

This change in furnishing program information to all readers has been contemplated for some time and required the overcoming of considerable difficulties in publishing.

As heretofore, Radio Digest again anticipates the desires of its readers and betters the service it gives to all Radiophans. The three-day earlier publication of programs should increase greatly the value of this information.

KYW, Chicago, Ill. (Central, 536), 6:30 a. m., morning exercises, Y. M. C. A.; 11:35, table talk, Mrs. Anna J. Peterson; 6:35-7, children's bedtime story, Uncle Bob; 7-7:30, dinner concert, Congress hotel; 8-8:55, Edward Zaacala, tenor; Sallie Menkes, accompanist; James Rote, violinist; 9:05, talk, H. Archibald Harris; 11:30, late show; 12-2 a. m., late show, Coon-Sanders Original nightingales.

PWX, Havana, Cuba (Eastern, 400), 8:30-11:30 p. m., Carlos Fernandez, pianist; Armando Moraes; Anselmo de Castillo; Nena Guerra, soloist; Aurelia Hurmendi, Nestor del Prado; Gloria Espina, violinist; Pausto Alvarez; Emma Otera, Maria Gonzales; Graciela de los Santos.

WBAP, Fort Worth, Tex. (Central, 476), 7 p. m., review of the interdenominational Sunday school lesson, Mrs. W. F. Barnum.

WBAW, Columbus, Ohio (Eastern, 423), 12 m., Ila Lorbach Owens, pianist; 9 p. m., dance program, remote control from Spring Lakes pavillion.

WBRR, New York, N. Y. (Eastern, 273), 8 p. m., instrumental selections; 8:10, vocal selections; 8:20, answers to Bible selections; 8:40, vocal selections; 8:50, instrumental selections.

WBZ, Springfield, Mass. (Eastern, 337), 2:15 p. m., Harvard-Princeton game; 6, Leo Reisman and his Hotel Lenox ensemble; 6:30, Copley Plaza orchestra, W. Edward Boyle, director; 7:05, bedtime story for the kiddies; 7:30, Hotel Kimball trio; 8, Lillian Smith, contralto; Paul Bernard, pianist; 8:30, John Doherty, entertainer; 9, concert, Hume Music studio; 10, Ella F. Blanshan, violinist; Mabel M. Hopkins, cellist; Irene Atkins, pianist; 10:30, "World Argie Night," auspices Alumni of Massachusetts; 11:30, Leo Reisman and his Hotel Brunswiek orchestra.

WCAG, Pittsburgh, Pa. (Eastern, 462), 3 p. m., Pitt-Geneva college football game; 6:30, dinner concert, William Penn hotel; 7:30, Uncle Kaybee; 7:45, Lew Kennedy, popular singer; Irene Setzler, accompanist; 8:30, musicale.

WCAL, Northfield, Minn. (Central, 360), 9:45 a. m., St. Olaf College chapel services; 12, midnight musicale.

WCAP, Washington, D. C. (Eastern, 469), 2 p. m., Harvard-Princeton football game.

WCCO, Minneapolis-St. Paul, Minn. (Central, 417), 10:45 a. m., talk to girls, Betty Crocker; "Good Things for Breakfast;" 2 p. m., Ames, Iowa and

ist

W. 6, 20, 45, 45,

I; N; C; 05, 3G, 45,

DI; CY; LE;

New York
 9:30, talk,
 My Eskimo
 & Stream.
 10 a. m., house-
 Heath; 10:20, Vogues
 for a Dime; Grace
 te, Bertha Baldwin;
 alk; 1 p. m., Nathan
 stra; 4:30, Bernhard
 orchestra; 7, "Dogs,"
 of's Hotel Vanderbilt
 review; 8:10, N. Y.
 J. Edmund Woodman;
 auspices American
 estra.
 olonial, 360), 9-10:30
 ic, WKAQ orchestra;
 l, Carmelo Diaz, Ho
 423), 4 p. m., Ho
 10, Rubber-Textile
 Meyer, tenors; Edwin
 bass; 11:30, Lange-
 47.5), 12 m., weekly
 urers association; 4
 30, musical program;
), Hotel LaSalle or
 review; 8:20, travel
 .association of commerce
 Farr, pianist; Douglas

500), 8:30 p. m., con-
 of, Frank Pappalardo,
 Scottish Rite cathedral,
 13), 10:30 p. m.-12:30
 adow Brook orchestra,
 m.
 126), 6 p. m., "Advice
 3:25, dinner program,
 Baker, vocalist; vocal
 ardt, Mrs. Blakesley;
 athleen Hurst Thomas;
 Tarkio band; euphon-
 Hurst Thomas, so-
 olinist; Sam Emmert,

509), 11 a. m., organ
 m., Wanamaker crystal
 Golden, director; 5:10,
 s; 5:15, organ recital,

5), 7-7:30 a. m., WOR
 2:30-2:45 p. m., Iris
 of Children's Feet,"
 5-3:30, Iris Brussels;
 30-6:45, man in the
 collegians; 7:15-7:30,
 ly, Bill Steinke,
), 11-12 m., "Meats,"
 the Medium Figure,"
 Place of Angel Cake,"
 Job in the World,"
 alf," Mrs. Lee Mida;
 Hiams and his Rainbo
 Peck, reader; Central
 quartet, Y. M. C. A.;
 a. m., Ralph Williams
 Lougher, tenor; Nubs
 soprano; Gail Bandell,

tern, 469), 6 p. m.,
 n), 8, "Armistice Day
 a Wile.

309), 7 p. m., Hotel
 isconti, director; 7:30,
 stories, Ethel Knapp
), 9, special Armistice
 of Peace on Armistice
 ; baritone solo, George
 vard Elds.

1, 12 m., entertainment;
 's bedtime story; 8-9,
 Bernard and Robison,
 n, 390), 6 p. m., Guy
 estra.

283), 6:45-7:45 p. m.,
 Sandy Meek, baritone;
 orchestra; 9-9:45, 10:15-
 om orchestra.

17), 8 a. m., setting-up
 talk, women's editor,
 v, pianist and sonster;
 a; 7, Detroit News or-
 ta.

November 12

WFAA, WGY, WJAX.

rn, 425), 1:45 p. m.,
 ogram, 7:30 p. m., folk
 330), 2:30 p. m., Dairy
 nton; "The Business of Dairy-
 er.

Los Angeles, Calif. (Pacific, 469), 6:45-8 p. m.,
 detective talk; orchestra; 7:30-8, vocal recital; 8-9,
 instrumental program; 9-10, vocal and instrumental
 selections; 10-11, de luxe concert; 11-12, Ambassador
 hotel Coconut Grove orchestra. 286), 7:20-8 p. m.,
 college of the air; 8-9, band concert; 9-10, "Black-
 smith Tour," male quartet; 10-11, Jubilee Boys' or-
 chestra; lecture, Dr Brinkley.

KFNF, Shenandoah, Ia. (Central, 266), 7:30 p. m.,
 concert, Bedford Municipal band.

KFSG, Los Angeles, Calif. (Pacific, 278), 2:30-4:30
 p. m., auditorium divine healing service; testimonies;
 sermon, Aimee Semple McPherson; ladies' revival
 chorus; Florence Glauser, soprano; Ruth Frances
 Thomas, pianiste; Esther Fricke Green, organist; 6:30-
 7:30, Gray studio children's program; Mrs. Edward
 Hughes and daughters, Mary Elizabeth and Helen, in
 nature study continuity features.

KGO, Oakland, Calif. (Pacific, 312), 3 p. m., music
 program, Cora L. Williams Institute speaker; 4-5:30,
 concert orchestra, Hotel St. Francis.

(Continued on page 14)

45, WDAF;
 KHL.
 November 12:
 7:30, KFNF;
 KHJ, 8:30;
 KPO, WEBB,
 AX, WMH;
 KB, WOAW;
 H, WFAA;
 LW, 11:45;
 KGO, KHJ.
 November 13:
 7, WEBB;
 30, WMC; 9,
 1:05, WDAR;
 WOO; 10,
 10:30, WOR;
 11, WEIH;
 45, WBAP;

WIP, Philadelphia, Pa. (Eastern, 509), 1 p. m., Gimbel
 tea room orchestra; 3, Bible talk; 3:15, Food Week
 talk; 3:30, recital, students of Clarence Fuhrman
 studio; 6:05, Hotel St. James dinner orchestra; 7,
 Uncle Wip's bedtime stories.
 WJZ, New York, N. Y. (Eastern, 455), 10 a. m., house-
 wives league menu, Mrs. Julian Heath; 10:20, "Shop-
 pers' Guide," Mrs. Pauline Peck; 10:30, "Home Beau-
 tiful," Dorothy Ethel Walsh; 10:40, talk, John C.
 Cutting; 10:50, fashion talk, Eleanor Gunn; 1 p. m.,
 Henry Vander Zanden, Hotel Ambassador trio; 4,
 Mario Caiati, cellist; Keith McLeod, accompanist;
 4:30, Fred Hall's Royal Terrace orchestra; 7, Bern-
 hard Levitov's Hotel Commodore orchestra; 8, Wall
 Street Journal review; 8:10, N. Y. U. Air college;
 "Geology," Prof. J. Edmund Woodman; 8:30, celebra-
 tion of Marine Corp. birthday; 10:45, Jacques Green
 and his Club Deauville orchestra; Clark's Hawaiians.
 WLW, Cincinnati, Ohio (Central, 423), 8 p. m., Alvin
 Rocher's orchestra; weekly theatrical review; 8:40, Orchie
 Snyder Beall, soprano; Mrs. George W. Collins, accom-
 panist; 8:50, Cooper orchestra; Cooper male quartet;
 11:30, Lango-McKay orchestra.
 WMAQ, Chicago, Ill. (Central, 447.5), 4 p. m.,
 mothers in council, Mrs. Frances M. Ford; 4:30,

KFNF, Shenandoah, Ia. (Central, 266), 7:30 p. m.,
 Armistice Day program.
 KFSG, Los Angeles Calif. (Pacific, 278), 3:30-4:30
 p. m., Esther Fricke Green, in organ gems, assisted
 by vocal artists; 6:30-7:30, "Cousin Jim," children's
 friends in song, music and story (Harry James
 Beardsley); assisted by Eugene Lamb, pianist and
 accompanist.
 KGO, Oakland, Calif. (Pacific, 312), 4-5:30 p. m., con-
 cert orchestra, Hotel St. Francis; 8, College of the
 Pacific Chamber of commerce; J. Russell Bodley, pian-
 ist; Miriam Burton, soprano; Charles M. Dennis,
 baritone; "The New Renaissance," Tully Cleon Knoles;
 Bozema Kalas, pianist; Nella Rogers, contralto; travel
 talk, Ford E. Samuel; Allan Bacon, pianist; 10-1 a. m.,
 Henry Halstead's orchestra.
 KGW, Portland, Ore. (Pacific 492), 12:30 p. m.,
 concert; 5, children's program; story, Jean Adkins;
 8, agricultural lecture, Oregon Agricultural college ex-
 tension service; 8:30, Portland Civic Music club.
 KHJ, Los Angeles, Calif. (Pacific 395) 12:30-1:30 p. m.,
 Rendezvous ballroom orchestra from Crystal Beach;
 2:20-2:30, matinee musical; 8-8:30, Art Hickman's

orchestra; 8, Friendly Brothers, 10:30-11:30 p. m.,
 Stephen E. Boisclair.
 WHAS, Louisville, Ky. (Central, 400), 4-5 p. m., Alamo
 theater orchestra; 7:30-9, Rosson's entertainers.
 WHK, Cleveland, Ohio (Eastern, 283), 6 p. m., Ponce
 de Leon orchestra, Herbert Hayward, director, Grebe's
 Hanna restaurant; sports news.
 WIP, Philadelphia, Pa. (Eastern, 509), 1 p. m., Karl
 Bonawitz, organist; 3, Walton concert orchestra; 4:15,
 song recital, Jane Maule Melver; Ella Day Bleine,
 pianist; 6:05, Ehrenzeller's concert orchestra; 7, Uncle
 Wip's bedtime stories; 8, "Philadelphia's New Y. M.
 H. A.," talk by Sydney K. Allman; 8:30, Armistice
 day program, addressed by commanding officers of
 79th Division; concert, members of Stern-Price Post,
 American Legion; 11:05, Harvey Marburger and his
 Vaudeville dance orchestra from Cafe D'Aiglon.
 WJAX, Cleveland, Ohio (Eastern, 390), 7:30 p. m.,
 program arranged by Cleveland News-Leader; E. G.
 Johnson, bedtime story; Don Palmer, Radio cartoon;
 Mrs. Sidney Carter Johnson, soprano; Joseph P. Mach,
 tenor; orchestra.
 WJY, New York, N. Y. (Eastern, 405), 7:30-8:15 p. m.,
 Orlando's Roosevelt hotel orchestra; 8:15-8:35, "Cur-

Los Angeles, Calif. (Pacific, 469), 6:45-8 p. m.,
 detective talk; orchestra; 7:30-8, vocal recital; 8-9,
 instrumental program; 9-10, vocal and instrumental
 selections; 10-11, de luxe concert; 11-12, Ambassador
 hotel Coconut Grove orchestra. 286), 7:20-8 p. m.,
 college of the air; 8-9, band concert; 9-10, "Black-
 smith Tour," male quartet; 10-11, Jubilee Boys' or-
 chestra; lecture, Dr Brinkley.
 KFNF, Shenandoah, Ia. (Central, 266), 7:30 p. m.,
 concert, Bedford Municipal band.
 KFSG, Los Angeles, Calif. (Pacific, 278), 2:30-4:30
 p. m., auditorium divine healing service; testimonies;
 sermon, Aimee Semple McPherson; ladies' revival
 chorus; Florence Glauser, soprano; Ruth Frances
 Thomas, pianiste; Esther Fricke Green, organist; 6:30-
 7:30, Gray studio children's program; Mrs. Edward
 Hughes and daughters, Mary Elizabeth and Helen, in
 nature study continuity features.
 KGO, Oakland, Calif. (Pacific, 312), 3 p. m., music
 program, Cora L. Williams Institute speaker; 4-5:30,
 concert orchestra, Hotel St. Francis.

Wednesday, November 12

(Continued from page 13)

KGW, Portland, Ore. (Pacific, 492), 12:30 p. m., Bill Darby's orchestra; 5, children's program; fairy story, Aunt Nell; 8, concert; 10, dance music, George Olsen's Metropolitan orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:30 p. m., concert, Presenting Abe Perless and Rose room orchestra, courtesy; Rose room; garden talk, Fred C. McNabb of Agler and Musser Seed company; 2:30-3:30, matinee musical, courtesy, Southern California Music company; 6-6:30, Art Hickman's concert orchestra, Edward Fitzpatrick, director; 6:30-7:30, children's hour, "American History," Prof. Walter Sylvester Hertzog; Dick Winslow, silver-sheet juvenile and remoter; baby Muriel MacCormac, silver-sheet juvenile; bedtime story, Uncle John; 8-10, special program of vocal and instrumental numbers; 10-11, Art Hickman's dance orchestra, Earl Burnett, conductor.

KOB, State College, N. M. (Mountain, 360), 7:30-8:30 p. m., "Selection of Sheep for Range Wool Production," M. G. Snell; "The Old Southwest," Mrs. Henry Steeg; music.

KPD, San Francisco, Calif. (Pacific, 423), 1-2 p. m., Rudy Selger's Fairmont hotel orchestra; 4:30-5:30, Rudy Selger's Fairmont hotel orchestra; 5:30-6:30, children's hour stories; 7-7:30, Rudy Selger's Fairmont hotel orchestra; 8-11, E. Max Bradfield's Versatile band; lesson in conversational French, Marie Boutin.

KSD, St. Louis, Mo. (Central, 546), 6:45 p. m., Aberg's concert ensemble; Arne Arnesen, violinist; 9, Hoosier male quartet.

KYW, Chicago, Ill. (Central, 536), 6:30 a. m., exercises, physical director of Y. M. C. A.; 9:30, late news; 11:35, table talk, Anna J. Peterson; 6:02 p. m., news, financial and final market reports; 6:35, bedtime story, "Uncle Bob"; 7, dinner concert from Congress hotel; 7:30, Duncan sisters music studio; 8, musical program, Lyon & Healy; 8:30, stage revue; 8:45, Lyon & Healy program; 9:15-2:30 midnight revue; Coon Sanders Original Nighthawks; organ, W. Remington Welch, McVicker's theater.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Vahn Municipal band, Charles Finstall, director; 9:30-10:45, dance program, Jim Riley's Texas hotel orchestra.

WCAE, Pittsburgh, Pa. (Eastern, 462), 3 p. m., Fred Rosenfeld, pianist; 6:30, dinner concert, William Penn hotel; 7:30, Sunshine girl; 8, special feature; 8:15, special feature; 8:30, Da Vanville quartet; Grossman's orchestra.

WCAY, Milwaukee, Wis. (Central, 266), 6:30 p. m., Boston Store night; Jerome Trelis, cornetist; Anthony Wuchter, reader; Ruth Elmer Lowe, mezzo-soprano; piano duo, Constance and Sidney Swindells.

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; address, auspices Health Conservation association; address, representative of the Heat Council of Greater Kansas city; the Tell-Me-a-Story lady; music, Hotel Muehlebach Trianon ensemble; 8-9:30, program presented by the Jenkins Music company; 11:45-1 a. m., Nighthawk frolic, the "Merry Old Chief" and the Plantation players.

WDAR, 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, Edna Finestone, pianist; 7:30, Dream Daddy's bedtime stories; 8, "Conversation Corner," Arnold Abbott; 8:15, dance music from Green Hills Farm hotel; 10, Arcadia cafe dance orchestra.

WEBH, Chicago, Ill. (Central, 370), 7-8 p. m., Jean Devenport, concert; Orione orchestra; musical bits, Riviera theater; 9-10, Langdon brothers; Marie Kelly, reader; 11-12, Frederiek Agard, tenor; Rosemary Hughes, soprano; Edna Solomon, contralto; Orione orchestra; Langdon brothers; Marie Kelly, Paul Lochner.

WEEL, Boston, Mass. (Eastern, 303), 6 p. m., Dok-Eisenbourg and his Sinfonians; 7, Boston Edison Big Brother club; 7:30, musicale; 8, musicale; 8:30, Loriston Stockwell, basso-cantanti; Mildred Vinton, pianist; 10, musicale; 11, Dok-Eisenbourg and his Sinfonians.

WFAA, Dallas, Tex. (Central, 476), 12:30-1 p. m., address, DeWitt McMurray.

WFI, Philadelphia, Pa. (Eastern, 395), 1 p. m., Meyer Davis Bellevue Stratford concert orchestra; 3, closing prices, Chicago grain market; 3:05, Loretta Kerk, pianist; 6:30, Meyer Davis Bellevue Stratford concert orchestra; 7, Sunny Jim, the kiddies' pal.

WGN, Chicago, Ill. (Central, 370), 1:40 p. m., luncheon concert; 2:30, Lyon & Healy artist series; 3, rocking chair time; 5:30, Skeezix time for the children; 6-6:30, organ recital; Lyon & Healy; 6:30-7, 8-8:30, dinner concert, Drake concert ensemble; Blackstone string quartet; 8:30-9, Lyon & Healy artist concert; 10-11, Jack Chapman orchestra, Blackstone orchestra.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1 p. m., George Albert Bouchard, organist; 2:30, Buffalo Courier and Enquirer musical program; 6:30, dinner music, the Vincent Lopez Hotel Statler dance orchestra; Harold Gieser, directing; 8-8:15, lecture by Dr. C. E. Cummings, Buffalo Society of Natural sciences, on "Mushrooms"; 9-10, concert, American Artists club, A. A. Van der Mark, directing; 10-11, musical program, Will Collins and Sam Stepe, songsters; 11:30, supper-dance music, the Vincent Lopez Hotel Statler dance orchestra; Harold Gieser, directing.

WGY, Schenectady, N. Y. (Eastern, 380), 6:30 p. m., adventure story, Youth's Companion.

WHAS, Louisville, Ky. (Central, 400), 4-5 p. m., Alamo theater orchestra; 7:30-9, K. & I. Terminal Railroad orchestra, J. Clark Martin, director.

Headliners of the Week

LOVERS of Wagner's operas will enjoy the program given by the English Opera company at WGBS, New York, Saturday. The Russian Opera company will also be represented at WFI, Philadelphia this same evening. Madame Dormant, soprano will be accompanied by Favian Levitsky, violinist.

Sunday night the Chicago Civic Opera stars will sing from WGN, Chicago, some of their favorite selections. Charles D. Isaacson will open the program with an opera chat.

Eternal youth may be yours. Alice Jewel, the modern "Ponce de Leon," is giving a series of lectures Mondays from WBZ. Miss Jewel practices the principles she teaches and is very young indeed. Christmas will soon be here KGO reminds us. Joseph Henry Jackson will review and recommend children's books as gifts. This same night is father and son night at WHAZ. Mothers and daughters may not tune in.

Tuesday is Armistice day and no

Radiophan may forget that six years ago firing ceased and quiet fell along the western front, because every station will for an hour at least commemorate the ending of the world war.

If you have never heard the famous Municipal band of San Juan, Porto Rico, tune in Wednesday night for WKAQ and hear the national airs of this little island.

Thursday WSAI, Cincinnati, will keep you amused with a Radio drama, "Canned Goods." This is a particularly funny comedy and ought to carry mirth as it traverses the ether. Major General Henry T. Allen will entertain the more serious minded with the European situation at WMC.

WHO will help you to see only the best motion picture plays. You may know hereafter by listening in to Dorothy Day's "Movie Chats" on Friday which plays are proper for grandmother and which plays no aunt should see.

Thursday, November 13

Silent night for: KFAE, KGW, KSD, WGR, WHO, WOO.

CNRW, Winnipeg, Can. (450), 7:30 p. m., Esperanto lesson; 8, Canadian National Railway's program.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Bon Ton orchestra; Y. M. C. A. lecture; 7:30-8, all-voiced program; 8-9, Hotel Ambassador concert orchestra; 9-10, instrumental and vocal program; 10-11, instrumental quartet recital.

KFKB, Milford, Kans. (Central, 286), 7:20-8 p. m., college of the air; 8-9, band concert; 9-10, "Blacksmith Four," male quartet; 10-11, Jubilee Boys' orchestra; lecture, Dr. Brinkley.

KFNF, Shenandoah, Ia. (Central, 266), 7:30 p. m., concert, Caskey Concert company.

KFSG, Los Angeles, Calif. (Pacific, 278), 3:30-4:30 p. m., organ recital, courtesy, E. Ernest Ballard, assisted by Margaret Kennedy, soprano, and Harold Lloyd, tenor; 7:30-9:15, auditorium service, evangelistic sermon and water baptism; choir, band and organ in musical offerings; 9:15-10, Gray study program, instrumental and vocal selections assisted by soloists; 10-11, organ hour with Esther Fricke Green, assisted by Alfred C. Green, tenor; Dr. Joseph Marple, tenor; S. R. Donaldson, trombone, and Tilda Rohr, Swiss contralto.

KGO, Oakland, Calif. (Pacific, 312), 4-5:30 p. m., concert orchestra, Hotel St. Francis; 8, KGO trio; Richard A. Brown, tenor; Julia Hannas Cochrane, violinist; "Darjeeling and the Himalayas," Ford E. Samuel; Pavn Post Trowbridge, soprano; "Children's Books," Joseph Henry Jackson; violin ensemble, Lillian B. Peters, conductor; male octette; piano duo, Alma Morris, Lillian B. Peters, pianist; 10-11 a. m., dance music, Henry Halstead's orchestra.

KGW, Portland, Ore. (Pacific, 492), 12:30 p. m., concert, Civic Music club; 5, children's program of stories and music.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:30 p. m., instrumental program, presenting Coy Barkley and Palace ballroom orchestra, Ocean Park, Calif.; 2:30-3:30, matinee musicale, courtesy, Southern California Music company; 6-6:30, Art Hickman's concert orchestra, Edward Fitzpatrick, conductor; 6:30-7:30, children's program, "American History," Prof. W. S. Hertzog; 8-10, de luxe program; 10-11, Art Hickman's dance orchestra, Earl Burnett, director.

KPO, San Francisco, Calif. (Pacific, 423), 1-2 p. m., Rudy Selger's Fairmont hotel orchestra; 4:30-5:30, Rudy Selger's Fairmont hotel orchestra; 5:30-6:30, children's hour stories; 7-7:30, Rudy Selger's Fairmont hotel orchestra; 8-9, Theodore J. Irwin, organist; 9-10, Ruth May Friend, soprano; 10-11, E. Max Bradfield's Versatile band.

KYW, Chicago, Ill. (Central, 536), 6:30 a. m., exercises, physical director of Y. M. C. A.; 9:30, late news, financial and commercial comments; 10:30, Farm and Home service; 11:35, table talk, Anna J. Peterson; 2:35 p. m., afternoon frolic; 6:02, news, financial and final market reports; 6:35, bedtime story, "Uncle Bob"; 7, dinner concert, Congress hotel; 8, "Twenty minutes of Good Reading," Rev. C. J. Pernin, Loyola university; 8:20, musical program, Hinshaw conservatory of music; 9:15, "Safety First" talk, Z. C. Elkin; 10, "At Home" program; Coon Sanders Original Nighthawks.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., musical program, College of Industrial arts; 9:30-10:45, concert, Sam Losh and artists.

WCAE, Pittsburgh, Pa. (Eastern, 462), 6:30 p. m., dinner concert, William Penn hotel; 7:30, Uncle Kay-bee; 7:45, special feature; 8:15, special feature; 8:30, Moore's cafeteria weekly Radio review, Clark's Pennsylvanians and co-operating artists.

WCAL, Northfield, Minn. (Central, 360), 9 p. m., Alice Stibbs, soprano; Gladys Grindeland, pianist; J. Milton Hansen, baritone.

WCAY, Milwaukee, Wis. (Central, 266), 10:30 p. m., Arcadia ballroom orchestra; Corinne Deuster, soprano; Querin Deuster, pianist.

WCBQ, Zion, Ill. (Central, 345), male quartet, Barton, Bull, Paxton, Thomas; E. B. Paxton, baritone; G. R. Sparrow, tenor; Florence Farrar, contralto; Mrs. H. A. Mayfield, soprano; William Mason, trombonist.

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; travolque, Edgar Allen Linton; readings, Cecile Burton; the Tell-Me-a-Story lady; music, Hotel Muehlebach Trianon ensemble; 11:45-1 a. m., Nighthawk frolic, the "Merry Old Chief" and the Plantation players.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., daily almanac; 12:02 p. m., Stanley theater organ recital; Arcadia cafe concert orchestra; Feri Sarkozi, director; 2, Arcadia cafe concert orchestra; 4:30, Edna Finestone, piano recital; 5, Pierce school, educational lecture; 7:30, Dream Daddy's bedtime stories.

WEBH, Chicago, Ill. (Central, 370), 7-8 p. m., Orione orchestra; Nick Lucas, songster; 9-10, Edgewater Orione orchestra; Dean Remnick, pianist; Every day songs by Guest, Robert Boniel; 11-12, Orione orchestra; Harry Davis; Edgewater Beach hotel late revue.

WEEL, Boston, Mass. (Eastern, 303), 1 p. m., assembly luncheon, Boston Chamber of commerce; 6:30, Jack Renard and his Mansion Inn orchestra; 7, Boston Edison Big Brother club; 7:30, talk, David S. Hickey; 7:40, program, Horner, cornetist; Miss Giesmer, pianist; 8:30, Kay, Kriss and Ohie trio; 9-12, program, WEAFF, N. Y.

WFAA, Dallas, Tex. (Central, 476), 12:30-1 p. m., "Health and Morals," Charles E. Osborne; 8:30-9:30, Belcanto male quartet; 11-12, Adolphus hotel orchestra.

WFI, Philadelphia, Pa. (Eastern, 395), 1 p. m., Meyer Davis Bellevue Stratford concert orchestra; 3, closing prices, Chicago grain market; 3:20, Housewives Radio exchange, direction of Mabel Swint Ewer; Swarthmore Music club recital and concert; Vera Monker Moore, soprano; 6:30, Meyer Davis Bellevue Stratford concert orchestra; 7, Sunny Jim, the kiddies' pal; 8:05, Boy Scouts radio meeting.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1 p. m., George Albert Bouchard, organist; 2:30, Buffalo Courier and Enquirer musical program; 6, dinner music, Halpryd string quartet.

WGY, Schenectady, N. Y. (Eastern, 380), 6:30 p. m., dinner music, Hotel Ten Eyck orchestra; 7:45, "A Few Moments with New Books," William F. Jacob; 8, Sullivan's Country club; orchestra; Joe Sullivan, cornetist; "Aurora Borealis or Northern Lights, and Their Relation to Electrical Circuits," John B. Taylor; 9, minstrel show; Georgia Minstrel boys; WGY orchestra; Radio four; 11:30, Stephen E. Boisclair, organist.

WHAS, Louisville, Ky. (Central, 400), 4-5 p. m., Alamo theater orchestra; 7:30-9, concert, auspices Mrs. J. E. Harmon, Jr.

WHK, Cleveland, Ohio Eastern, 283), 6 p. m., Ponce de Leon orchestra, Herbert Hayward, director; Grebe's Hanna restaurant; sports, news; 8, program arranged by the Cleveland Press, vocal and instrumental music.

(Continued on page 18)

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Batteries, Their Use, Abuse, Care and Upkeep

Part II—Construction of the Electrolytic Rectifier

By William Fenwick

THE materials you will need to make a two-jar rectifier are: 2 fruit jars, one pint size; 2 wooden discs, same diameter as glass covers, and 1/16 to 1/8 inch thick; 2 strips of pure aluminum, 6 inches by 1 inch by 1/32 to 1/8 inch; 2 strips of lead, 6 inches by 1 inch by 1/8 inch; 4 small binding posts, or machine screws; a few ounces of borax and 2 pints pure distilled water.

The beginner will find little trouble in its construction as it is all very simple. The electrolyte consists of three or more heaping teaspoonfuls of borax dissolved in two pints of distilled water. The solution should be let stand for a while till that part of the borax which did not

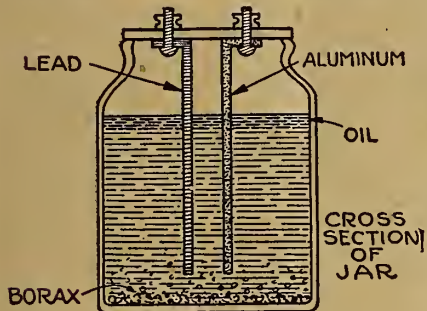


Figure 2.

dissolve has settled on the bottom; this should be removed. Fill each jar to about one inch from the top and pour a small quantity of oil on to keep the water from evaporating too quickly.

To make the plates, bend all metal strips at right angles 1/2 inch from one end, then drill a hole in each to pass the binding post, next, drill two small holes in the wooden disc, or better still if it is fibre, or hard rubber. These holes should be spaced 3/8 inch apart. Insert the binding posts through one aluminum and one lead plate, thence through the holes on the disc, and tighten them securely. Each plate is now separated by approximately 3/8 inch. So as to minimize the chances of a short circuit, both plates should be shellacked for about 1 1/2 inches from the top. All that remains to be done, is to immerse the electrodes into the solution, and screw the cap on the jar; this holds everything ruggedly in place and prevents the fluid from spilling if accidentally overturned. A cross-sectional view of a rectifier jar is shown in Figure 2. By repeating the above process any number of jars may be made.

Some sort of resistance is necessary for the rectifier is apt to blow a fuse. It may either be a 100-watt bulb or a container filled with salt water, and having

lead and carbon electrodes. As the former is the neatest and least troublesome, it might be suggested for the beginner.

The complete hook-up of the electrolytic rectifier is in Figure 3. A is the aluminum plates, and L the lead plates of the rectifier; R is the 100-watt lamp resistance; and B are the terminals where the battery is connected. The same caution should be observed when connecting the battery for charging as mentioned before; make certain that the positive of the battery connects to the positive of the charger and that the negative of the battery connects to the negative of the charger.

Before the completed rectifier is used, the plates must be "formed," i. e., the aluminum electrodes should have a thin crust or deposit on them. To do this, the jars should be connected as in Figure 4 to the A. C. line for 10 to 12 hours. This is necessary because the rectifier acts only as a resistance when alternating current first flows through it, and if the battery were connected to it before the plates are formed it would be fed A. C. instead of D. C.

The temperature of the solution should never exceed 35 degrees centigrade; the hotter the solution the higher the internal resistance and a reduction in rectification is the result.

A diffused, phosphorescent glow on the aluminum plates indicates that the cells are working at their best, while no glow at all on them indicates that the electrolyte has become weak and that the cells are not functioning. To remedy this the solution should be renewed.

The only thing that needs to be replaced in the cells, with the exception of the

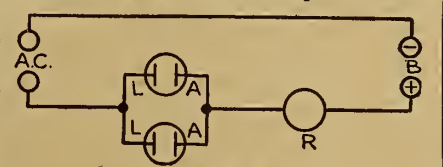


Figure 3.

electrolyte, is the aluminum electrodes as they eat away from usage.

Never put a battery on charge without first having disconnected it from the set, for it seldom fails to blow out the lighting line fuses or the vacuum tube on account of one side of the line and most filament circuits both being grounded.

The Dry Cell A Battery

A really portable Radio receiver, one contained in just a single cabinet with outside connections to aerial, ground, and phones only, was never known till the dry cell tube made its appearance, for a set could not be called a "portable" very well when a 40 or 50 pound storage battery

had to be carried around wherever it went, and furthermore, which had to be recharged every two weeks. This explains how the dry cell tube has attained such a high degree of popularity, and also the single dry cell battery.

Dry cells when connected in the A circuit do exactly the same work as the storage A battery does; viz., lights the filament of the vacuum tube. Dry cells should never be substituted for the accumulator type of battery though, as the tubes using these have a large current consumption, and it ends in very poor economy. Tubes such as UV-200, C-300, UV-201, C-301, 208A, 216A, 203B, 205B, VT-1, VT-2, or 0/20 (mullard), can not operate successfully on dry cells as the current consumed is from 1.0 to 1.75 amperes; manufacturers say that the drain

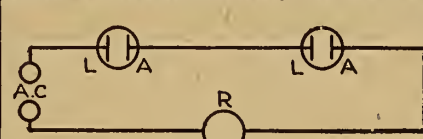


Figure 4.

should not exceed .123 amperes on a dry battery if satisfactory service is wanted. Hence, each 1 1/2-volt, 1/4 ampere vacuum tube should have two cells; by following this procedure the two cells will last approximately as long as if three had been used singly.

The dry cell is in every respect the most convenient method of obtaining small amounts of electrical energy, but its one disadvantage is that it can not be recharged; i. e., it has to be discarded and replaced by another after it is run down.

It has been made clear that dry cells are unprofitable in permanent installations because they are good only for a few months, then have to be thrown out, whereas the storage battery no matter how much use it is put to, is very long lived, providing of course it is not abused. Obviously then they are best suited to the amateur who does a good deal of experimenting. But the novice is wise if he

will choose a dry battery tube set to begin with, for he has to be careful how he connects his batteries and they offer no more trouble till they need replacing.

Any of the following tubes operate on dry batteries: UV-199, C-299, UV-201A, C-301A, WD-11, WD-12, Ora (mullard), D. Mullard, Meyers Universal, Meyers dry battery, Philips, Marconi, and McCullough.

A Radio frequency amplifier must necessarily have a potentiometer shunted across the A battery to make it work efficiently. This will also allow the current to leak through it, especially if it is of low resistance, and will cause a drain on the A battery while the set is not in operation if the battery is not disconnected. The best thing to do is to mount a switch on the panel so that the A battery circuit can be quickly and easily broken.

The writer has found dry cells to be ideal, economical, and the most convenient when put to use in the filament and plate circuits of a portable outfit, either transmitting or receiving, and in a beginner's set.

The Dry Cell B Battery

As is well known, the B battery is employed to furnish the plate of the vacuum tube with current so that it may attract the electrons from the filament, thereby creating a closed electrical circuit. But when the layman gazes into a valve after making connections to the batteries, all that he sees going on is the filament glowing brilliantly. It stands to reason he gets the impression that the B battery does no actual work at all, or, as a BCL once told the writer, they were included in a circuit merely for blowing out tubes.

As a matter of fact, the current supply for the plate is as essential as the current supply for the filament; one can not work without the other. It is the plate current that furnishes the power for transmitters and receivers. In some transmitting outfits the vacuum tubes have such a high amperage on the plates that they get red hot. But in sets designed for reception, the heating is not so evident; the plate

(Continued on page 18)

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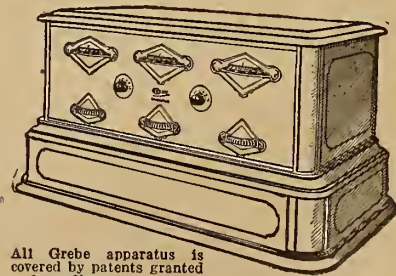
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Ticker Used for Tuning In

Make It Unnecessary to Pick Up Signals on Program

IT IS annoying to have the local set operator to tune in and kill the music or talks, by tuning a station in with the voice of the announcer, or the broadcast program. A suggestion is made that the broadcasting stations install a small ticking device or attachment to the microphone so that the one tuning in can pick up the station between numbers, as well, or better than waiting for the music to start, causing countless listeners in no end of annoyance by local interference. Of course the ticking sound could be turned on and heard only between music or talks. This practice is now in use by the Havana, Cuba, broadcasting station and is found to be quite a convenience.

Another suggestion would be to have, instead of the ticker, a cylinder or record, that would announce the name of the station, over and over. This would be a great help to the many who try to see how many stations they can get in an evening.

Electro-Acoustic Art of Sound

Developments Tend to Better Reproduction

EVIDENCE to the extent to which the Radio has gripped the fancy of the American people is reflected in the attendance at the Radio World's Fair in New York. It is stated officially that the exposition was attended by 175,000 people during the week it was opened and thousands were turned away daily. On a dozen or more occasions fire departments officially temporarily closed the doors because of the fact that both huge auditoriums were packed.

Countrywide the Radio vogue has gained strength in a little time. This thing of listening through the air is still so new that almost over night notable improvements are wrought. The last minute apparatus of a year ago is antiquated already, relatively speaking. However, today the better class of apparatus gives reproduction which will satisfy even discriminating musicians and it may be stated that the electro-acoustic art of sound reproduction by electrical means is advancing rapidly.

Tone Perfection

Short Distance with Good Reception Sought

IS THE fad of distance reception coming to a halt? Many listeners are finding more satisfaction in getting clear reception of good programs from stations nearby than in freak reception from very remote stations whose signals are sought merely because the stations are at a distance.

There has never been a really good business proposition, sports or in some science but what if the millions take hold of it that there is a tendency to "beat the other fellow." The owner of an automobile can always drive faster and better in his own car and can beat any other fellow on the road, in his own estimation. The sport element of the thing that eggs one on in a race or business also enters the game of Radio. In the early stages of the science everybody was trying to beat his neighbor to long distance reception. Most of this race has abated and a large majority of set owners are beginning to realize the best entertainment is derived from clear reception of a good program sent out from a station at a reasonable distance.

From all sections of the country come reports of the growing insistence of quality reception, even over range. Every part of the United States is today within reasonable range of some good broadcasting station. There is now a tendency for the leading broadcasters to link up stations by land wires when programs of nation-wide interest are to be sent out. This assures good reception everywhere.

We will always find the DX fans just the same as the few automobile owners that get their greatest thrill for breaking the speed limit and taking all hills on high. But the great majority of people prefer reasonable speed and reliability in motoring, and clear, dependable reception in Radio.

RADIO INDI-GEST

Out of the Night

Comes out of the night a song to me,
From a far away city beside the sea.
The sky and the air and the earth below
Are full of a smother of driven snow,
The cruel fangs of a northwest blast
Are snarling and bare as it gallops past.
Over the chimney moans the storm;
The goblins dance and the harpies swarm;
But still pours out of the night to me
This crowning marvel of minstrelsy.

The flick of an eye, a heart's quick beat,
The tap of a step in the midnight street,
The unmarked time of a spark's brief light,
A handbreadth span from the comet's flight—
Even such a mote of eternity
Are time and to spare for a melody
To bridge all the ocean and leap all the land,
To the loneliest hill and the farthest strand
Of the last wee isle in the last wide sea,
And wrap a whole world in harmony.

The ends of the earth are hand in hand,
A heart beat quivers from land to land;
A word with justice and friendship fraught
Sweeps over the world with the speed of thought,
And carries truth to the myriad mind
Of the far spread millions of human kind.

Though demagogues in their blindness prate,
The truth shall sweeten their founts of hate;
O'er the whole wide world its tide shall roll
From mountain to sea and from pole to pole;
And the alchemic touch of its cooling flood
Shall cleanse from the earth the stain of blood.

Awake to the morn of a glorious day
When none shall be marshaled in battle array!
When swords in anger no longer flash
And out of the smoke no cannon crash!
Not alone from the night comes the voice of song
But the truth that shall right earth's greatest wrong.
H. D. THOMPSON.

Mrs. Partington Speaks Out

Dear Indi: Mrs. Partington says she listened in onto the relaycasting of Secretary Hoover's Radio Conference speech which come in to the full capacity of her dials and panel, from coast to Hastings. She says she enjoyed this lecture as well as the illustration of how the whole country can listen to the same speech at the same time, but she says the most wonderful broadcasting and relay work she ever heard was on Tuesday night when some station broadcasted and relayed the piece called "Jealous," so that you could hear it at all the stations, nearly, and some of the stations transformed it into a soprano solo, others into contralto or baritone, and at some stations where the orchestras and bands were playing, why they just kept on playing and relayed it into "Jealous." She says she heard and put "Jealous" on her Log from 19 stations that same night, which was more stations than Sec'y Hoover had need of to cover the whole country with his speech. She says she don't just understand how this latest kind of relaying was done, but maybe Mr. Digest will print a diagram of it or else Mr. Brown can have Spir L. and Lew P. work out the problem how it was done.

SIGNING OFF.

We Know Him, He's Our Mechanic

He tried out his receiver
Till the hour was sadly late.
He didn't get a single squawk
He hadn't tuned the plate.

He connected up his ant
To capture concerts that abound.
His speaker never loosed a pant,
He hadn't any ground.

He bought a brand new neutrodyne,
A beauty of a set.
Complained he couldn't hear a thing,
Though no tubes as yet.

L'envoi*

He'd built a husky super-het
With more knobs than seem just fit.
He couldn't get a thing from it,
His detector simply wasn't lit.

* Noise like a burnt out vt makes
burning out. 5XV.

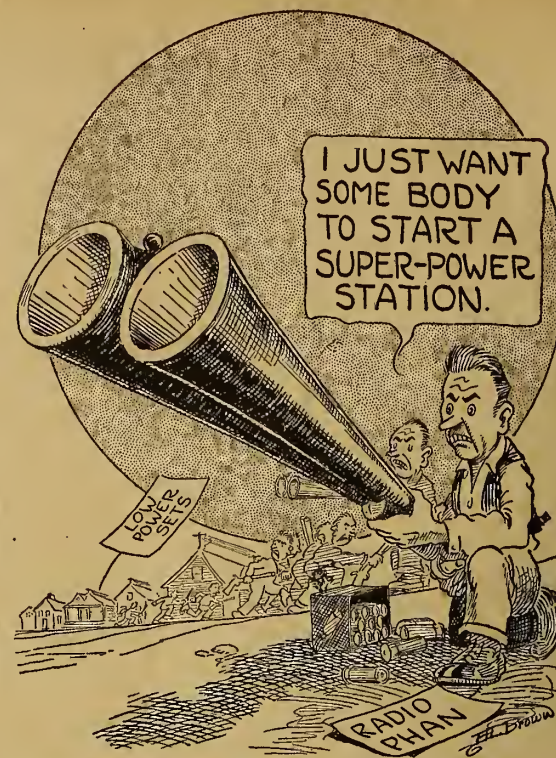
"That" a Cinch!"

Dear Indi: While nearly everyone else has been talking about "superdynes" and "neutrodyne," I have been experimenting with crystal sets and I have discovered a process which makes galena detectors super-sensitive. The process is to cover the catwhisker point and the surface of the galena crystal with a good thick layer of shellac. Then if you receive any stations, they will be twenty-five times louder.
Anybody with a GOOD IMAGINATION and a \$10 crystal set (treated as above) can receive stations 2,000 miles away. I. NOA LOTT.

"How Did You Guess It?"

Dear Indi: Relative to that mysterious whisk broom. Our family discussed it pro and con (mostly con). It is the guess of our wee daughter that it's the gift of a contrb who's met you—and sent it to brush your "fiskers"! MAMA HAYMES.

The Spirit of '24



Condensed

By DIELECTRIC

About as beautiful a lyric tenor as one could hear sang at the Germantown theater and WIP Radiocast the group of songs Frank Oglesby offered. When any station puts out programs with talent of such character the studio should be flooded with letters of appreciation. I certainly commend to your dials the wave that carries Mr. Oglesby's tenor voice.

Wendell Hall started a new line in Radio entertainment with his intimate manner of providing fun and song. His particular style of composition and rendition has been copied in several instances though I think Nate Colwell, who formerly entertained from WGN and must be familiar to most of you, has developed the best off-shoot. His original songs as he sang them at WEEL were really a feature worth waiting for.

Whether you are groaning or exulting in the outcome of the Big Day so recently past, all who tuned in WGY with its Darktown political convention at Bull Run, Dixie, were given a good laugh. The travesty on the Democratic convention, which that gave, showed careful rehearsing. Delaware's six votes for "Pillsbury" and the announcer's interruptions to describe the scenes in the hall (with a straight face) were comical.

Fraternal organizations are reaching their members by Radiocast with addresses by officials of the orders and music to suit varying tastes. WJJD is not very old but members of the Loyal Order of Moose know they can tune to Mooseheart, Ill., and hear from headquarters.

It wasn't the least bit surprising to find the announcer at WOR a little rattled when he gave us word of the arrival of the ZR-3. No one in the path of the dirigible's flight to Lakehurst holds anything against him, for otherwise we might have missed seeing the ship on its arrival over American soil. News service is one of the most attractive features.

In a perfect collegian manner a lady tells us we just heard the chimes at Ohio State university. If you haven't heard them tune to WEAO—Radio Digest gives their wave length—and enjoy yourself.

WJAX is responsible for letting us hear the Northeastern Ohio Elks conference during which Judge Sullivan enlivened the meeting with anecdotes reminiscent of by-gone days. The Elks gave listeners in an idea of the things for which the order stands. It was all right Union Trust.

At this point WJZ comes in for our blessing. Some thrilling experience Lieutenant Smythe of Toronto had to recite before Mike at the R. C. A. station. Traveling from his home to Rome, Italy, in a canoe, with a boost across the Atlantic, is a feature bearing no stale marks whatever. His happy style of description made it the more entertaining.

Nearly every fan in the country had a box seat at the opening of the third of the Radio conferences held in Washington with such a string of stations linked together to Radiocast the speech of Secretary Hoover. This was one of the BIG features, and Mr. Hoover made plain his advocacy of giving the widest possible publicity via Radio to ALL features of national importance. We know where he stands on the future of Radiophony by hearing it first hand.

Secrets of Selectivity and Regeneration

Part IV—Stray Electromagnetic Coupling Phenomena

By William W. Harper

IN THE construction of tuned Radio frequency amplifiers it is very essential to consider the effect of extraneous coupling phenomena, especially where regeneration is involved to give amplification and increased selectivity.

The effect of electrostatic coupling is usually made negligible by careful design and logical distribution of the wiring system.

The experimenter encounters the greatest difficulties in connection with electromagnetic coupling, and it is the purpose of this article to describe phenomena of this kind.

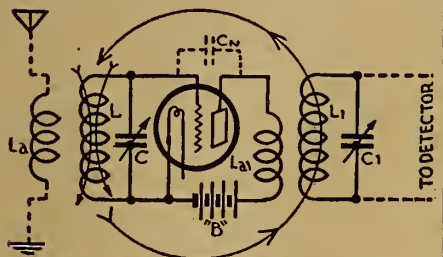


Figure 9.—Positive Feedback.

As in the preceding explanation for the sake of clearness and brevity, only one stage of tuned Radio frequency will be considered.

Tuned Regeneration Amplifier

In the electrical diagram of Figure 9, a tuned regenerative (Radio frequency) amplifier, as previously described, is reproduced. Only that portion of the circuit which has influence upon the coupling is shown. In this diagram a condition of positive electromagnetic feedback is illustrated. This is identical to the regenerative action described in the first article, Figure 3.

It has been shown that the field of L1C1 is quite extensive due to extremely low circuit resistance. Furthermore, since it is almost essential to use air core coils several inches in diameter for the secondaries L and L1, the electromagnetic fields of these coils will be entirely unconfined and in the average receiver, even where a separation of 6 or 8 inches is used, it is imperative to consider the phase relationship of the currents and the resulting fields of these coils. In the diagram of Figure 9 a state of additive feedback is clearly represented.

The electromagnetic field of L1 penetrates the coil L, and, as shown by the arrows, their fields are in the same direction. As a result, the current reinduced into L by the field of L1 is in phase with

the signal current present in L and we consequently have regeneration.

The extent of this phenomenon depends upon the distance between L and L1, as well as the angular relation of their respective axii. In this case, the total regeneration is made up of two component parts, that due to the passage of reaction current through Cn, and the energy feedback caused by the field of L1 being in phase with L.

It should be borne in mind that under any conditions only a given amount of regeneration can be used, so we may not expect to get double regeneration from the two components of regeneration mentioned above. This will be clear from the following: Regeneration serves to reduce the resistance of the tuning circuit LC. When this resistance is reduced to zero the whole system sustains an oscillation. We can use only that amount of regeneration which almost reduces the circuit resistance to zero. This point has been termed "maximum regeneration" or "critical regeneration."

This follows from the necessity of a state of non-oscillation for telephonic reception. Therefore, assuming that one unit of regeneration will reduce one ohm of circuit resistance, it will be obvious that if the total circuit resistance is ten ohms it will require almost ten units of regeneration to have a very small positive resistance, slightly greater than zero. For this reason, the sum of the regeneration through Cn and that which exists by virtue of the mutual fields must not exceed 10 units. We may have 5 units in the electrostatic coupling Cn and 5 units in the electromagnetic coupling or any other combination.

Assuming that the majority of the regeneration present is due to the electromagnetic fields between L and L1, it is very important to note that the regeneration through Cn must be reduced to a low

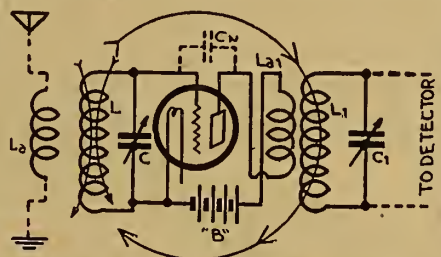


Figure 10.—Negative Feedback.

value, otherwise, an oscillatory condition will be set up.

Reducing the regeneration through Cn

necessitates a reduction in the number of turns in coil L1. An abnormal condition of coupling will obviously cause inefficiency, because, in so reducing the number of plate coil turns, we reach a degree of coupling between L1 and L1 which is less than the critical value and the efficiency of the transfer of energy from L1 to L1 is low.

Furthermore, this phase relationship obviously increases the forward interstage or intercoil coupling and tends to impair the selectivity.

The direction of the plate current through the coil L1 determines the phase of the currents in L1 and L.

Electromagnetic Feedback

If the current is reversed in L1 we will throw the field of L1 out of phase with L. This condition is pictured in Figure 10. We now have something new to consider, namely, a reversed electromagnetic feedback.

As in the case of a positive feedback, the magnitude of this reversed effect depends upon the extent of the inductive coupling between L1 and L, increasing as they come closer together.

It is obvious that we have one feedback of energy through Cn which is additive in respect to the signal energy in LC, and due to the coupling between L1 and L, a second feedback which is subtractive in nature.

If this latter coupling is carefully adjusted it is possible to make the reversed feedback equal in magnitude to the regeneration through Cn, and since these two are out of phase, the resultant will be zero regeneration. In other words, we have a purely non-regenerative amplifier. Such an amplifier is often termed a "repeater."

It is this principle of balancing a positive and negative feedback which constitutes the basis of many of our present-day receivers, such as the superdyne, neutrodyne, etc.

It is obvious that a large negative feedback by virtue of the electromagnetic coupling will necessitate a relatively large number of turns in the plate coil L1. In

fact, the greater this reversed feed-back the more turns will be necessary in L1 to give maximum regeneration through Cn. In all cases, the positive feedback through the tube capacity Cn must at least equal or preferably be so much greater than the reversed feedback, that the system is on the verge of oscillation, otherwise the signal current in LC will be greatly suppressed. A reversed feedback tends to increase the effective resistance of the tuning circuit LC and may completely annihilate a received signal.

Effect on Selectivity

The effect of this reversed feedback upon the selectivity, which we may expect to gain in the coupling between L1 and L1 is pronounced. If, to compensate for an abnormal reversed feedback, it is essential to use a large number of turns in coil L1, we may exceed the critical coupling value; resulting in broadened and unselective response in the tuning circuit L1C1. On the other hand, if we do not increase the number of plate coil turns, there will be insufficient regeneration to the circuit LC to give maximum response and selectivity.

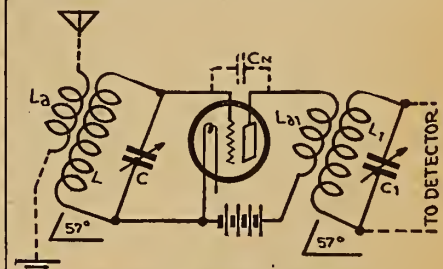


Figure 11.—Zero Coupling.

The writer has found the most ideal condition of balance when the coupling between L and L1 is approximately zero. This state may be obtained in two ways. First, the coils L and L1 may be mounted (Continued on page 18)

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ADVANCE PROGRAMS

(Continued from page 14)

WIP, Philadelphia, Pa. (Eastern, 509), 1 p. m., Gimbel tea room orchestra; 3, recital, students, Philadelphia Music academy; 6:05, Art Coogan and his orchestra from Club Adriatic; 7, Uncle Wags bedtime stories; 8:15, Philadelphia Police band, direction, Lieutenant Joseph Klefer; 9, talk, Philadelphia Branch of United Synagogues; 10, Harvey Marburger and his Vaudeville orchestra from Cafe L'Aleion.

Friday, November 14

Silent night for: CKAC, KGO, WLW, WMH, WRC, WSAI. CKAC, Montreal, Can. (Eastern, 425), 4:30 p. m., 10 lessons.

SELECTIVITY SECRETS

(Continued from page 17)

so as to be at right angles. This mounting is not highly recommended, however, inasmuch as the zero coupling point is very sharply defined and difficult to secure. A better method, and one which is generally used, consists in placing the coils in a staggered manner, as represented by the circuit of Figure 11.

while reading for those who have read all or a part of "Secrets of Selectivity and Regeneration."—Editor's Note.)

CARE OF BATTERIES

(Continued from page 15)

The dry B battery is nothing more than a block of cells all identical to each other and connected in series. The only difference between a dry cell A and a dry cell B battery, is their size. The A is usually 6 inches in height and 2 1/2 inches in diameter, while the B generally varies between 2 1/2 to 3 1/2 inches in height, and from 1/2 to 3/4 inch in diameter.

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Helpful Hints to Get the Most from Radio

Chapter VIII—Grid Leaks and Biasing

By Thomas W. Benson

IN THIS series of articles set operation will be told in so simple a manner that the uninitiated can follow instructions and get the most out of reception, whether or not he knows anything about electricity or its application to broadcasting and reception. The series consists of thirteen chapters, of which the five next will be:

- Chapter IX—Jacks and Switches.
- Chapter X—Amplifying the Signals.
- Chapter XI—Care of Radio Batteries.
- Chapter XII—Telephones and Loud Speakers.
- Chapter XIII—Hints on Tuning.

A GRID leak is essentially a very high resistance and made in two types, namely, fixed and variable. In the former the resistance unit is made either of a strip of insulating material coated with India ink or a thin film of high resistance metal and enclosed in a glass tube to exclude moisture and simplify its support. The variable types take many forms, the idea being to have under control the resistance of the unit.

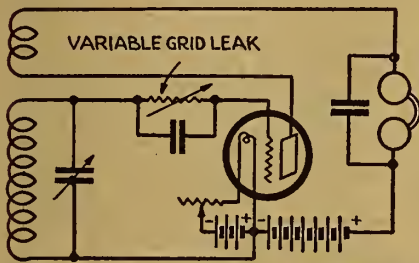


Figure 17.—Regenerative circuit showing how grid leak drains grid charges to filament through inductance.

It is safe to say that any form of variable leak in which a contact lever moves over the unit is short lived. This is due to the moving arm gradually scraping

off the resistance material and eventually destroying it. The better types of instrument employ either a fluid contact that is mercury as the contacting medium, or have the resistance changed by being partially shorted as desired by a strip of metal being forced against the surface of the resistance material.

Grid Leak Plays Important Part

The grid leak plays an important role in the operation of a receiver and follows

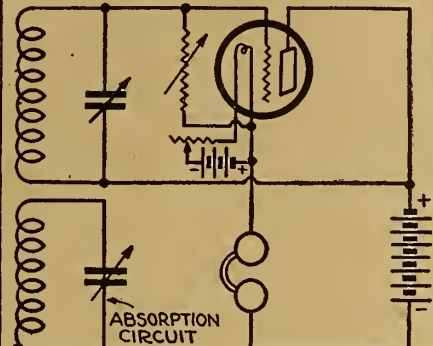


Figure 18.—Regenerative circuit in which leak must connect direct to filament since inductance is at plate potential.

can often be traced to this cause. Let us consider the detector circuit. Here we find that a grid leak practically controls the detecting function of the tube. We learned in the chapter on detectors that the grid charge obtained during half the cycle was prevented from leaving the grid by the grid condenser.

To prevent this charge building up high enough to shut off the tube action a grid leak is connected across the condenser. The resistance of this leak will determine the rate at which the charge will flow from the grid to the filament. With a leak of too low a value the charge leaks off too rapidly and the grid charge never builds up high enough to obtain full response from the tube. With a high value

in the leak the grid charge builds up too high and the tube shuts off for an instant till the charge can leak off. This action manifests itself by a series of clicks in the phones that increase in frequency as the resistance of the leak is lowered until they become inaudible.

The detector then should be equipped with a variable grid leak to permit close adjustment of the leak value which varies somewhat with each tube. The soft tubes, as a rule, are more sensitive to changes in the resistance of the grid leak while the hard amplifying tubes as well as the dry cell tubes are not so sensitive.

Tickler Feedback

It is well to remember that the grid leak must always be connected from the grid to a part of the circuit that is at filament potential. In Figure 17 is shown the conventional connection with a tickler feedback regenerative circuit where it will be seen that the top of the inductance is at the same potential as the filament because it has a metallic connection to the filament. There are some forms of regenerative circuit where this is not true; for instance, the circuit in Figure 18 where the inductance connects to the plate and consequently is at plate potential. In this case the grid leak then is connected direct to the filament. With

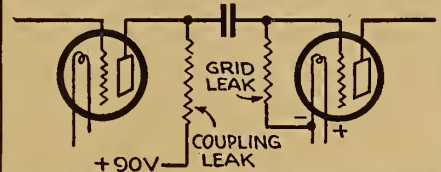


Figure 19.—Skeleton circuit of resistance coupled amplifier showing leaks used as coupling device as well as grid leak.

a grid condenser in the detector, slightly better results are had when the grid return is connected to the positive terminal of the filament.

A similar condition exists in resistance coupled audio frequency amplifiers where

we find grid leaks are likewise useful for coupling between tubes, as shown in Figure 19. A moment's consideration will show that were the grid leak to be connected across the grid condenser, which in this circuit functions simply as a blocking condenser to keep the plate potential off the grid, we would be defeating the purpose of that condenser and place a high positive potential on the

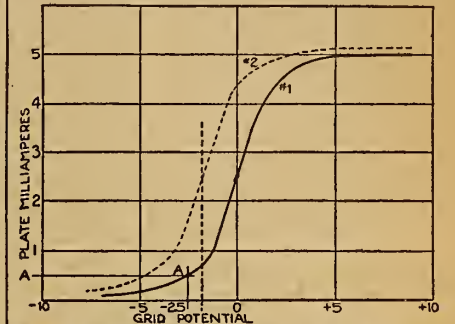


Figure 20.—Characteristic curve of vacuum tubes to show effect of biasing.

grid. The leak therefore is connected to the filament and for this type of duty is of the fixed type because the tubes used are hard and the proper value of leak determined by experiment.

Leak Used as a Coupling

The use of a leak for coupling between audio frequency amplifiers is by no means new, but has one feature to recommend it to the critical fan. The reproduction of music and voice is perfect when the leak is high enough in value, at least equal to the impedance of the tube. Resistance coupling gives equal amplification at all voice frequencies and thus introduces no distortion.

The fact that grid leaks are of extremely high resistance makes it unhandy to rate them directly in ohms, so it has (Continued on page 20)

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RADIO
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ATLANTA, GA. U.S.A.

GET MOST FROM RADIO

(Continued from page 19)

become the practice to rate them in units of 1,000,000 ohms, calling this unit a megohm, usually abbreviated to meg.

We come now to a consideration of grid biasing, which is nothing more or less than applying a fixed potential to the grid of the tube to control its operation. As usually applied it refers to the audio amplifying tubes, but we will consider it first in connection with detectors.

Previously we considered tube detectors with a grid condenser that detected by reason of the varying potential of the grid condenser thus controlling the plate current.

Under some conditions it is desirable to eliminate the grid condenser and leak for the sake of simplicity and we can then resort to a biased grid to obtain detection. This action of detection with a biased grid is extremely important in that it enters into the operation of reflex receivers with the result that the set will not function.

It is conceivable that the grid biasing in a Radio frequency amplifier could be such that detection would result, thus reducing the efficiency of any other stages of Radio frequency amplification, and this is just what happens when signals can be heard through a reflex receiver with the detector out of operation.

Grid Plate Characteristics

With the assistance of the curve shown in Figure 20 the action can be made clear. This shows the general grid plate characteristics of a vacuum tube, but is not an actual plotted curve, the potential of the grid being read along the bottom and the plate current up the side. Suppose the potential of the grid is 2.5 volts negative, then the plate current will be represented by point A. Now, if an alternating current, in this case a Radio current, is impressed upon the grid it will alternately become more negative and less negative or more positive.

When the grid is more negative the plate current is reduced slightly, but when the grid is made less negative the plate current is proportionately greatly increased. Thus an alternating current impressed upon the grid is reproduced in the plate circuit by a current having alternative halves of the cycles larger than the remaining half cycles. The result is actually the same as if rectification had taken place and thus giving the detector action. This is known as working on the bend of the curve and a similar action would take place were the grid to be

biased positively to cause the tube to work on the upper bend of the curve.

While the bend of the curve gives rectification and detection because of the distorted plate current an amplifier tube must give an exact reproduction in the plate circuit of the varying voltages impressed on the grid. To do this the tube must be worked on the straight portion of the curve and referring to the curve we see the grid should be at a zero voltage with this curve.

The curve was drawn with a certain B battery voltage and when the plate voltage is increased the curve shifts to the left as shown by dotted lines marked number 2. We now see that a zero voltage on the grid throws the operating point of the hub on the upper bend of the curve and were the tube worked as an amplifier with zero grid voltage distortion would result. To correct this a bias or C battery is connected into the circuit to impress a negative voltage on the grid of about 2 volts, which then brings the operating point back on the straight portion of the curve.

This shows nicely that as the plate voltage is increased on an amplifying tube the grid must have an increased negative bias applied to it to prevent distortion. A slight negative bias is always given the grid when its return is connected to the negative filament, but this is not always sufficient to give the proper operating point for the tube and it is well to try a C battery on every audio amplifier and note if there is any improvement in reproduction.

Improper Bias

Poor amplification in reflex sets is usually due to improper bias being applied to the grid that gives distortion and detection in the Radio stages and distortion and poor amplification in the audio stages. An attempt to bias Radio stages usually results in making them unstable and liable to oscillate so the logical thing to do is to try various plate voltages and thus shift the curve to suit existing grid biasing in the set. This little trick is the secret of making balky reflex sets work.

(In the succeeding article by Mr. Benson he will give you in detail the manner of construction and use of jacks and switches. A set may be spoiled by their use if they are improperly installed, but when located right they greatly aid the operator in getting the most out of his set.—Editor's Note.)

HOW TO OPERATE SET

(Continued from page 9)

ing makes this necessary. The loud speaker terminals are fastened at the factory to the two right hand binding posts on the socket shelf. Be sure that these connections are fastened properly before attempting to tune the set. Note that the cords from the loud speaker are positive and should be fastened to the proper respective posts. If it is desired to use headphones or some other make of loud speaker, first and second stage jacks are provided in the panel for this purpose. Note that when a plug for phone or outside loud speaker is inserted in the second stage, the in-built loud speaker is automatically disconnected. It is thus possible to tune with headphones without the loud speaker being connected, and to bring the loud speaker into action by simply removing headphone plug.

Tuning

If the instructions given above have been carefully followed, the set is now ready for operation. The upper left hand lever Number 5, marked "Filament Battery," which during the connecting up process should be turned to the "Off" position, should now be turned to the "On" position. This lights the filaments of the tubes from the "A" battery. The turning of this switch to the "Off" position is all that is necessary to disconnect the set when not in use, since this switch disconnects both the A battery and the ground from the set. The rheostat, Number 4, in the upper right hand corner should then be turned to the numeral 8 on the dial. The correct position of this rheostat will depend somewhat on the tubes used. Now move the lever marked "Intensifier," Number 3, to approximately the numeral 6 on the dial. Then take the lever marked "Turner," Number 1, in the left hand, and lever marked "R. F. Tuner," Number 2, in the right hand, and bring both to positions showing similar reading on both dials. Now proceed as follows: Holding the tuner lever, Number 1, steady, move the R. F. tuner, Number 2, back and forward over a reading of the scale until an audible click is heard. If it is impossible to secure this

click, move the intensifier, Number 3, to a reading of 8 or even 10, and repeat process described above. If still it is impossible to secure a decided click in the receiver and you are positive that A and B batteries are of proper voltage and are properly connected to the set, exchange the first, or left hand tube with one of the other three tubes and proceed with the tuning as before.

In explanation of the possible necessity of changing tubes, it should be noted that occasionally a tube will not oscillate properly in the first or Radio frequency socket, and it is very desirable to put in this socket the tube which will best respond. When operating the tuners as described above, and it is possible to secure a decided click, it is proof that the tube in the Radio frequency socket is oscillating properly.

When satisfied upon this point, proceed with the tuning by moving the tuning lever, Number 1, a few points at a time and, while holding it constant, rotating the R. F. tuner lever, Number 2, through a small arc to the position at which the click mentioned above is audible. When the tuner, Number 1, has been moved to proper position to receive the station, a very characteristic whistle, which is already familiar to all Radiophans, will be heard. To clear the tube of oscillation, which causes this whistle, move the intensifier, Number 3, toward the O position until the whistle disappears, then move it back to a point just below where the whistle is heard.

Now by moving carefully, one at a time, the two tuner levers, number 1 and number 2, sharpen tuning until the voice or music is heard satisfactorily.



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Internal Spiderweb Coil Mounting

Inductances Adjusted from Front of Panel

There are many who like spiderweb coils for tuning, but mountings are not always suitable, nor do they present a neat appearance on the panel face. Many

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

inside mountings have been designed for enclosing in a set and a few of them work well, but it is very clear that the one shown in the illustration is quite superior to most of them.

Two blocks of wood are used for the base upon which the mountings are placed. These blocks are faced with a piece of panel stock and the whole is fastened to the panel with screws. The center coil is mounted stationary in the center of the blocks and the two outside coils are pivoted to turn through the arc of a circle and are operated with long threaded rods or screws with a thumbnut on the ends and rubber bands. The rods are run through threaded holes in the block mounting panel.—R. Compton, Los Angeles, Calif.

Dash Lamp Makes Panel Light

While sitting up late at night trying to tune in DX, other members of the family will not have their sleep disturbed because of the light if an automobile dash lamp is placed on the panel. This lamp can be connected directly to the A battery with a switch in series with it. This lamp

CARTER "TU-WAY" Plug \$1.00



The first plug to take more than one head set and still the first plug in popularity with Radio Fans who know good parts and buy them.

Insist on the original. Any dealer can supply.
In Canada
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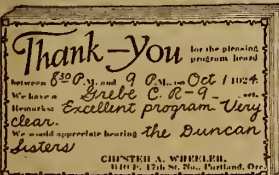


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Stations are glad to put on numbers at your request. We print special "Thank You" cards that get ATTENTION. See the name CHESTER A. WHEELER on illustration. That is where YOUR name will be. Your INDIVIDUAL cards show more than ordinary interest and stations appreciate them and consider your request.

Thank YOUR Favorite Stations

Speakers and musicians deserve and appreciate applause for radio programs just the same as from the stage. Their entertainment makes your radio possible. Encourage them and help bring the best talent to radio. Send them YOUR "Thank You" card of appreciation.



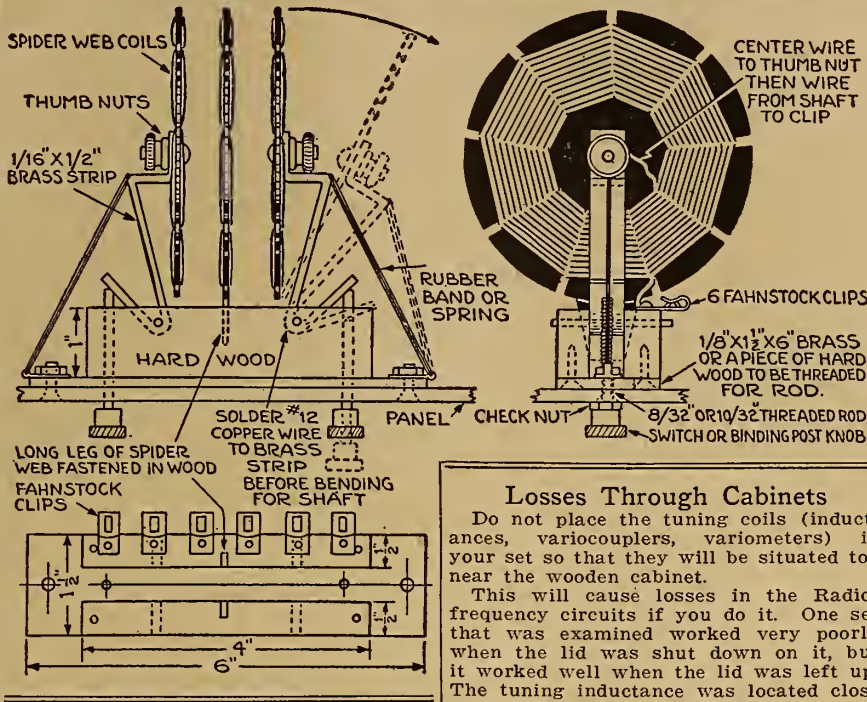
Sample Card FREE All the Rage

Be up-to-date. Enjoy these popular "Thank You" cards. Get this additional pleasure from your radio. Save letter postage. Cards require only 1c stamp.

FREE No Charge for Printing Your Name and Address

Good quality cards. High grade printing. Attractive special radio design. The kind that gets results. 100 only \$1.35; 200—\$1.85; 300—\$2.35, plus low cents postage. Don't send one cent. Just pay postman after cards arrive. If you prefer to send money order or check with order, we prepay postage. We GUARANTEE Satisfaction. Money Returned If Not DELIGHTED. Send order today—NOW. A postcard will do. Radio Printers, Dept. 48A, Mendota, Ill.

ATTACHES TO CABINET PANEL



should be mounted so that it will throw a light on the tuning dials. When late tuning is to be done, the switch is turned on and the major tuning controls will be in the light so that the dial settings can be followed. It will then be unnecessary to have any other light burning.

Losses Through Cabinets

Do not place the tuning coils (inductances, variocouplers, variometers) in your set so that they will be situated too near the wooden cabinet.

This will cause losses in the Radio-frequency circuits if you do it. One set that was examined worked very poorly when the lid was shut down on it, but it worked well when the lid was left up. The tuning inductance was located close to the varnished wood of the lid.

Soldering Phone Cord Tips for Perfect Joint

When the tip pulls off your telephone cord there is one way that it can be replaced so that it will stay put. Don't try to cover the tinsel cord with a coating of lead without first making some sort of foundation for the solder to cling to. The best way to build up this foundation is to remove the insulation from the tinsel cord for a distance of about 1/2 inch, after applying a coating of acid. Wind about twenty or thirty turns of some fine magnet wire (No. 34 or 36), from which the insulation has been removed, around the tinsel. After the loose ends have been cut you are ready to apply a coat of acid and tin the end of the cord with solder. You will now have a stiff end which will not bend or fray out.

Next hold the tip with a pair of pliers over a Bunsen burner or gas jet and when hot fill the opening nearly full of solder, then remove tip from flame and while it is still hot the previously prepared tinsel cord can be forced into the opening; this will force out the excessive solder. Small beads of solder which have collected on the shank of the tip can easily be scraped off and the job finished. The result is a good connection and a cord which will give many months of service.

Always keep the plate and grid leads as far apart as possible. If they must run close, have them run at right angles to each other. This will reduce howling.

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With the new FADA set of knock-down parts and the new FADA book you can build a 5-tube Neutrodyne receiver that will beat anything you ever had. Outfit No. 169-A sells for \$72. It contains everything necessary. The new enlarged FADA book of 76 pages makes every detail of assembling clear. 30 pages of trouble shooting. Large picture wiring diagram. At your dealer's, 75c.
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Sockets ranging from 1/4" to 1/2"

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Place socket of required size on end of shaft with slots not in line with lugs on shaft.

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Every pin point on this double-rectifying crystal is a "hot-spot." Permits close tuning without violent oscillation. Great for reflex sets.

Two extra pieces of Miller-B-Metal are given free with each crystal. You can remove the old and replace with new Miller-B-Metal when you wish.

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If it isn't in the Mahogany Block, it isn't a genuine Cosmopolitan Phusiformer

The Cosmopolitan Phusiformer, which has won the Universal praise of Radio Engineers, enables you to start in with the small expense of a crystal or a one-tube set and to build, by degrees, a multi-tube set with as many stages of tuned R. F. as desired, simply by adding more tubes and Phusiformers. Radio sets that use Phusiformers as tuning units are free from oscillation, squeals and howls. Phusiformers are self-neutralizing, no extra condensers or coils are necessary to balance the capacity of the tubes. Build a Phusiformer tuned radio set and learn with what clarity and volume distant stations can be received.

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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.

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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 hole in panel. Bakelite moulded. Silver etched dials. Many other superior features. All one price, \$2.50 each.

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Questions and Answers

Audio Amplifier

(9692) ROB, Crilchton, Ala.

I would appreciate learning how I might hook-up a two stage audio frequency amplifier of my Radio set, putting in the circuit a Type LS2 Model A Magnavox which I use in connection with a phonograph for dance music, at my home.

The Magnavox does not give sufficient volume for dance music outside of the house. Radio reception for the next summer is almost out of the question on account of the severe static.

I wish to hook-up a 9 to 1 RC transformer on the second step, using 201A tubes.

A.—We are giving a diagram of amplifier to meet your requirements, advising, however, that a six to one and a three and one-half to one ratio transformer should be used on first and second stages respectively. A nine to one ratio is too high and will be likely to cause distortion.

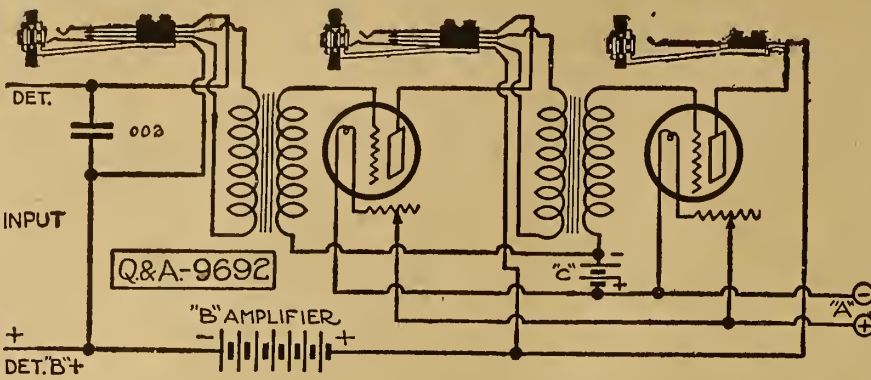
Honeycomb Coil Set

(07281) WSC, Montreal, Canada.

I have a three tube set (detector and two stages of audio amplification) with three honeycomb coils (50-45-75) which gives excellent results between 200 and 400 meters, but I can't touch the higher wave lengths such as KYW. I understand a different combination of coils would bring in higher wave lengths, and would like you to advise what combination would catch, say from 400 to 550.

I use WD-11 tubes with 3 dry cells in parallel on the filament, 22½-volts on the detector and 45-volts to 67½-volts for amplification, but can only get local on the loud speaker, except for Pittsburgh, occasionally. Can I get any more volume from this set using the same tubes?

A.—Your limitations in the matter of



wave length range can be overcome by employment of a fifty, seventy-five and one hundred turn honeycomb coils in primary, secondary and tickler.

Addition of another stage of audio frequency amplification will be the best method of increasing volume, and can be connected in the manner of preceding stages.

Split Variometers

(9151) RHM, Green, Kans.

Notice you frequently refer to and show diagrams for split variometer circuits. Will you please kindly explain what is the difference between the split variometer and the common variometer. Can the same instrument be used for either? What is done to split the common variometer?

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.

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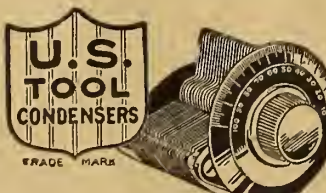
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U. S. TOOL CO., INC.

122 Mechanic St. NEWARK, N. J.

Have a diagram of a homemade reflex circuit, in which the Radio frequency transformers are wound at home. This calls for primary circuit wound around outside the secondary, with a thickness of empire cloth between the coils. What is empire cloth, and where could it be obtained? Have never found it in any catalogues. Would waxed paper do as well?

A.—Any standard variometer will serve to use as a "split" connection which is accomplished in using stator and rotor as separate coils instead of in the usual series electrical connection.

Empire cloth is an insulator and should be available through any dealer in elec-

SUPERTRON

A GOOD TUBE
ALL TYPES \$4.00
Be Sure It's a Genuine Supertron
VICTOR RADIO MFG. CO.,
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\$6.75 for a Radio Table

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No longer do you have to utilize the dining room table, or the sewing machine cabinet as a place to keep your radio set. The radio table illustrated is a real piece of furniture, beautifully finished in hand-rubbed mahogany; legs fitted with "dome of silence." The top measures 16x28 inches; the table is 31 inches high. Comes by parcel post, knocked down; a pair of pliers is the only tool needed to assemble. Send no money; we'll ship the table and you pay the postman. This table is guaranteed to satisfy you—or money will be refunded. Our new booklet shows and describes many other styles of radio tables.

RADIO FURNITURE COMPANY

5400 EMERSON AV. SAINT LOUIS

trical supplies. Waxed paper could be substituted.

Soldering Joints

When making up a soldered joint there are four points to be remembered: The surface of the parts should be cleaned and polished; the surface should be kept at the right heat; soldering flux should be applied to the cleaned surface; the metal parts should be heated with the iron and just enough solder applied to cover the parts neatly. This is called tinning the surface and it makes the solder run freely.

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At your dealer's, otherwise send purchase price and you will be supplied postpaid

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TYPE VARIABLE GRID LEAK

was designed especially for the non-technical set owner who can replace in an instant the fixed grid leak with this new, efficient cartridge type Variable Grid Leak without requiring the change of a single wire.

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STAR-ITE

THE STAR-ITE CRYSTAL

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

We 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-regenerative tube sets, and are glad to support our belief by making it extremely easy to try one 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.

1401 525 Woodward Avenue
DETROIT - MICHIGAN

SCIENTIFIC FIXED CRYSTAL DETECTOR

BEST BY TEST
Price, \$1.50

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Eveready "B" Batteries

There are Eveready Batteries for portable sets where small size and light weight are more important than long life. There are Eveready medium size batteries that come between the small and the large sizes. There are Eveready large size "B" Batteries that afford maximum economy and reliability of service when used with average one, two, three or four tube sets. And now there is a newer Eveready heavy duty, extra large size "B" Battery that gives similar economy to owners of multi-tube heavy drain sets and power amplifiers.

For maximum "B" Battery economy, buy Evereadys, choosing the large sizes (Nos. 766, 767, 772) for average home sets, and the heavy duty, extra large (No. 770) for multi-tube heavy drain receiving sets and power amplifiers. For portable sets choose the Eveready No. 764 medium size, unless space is very limited, in which case choose the Eveready No. 763 small size "B" Battery.

Eveready "C" Batteries

Eveready makes a long-lasting "C" Battery with terminals at 1 1-2, 3 and 4 1-2 volts. May

also be used as an "A" Battery in portable sets.

Eveready "A" Batteries

Eveready offers you "A" Batteries for all tubes, both storage and dry cell. For storage battery tubes, use the Eveready Storage "A." For dry cell tubes, use the Eveready Dry Cell Radio "A" Battery, especially built for radio use.

Manufactured and guaranteed by

NATIONAL CARBON COMPANY, Inc.
Headquarters for Radio Battery Information

New York

San Francisco

Canadian National Carbon Co., Ltd., Toronto, Ontario

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