

New Inductance Tuned Circuit Has No Condensers; 64 Advance Programs; Assembly and Wiring of Neutrodyne Receivers; Trouble Shooting Sets

Radio Digest

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

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

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BROADCASTERS WIN OUT

ACCUSED COMPANIES DENY TRUST CHARGE

FEDERAL TRADE COMMISSION PUSHES HEARING

Will Attempt to Prove R.C.A., A.T.&T. and Others Have Combined in Illegal Monopoly

WASHINGTON.—A blanket denial that a Radio monopoly exists has been made by the Radio Corporation of America and other respondents to the Federal Trade Commission's complaint alleging such a monopoly. Within one week, it is believed, the Federal Trade Commission will issue a call for hearings on the alleged monopoly and will summon witnesses to testify and prove the existence of an illegal monopoly.

E. L. Smith has been designated by the trade commission to handle its case against the Radio Corporation and other participants in the alleged monopoly.

Say Government Requested R. C. A.

Attorneys for the Federal Trade Commission are studying the seven voluminous reports filed in answer to the commission's charges. The seven volumes, practically all alike, deny the charges of the commission, claiming that their agreements were not set forth fairly in the complaint.

(Continued on page 2)



Dorothy Knapp, who was judged as one of the most beautiful girls in America at a recent beauty show, is a member of Earl Carroll's "Vanities" which was recently broadcast from KYW.

A. T. & T. NOT TO CONTROL BROADCASTS

'King Telephone' Settles WHN Suit out of Court—Sells Valuable Rights

License Allows Toll Use

Would Permit Greater Power Than 500 Watts—Same Treaty Open to All Plants

NEW YORK.—What seems to be a general retrenchment of the policies of the American Telephone and Telegraph company, "King Telephone" as it has been called, is brought to light in the recent settlement out of court of the suit against Station WHN, by means of which, it is believed by many, "King Telephone" sought to gain supreme control of the air.

Not alone is "King Telephone" to drop and forget his suit against Marcus Loew, (Continued on page 2)



Flo Gillingham (left) and Mlle. Renova, Premiere Danseuse (lower right), both members of Earl Carroll's "Vanities," were heard over the air recently when the entire first act of the "Vanities" was broadcast from KYW.

X-Ray Gets Share of Blame for 'Crackles'

Commerce Department Hears Complaints of Fans

WASHINGTON, D. C.—The Radio section of the Department of Commerce is receiving complaints from various parts of the country from Radiophans relative to interference.

While the Radio section is not clothed with any legislative powers to take up these matters, officials of the section are doing everything they can to co-operate with the Radiophans in seeking the interference causes. It is said that some of the interference has been caused by X-ray and violet ray machines, Cottrell electrical precipitation plants and magnetos on suburban telephone lines.



A. T. & T. SURRENDERS?

(Continued from page 1)

owner of WHN, but has granted a personal non-transferable license to WHN to use the station "for Radio telephone broadcasting, including broadcasting for toll or hire."

Licenses 500 Watts; Will License More

The consideration involved is the payment by WHN of \$2,000. This sum, it is understood, is not to be an annual fee but one sum covering operation of the station during the life of the patents owned or indirectly controlled by "King Telephone" and under which the license is granted.

The license sold WHN is based on the use of 500 watts power output, but the Telephone company agrees that at any time upon the request of the licensee, it will grant a license to operate with greater power on terms commensurate with the present license fee, "as far as its patents are concerned."

The Telephone company is said to have stated that anybody can obtain a similar license.

"King" Licenses from Fear Only

Contrary beliefs exist however. A well-known figure in the Radio manufacturing industry disputes the claim that the Telephone company will license anyone, and says that "anyone" means only those stations now in operation.

His statement follows:

"The facts of the matter are that the Telephone company is ready to sell licenses to any broadcasting stations now in operation, but it absolutely refuses to present licenses to those who contemplate building their own station, under any circumstances. In other words, the Telephone company is to license the existing stations, because it fears the effect of the broadcasting which these stations may do."

Thayer Statement Backs WHN Move

President Thayer of the A. T. & T. company several weeks ago made the significant statement which caused leaders in the field to believe the "ice was breaking." In this statement Mr. Thayer said: "We believe that others should broadcast and some should broadcast for hire. While we intend to maintain our title to our patent rights, we also intend to make it easy for others to use them."

"But—until regulation has been established, we shall not encourage the multiplication of broadcasting stations."

"King" Collects Royal Ransom

That "King Telephone" has found broadcasting for hire very remunerative, is borne by the incomplete financial statement deduced and shown here for paid broadcasts over WVEAF from April 8 to 22 inclusive:

April 8, \$650; 9, \$500; 10, \$750; 11, \$900; 14, \$600; 16, \$600; 17, \$400; 18, \$500; 19, \$500; 20, unknown; 21, \$800; 22, \$800.

Grand total for known paid ether advertising, \$7,300.

COMPANIES DENY TRUST

(Continued from page 1)

In one reply, the Radio Corporation of America avers that the Radio Corporation was formed at the instigation of certain United States officials, and claims this as a mitigating circumstance.

Who Is In Alleged Trust

The companies alleged to have illegally combined and conspired to monopolize the Radio industry are: General Electric, American Telephone and Telegraph and Western Electric, International Radio Telegraph, Westinghouse Electric, United Fruit, Wireless Specialty Apparatus and the Radio Corporation of America. Replies were filed by these organizations.

The firms admit some sections of the Federal Trade commission's complaint, but they also deny the jurisdiction of the commission to handle the case, or to cause them to desist. The Radio Corporation in this connection says:

"Respondent submits that the Federal Trade commission is without jurisdiction in law to make the order to desist described in the complaint or to conduct the proceeding therein directed."

RADIO BEACONS GUIDE FERRIES ACROSS BAY

Mark "Line" in Ether to Keep Boats on Course

SAN FRANCISCO.—Crossed coil Radio beacons, developed at the bureau of standards, have been suggested as a suitable means of guiding ferry boats across San Francisco Bay in foggy weather. This type of beacon marks out a "line" in the ether. A boat equipped with an ordinary receiving set can tell whether or not she is on that line, and to which side she is off.

The San Francisco ferry boats traverse a distance of three and one-half miles and carry a very large proportion of the city's commuting population as well as all through passengers from the east and north. At times the fog is so thick that one end of the boat can scarcely be seen from the other, and strong tidal currents are encountered.

"SHOW-ME'S" DIG UP TROUBLE AND PICK

CARTOONIST KNOTT LEADS AN EXPLORATION

Radio Listeners' Shovels Uncover Cause of Disturbance, Buried in a Terrace

By Eric E. Leibner

ST. LOUIS.—The Missouri Radio Listeners' association is out to dig up Radio trouble. It is succeeding both figuratively and literally.

Jean Knott, the celebrated cartoonist and leader of the trouble forces under the flag of Field Marshal Julius Nolte, co-operating with a detachment of Union Electric engineers, recently dug into a spot in Maryland terrace, a suburb of St. Louis, where the induction instruments of F. H. Abbott, engineer in charge, pointed and—

There it was!

A pick, poised just as it had finished the blow in the hands of a toiling workman excavating probably a few months ago, was found thrust through the electric company's conduit and into a high tension lead.

Workman Thought He'd Struck—Well!

It is evident that there was trouble aplenty for the workman down in the confines of the trench when the thing happened. The position of the pick indicated that a hasty retreat from the fireworks center had convinced him that he had in some manner established connections with a fiery world below.

Just how the pick became covered again is a matter of conjecture. However, residents in the immediate neighborhood recalled that it had been several months since any excavation had been done in the vicinity and also recalled vividly that their Radio sets quit functioning about the same time.

WTAM Asks Fans to Watch for Balloons

Messages for Station to be Dropped Overboard April 23

CLEVELAND.—Radiophans are requested to be on the lookout for balloons on the night of April 23 and report what they see to Station WTAM, Willard Storage Battery company here. The National Balloon Race starts on that day from San Antonio, Texas, at 4:00 p. m. Central time, and WTAM will endeavor to keep the balloonists informed of weather conditions and to warn them of all storms in any portion of the country where the balloonists are reported as being seen.

Radiophans are requested to keep a lookout for the balloons, and when one is sighted, to note the color and markings if possible. Then WTAM asks that this information, together with the observer's city and state, be communicated at once to its studio.

W. T. Van Orman and C. K. Wollam, in the Goodyear III which is Radio equipped, will drop scores of messages over the basket of their balloon as it passes over large centers of population. Anyone finding one of these messages is requested to take it to the nearest Western Union telegraph office where it will be taken free of charge and communicated to WTAM.

WTAM expects to broadcast all night, giving results of the observations and weather reports at two-hour intervals.

The trouble in Maryland terrace is almost gone and after the pick was disconnected from the high tension lead, Radio sets worked on DX far into the night.

Which all goes to show that friendly co-operation between the Union Electric company and the Missouri Broadcast Listeners' association is producing splendid results.

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Looking Ahead

At Last! A Reliable Super-Het Construction Article is available. Promised a long time, this excellent article by Allan C. Forbes starts next issue. Mr. Forbes has designed and built an excellent super-heterodyne, and knows his subject well. Don't miss this!

Essentials of Radio Electricity is the next topic of P. E. Edelman in his easy-to-understand series for Radio newcomers. He will introduce you to a few of the more important technical Radio terms.

Adjusting and Balancing the Neutrodyne will not be so difficult after you read Peter J. M. Clute's description of the proper procedure to follow, to appear next week. Mr. Clute's study of the neutrodyne receiver started two weeks ago.

The Famous Miloplex Family Picture, heralded for weeks, will make its appearance next issue. The bones of the old family skeleton are rattling in the closet. "Wanta" hear them?

Grown-Up Photos and Personality Sketches for the two announcers whose baby pictures appear this week. Who are they? Buy next week's Radio Digest and look on page 5.

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, 123 West Madison 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

Approved!



Standard or U. V. 199 Base

50¢ AT YOUR DEALER WALNART TUBE SOCKETS

Adopted by leading radio set manufacturers. Dependable in all circuits.

Can be mounted on panel or base board (packed complete with mounting screws).

Electrically Right Strongly Constructed (Non-breakable) Perfectly Insulated Thruout Fits Into Small Space

Continental White Horn Fibre—the positive dielectric insulation is used in these sockets

Ask to see the Walnart Line of Quality Radi Products Send for illustrated folder complete line Jobbers—Dealers—Manufacturers Write for Discounts

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Dept. 432, 1249 W. Van Buren St., Chicago

THORDARSON



POWER AMPLIFYING TRANSFORMERS

Price per pair, \$13.00

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

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

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

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

THORDARSON ELECT. MFG. CO.

500 W. Huron St. CHICAGO

CIRCUS ON AIR FROM CLOWNS TO ANIMALS

LIONS DO ROARING BIT FOR THREE STATIONS

Season Premieres of Two Great Shows Given to World Through KYW, WGY, WJZ

CHICAGO.—From calliope to chariot races, from spectacular opening to the ballyhoo of side show "talkers," the circus has gone over the ether.

Westinghouse Station KYW here, recently broadcast for the first time in Radio history the metropolitan opening of a big show—the fifth annual premiere of Sells-Floto circus in Chicago's Coliseum.

With a three-way switch, KYW presented the big show performance far beyond both coasts, sending forth side show and menagerie "High Lights" to give the typical big top atmosphere to the interesting achievement.

Fans Hear Lionesses Roar

The Sells-Floto performance this season is unusually well adapted to Radio, for a sextette of prima donnas, a chorus of several hundred, tell the story of the introductory spectacle—"The Bride and the Beasts"—in song. The finale of the number, the unleashing of eighteen lionesses in a steel arena in which the heroine of the pageant is "thrown to the beasts," gave the fans listening in a thrill, for the lionesses are thorough in vocal showmanship.

Calliope chants and elephant trumpeting preceded the booming measures of the spectacle, and traditional ringmaster's announcements added color throughout the broadcasting program.

Freaks Mike Their "Stuff"

Children happening to tune in were given a trip around the menagerie oval, for the microphone picked up the roaring salutations of all jungle beasts, the chattering of monkeys, the raucous sigh of the hippo and the laughter of hyenas, while the polar bears, en route to the performing arenas, staged an arctic hullabaloo unsurpassable in zoological discord.

W. H. McFarland, dean of "kid" show managers, toured the circle of freaks and curious peoples with the fans. Each platform was visited and, after a rattling old-time introduction by the veteran impresario, the freaks greeted the fans.

Although the circus is primarily an "eye" entertainment, there is a large amount of "ear" appeal—the speeches of the side show barkers, the ticket sellers, the peanut vendors and the announcers, while the big show band, "playing the show" steadily, is always available. The circus has proved a fertile field for Radio and Westinghouse Station KYW is receiving countless telegrams of congratulations for its innovation.

WGY and WJZ Follow Suit

The roar of the lion, the trumpet call of the elephant, the chatter of saucy monkeys and the dinner hour music of other jungle captives were, a few days following KYW's experiment, broadcast to England.

WGY, Schenectady station of the General Electric company, co-operating with WJZ, R. C. A. plant in New York, put the menagerie of the Ringling Brothers and Barnum and Bailey shows on the air from Madison Square Garden, New York. The menagerie musical program was transmitted by WGY on 380 meters and also for the benefit of English Radiophans, on 107 meters.

For the purpose of getting maximum vocal effort the feeding hour was taken for the performance. When hungry and with the smell of fresh red meat wafted to their nostrils, lions and tigers become positively eloquent. If the lion Leo's brother happened to be listening in in the African jungle on a selective set he probably frothed with envy at the ferocious, growling joy with which Leo wrestled with the fifteen pound slab of prime beef, man-killed and man-carved.

AIRWAVES BLOCKADE CROOKS' PET RUNWAY

DETROIT.—It will be difficult now for crooks to escape into Canada through Detroit and Windsor, Ont. The highly developed system employed by the police departments of the United States for broadcasting news of robberies and other criminal activities is now being taken advantage of by the Canadian customs officials at Windsor, just across the river from Detroit, where they recently have installed sensitive Radio receiving equipment. They are now constantly picking up police descriptions broadcast by American stations.

WBAP USES NOODLE TO END TOOTHACHE

FORT WORTH, TEX.—To Sam Losh director of music here, credit is given for having cured the first toothache by Radio. Mrs. J. W. Kratty of South Omaha, Neb., writes that after having three teeth extracted she could eat no dinner, but expressed her wish for some noodle soup. Tuning in WBAP, the next number announced by Mr. Losh, was the "Noodle Soup Song." "After hearing the song my toothache was gone," said Mrs. Kratty. WBAP now uses the cure many times each night for the benefit of other dental fans.

PIONEER NEWS PLANT BLAZES NEW TRAIL

WWJ PIONEERS IN NEW TRANSMITTER TYPE

Outfit One of Five of Kind in United States; Old Set Used 3,028 Hours

DETROIT.—WWJ, the Detroit News, was off the air Sunday and Monday until 8.00 p. m. two weeks ago for the longest "silent" period since it began broadcasting.

The cause of this brief rest was due to the fact that WWJ was installing a new transmitter, embodying all the improvements known to the Radio world, which permits the station now to continue its aim of giving the listening public the best there is—careful and accurate reproduction of good music and entertainment.

The Detroit News was the first newspaper in the world to install a broadcasting station, and through this service millions of people have been entertained. The transmitter which was just replaced is the second that has served the News Radio family. This transmitter was installed January 29, 1922, and was the first Western Electric 500-watt set ever sold.

Old Transmitter Broadcast 3,028 Hours

Radio history was made by this transmitter. For more than a year it held the distance record. When this old transmitter closed its time of service, it had completed a grand total of 3,028 hours of actual broadcasting. More than sixty of the big, 250-watt vacuum tubes have been used in sending out the 127 days of entertainment. More than 55,000 kilowatt-hours of electricity were required to operate the transmitter during this time.

WWJ dedicated its new equipment with an opening program by the Detroit News orchestra. Following the News orchestra was a remote control concert by the Jean Goldkette's orchestra, broadcast from the Greystone ballroom here.

The new transmitter is one of five of its type in operation in the United States at this time. The others are WEAJ, New York; WLS, Chicago; WHAA, Iowa City, and WCAP, Washington.

Jazz Music Under Ban at KFGZ, New Plant

Berrien Springs, Mich., Policy Wins Many Fans' Admiration

BERRIEN SPRINGS, MICH.—Featuring the Commonwealth quartet, Station KFGZ, located at Emmanuel college here, gave a recent Wednesday evening program which was appreciated by the Radiophans throughout the middle west.

KFGZ has been on the air but three weeks, but in that time has courted the friends of thousands of admiring listeners from coast to coast. The station is operated with an antenna input of 500 watts on a wave length of 286 meters.

There is perhaps one unique feature in connection with KFGZ programs. That is the absolute lack of jazz music and coarse humor.

KFGZ's slogan, "The Radio Lighthouse," can be heard on the air Sunday morning and evening, Monday evening, Wednesday evening, and Friday evening.

Longest Telegram Received by WJAZ, Uses 1,623 Words

CHICAGO.—What is probably the longest telegram ever received by any broadcasting station, was received not long ago by Station WJAZ, now WGN.

The telegram was signed by 500 residents of Ft. Wayne, Indiana, and was composed of 1,623 words. It was sent during the recent wet and dry referendum held by Station WJAZ, and was in favor of a modification of the Volstead law. Owing to the fact that all the names were on one telegram, this vote was not counted.

SUPER-HET AND SUPER-SUPER-HET



Miss Josephine Gavin, beside a mammoth super-heterodyne transformer made for exhibit purposes, holds its little brother in her hand. However big the special super-het transformer may be, remember that "good goods always comes, etc." © U. & U.

WASHINGTON SHOW IN OCTOBER
WASHINGTON, D. C.—The Radio Merchants association of this city at a recent meeting here reappointed Alfred L. Stern, who handled Washington's first Radio show so successfully, to stage a second show in the fall. It is probable that it will be held in October or November.

CAROLINA FANS ORGANIZE
ELIZABETH CITY, N. C.—Radiophans here have organized "The Radio Club of Elizabeth City" and plan, for one thing, to install a Radiophone station. The officers are: Rev. Geo. F. Hill, president; Dr. W. W. Sawyer, vice president; D. R. Kramer, secretary; Pat Twiddy, treasurer.

THE ANTENNA BROTHERS Spir L. and Lew P. "Fare" Enough



HELIUM FILLED TUBE IS BIG IMPROVEMENT

RADICAL INVENTION BORN IN LITTLE LABORATORY

F. S. McCullough's Discovery Ranks in Importance with De Forest's Addition of Grid

(Editor's Note.—F. S. McCullough is a living proof of the assertion that not all important Radio research work is done in the large manufacturer's laboratory. He has produced the Helium tube, which seems to be the most radical tube invention since Dr. DeForest added the grid to the Fleming valve. Mr. McCullough's home is Wilkensburg, Pa., where his remarkable research is now going on.)

By F. S. McCullough

HELIUM tubes are now playing a great part in the high frequency art today. You listen in to seventeen of the largest broadcasting stations using these tubes each evening. These are the first stations in the world to use the Helium atom as a carrier of Radio frequency currents.

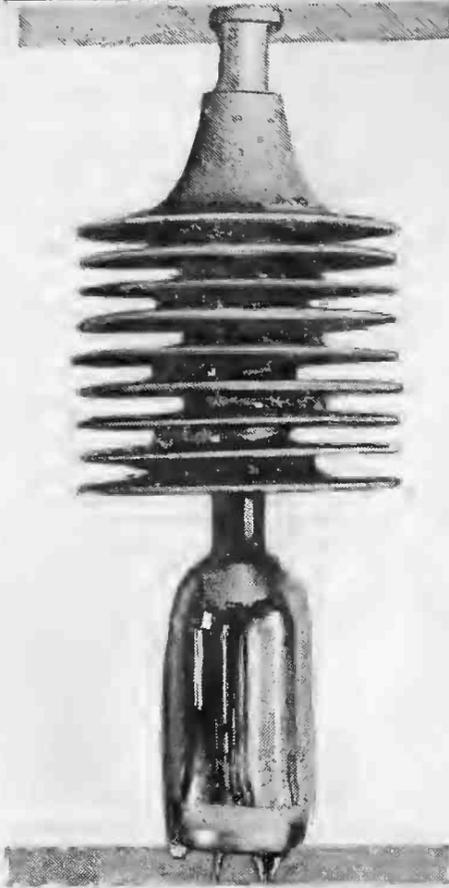
Heretofore, it has been practically impossible to separate the Helium atom. The Helium in these tubes is by far the purest in existence. There is practically no other gas mixed with it, otherwise the tube would become inoperative. These little carriers also cool the tube.

History of Tube Research

Now just what are these currents? A great many experiments have been carried out in connection with emission of electrons from hot bodies using filaments and plates within a glass bulb, which could be exhausted of air by means of a vacuum pump. The filaments were heated by a battery and means were provided for the measurement of the electrical charge on the plate. With the air inside the bulb at normal atmospheric pressure, the temperature of the filament was gradually increased by increasing the current passing through it. It was found that the plate received a positive charge of electricity, which increased until the filament was at a yellow heat.

When the temperature was raised above this value the charge decreased, until at white heat, the charge became small. The pressure of the air inside the bulb was now reduced gradually. The charge diminished still further until it reversed

SEE WONDER STRIDE IN QUEER NEW TUBE



Helium filled, air-cooled, metal 500-watt tube invented by F. S. McCullough. It has proven to give three times more power per watt than other tubes of today.

and went negative, and this negative charge gradually increased as the exhaustion of the bulb continued. Later it was found that the degree of electrification of the plate and also its sign depended largely on the nature of the gas inside the bulb. It was noticed that the presence of oxygen tended to reduce the charge received by the plate.

How Electron Theory Enters in

The electron theory is supposed to be an atom of an element consisting of a positive nucleus or core, around which

revolves a number of electrons. Little is known of the positive core, although its mass is great compared to that of the electron. Thus, the difference between gold and lead is probably that in one case there are more electrons than in the other.

If we could alter the number of electrons in an atom, we could probably change lead into gold. We have in Radioactive substances examples of atoms emitting some of their electrons and therefore changing their character.

Tungsten plays a very important factor in electron tubes. Take for example a tungsten filament at low temperature, no electrons are emitted. As the filament becomes red-hot, at about 1000°, a very small number of electrons are emitted, which increases further as the filament is heated. The maximum currents are obtained just before the filament melts, which is about 3270°.

Why the Metal, Air-Cooled Tube

The wattage consumed at this temperature is considerable and disturbs even a small amount of gas present, making the tube inactive. Gases have been used in tubes to try and stabilize this condition. Hydrogen, for instance, has a great cooling effect, but it decreases the electron current. The writer, however, found that by putting pure gases in tubes and keeping them in a free state, that entirely different results occurred.

All of the known gases have been used in a pure state and it was found that there was a number of factors to contend with. First, the cooling effect was always kept in mind, so a metal air-cooled tube was built and used to carry out the extensive experiments. During these experiments, it was found that when the tube containing the gas was kept cool, the gas itself was able to retain it in equilibrium and not become inactive. Helium proved the best because it was capable of cooling and gave a great deal more space current. The Helium tubes have been used for six months without any failures, and what is significant, they give three times more power per watt than any other type of tube.

First Move in Neutrodyne Suit Is Lost by Hazeltine

NEW YORK.—Efforts of the Hazeltine Research corporation to restrain Freed-Eisemann, neutrodyne manufacturers, from continuing manufacturing the set, has resulted in Judge Ince in the eastern district court of Brooklyn, N. Y., not only refusing the petition but ordering the Hazeltine corporation to turn over to the court all royalties paid by Freed-Eisemann, pending further hearing.

WLS, CHICAGO, OPENS WITH MUSIC 'FEAST'

SEARS-ROEBUCK STATION MAKES ITS DEBUT

Five Hours of Continuous Broadcasting Marks Gala First Night of Plant

CHICAGO.—Five hours almost of continuous broadcasting of an elaborate program opened here recently the new broadcasting station WLS and its sumptuous studio on the mezzanine floor of the Hotel Sherman.

Extending almost till dawn, the program represented the combined efforts of the Sears-Roebuck Agricultural Foundation, whose station WLS is, and the Herald and Examiner, a local newspaper, which will furnish programs and entertainment nightly.

The night was divided into periods, the first composed of addresses, music and other entertainment designed especially for rural America; the second was a gala bill transmitted by leased wire from a corps of celebrities in New York City; the third, an opera and concert program, and the fourth an imposing theatrical party.

Many Celebrities Broadcast

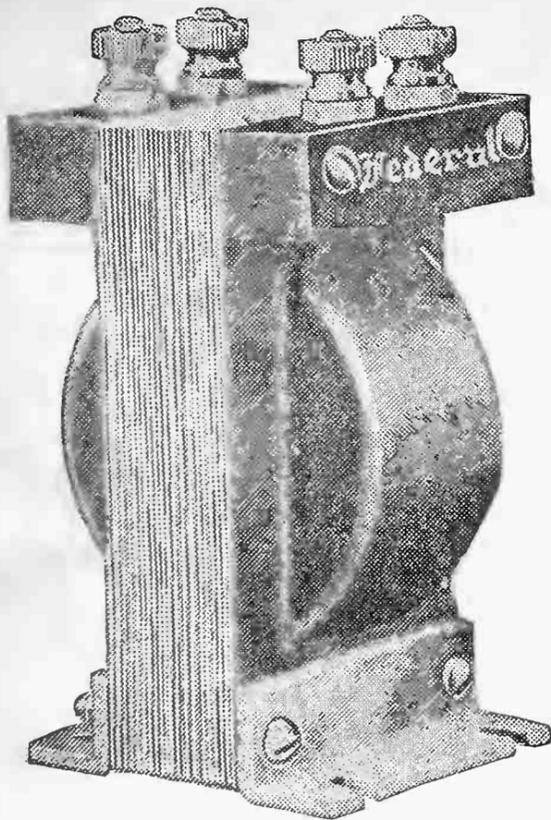
Mayor Dever, Ethel Barrymore, E. T. Meredith, former secretary of agriculture; Otis Skinner, Jane Addams; George Beban, the motion picture star; Ernest Truex, and from the opera circles, Margery Maxwell, Forrest Lamont, Virgilio Lazzari, Elizabeth Kerr and Isaac Van Grove—all these helped with their wondrous talents and participation in the program.

Edgar L. Bill, director of Station WLS, opened and directed the evening's festivities.

The downtown studio in the Hotel Sherman broadcasts behind glass windows, thus allowing interested Radiophans to watch the broadcasters at work from the mezzanine floor of the hotel.

WASHINGTON, D. C.—Local Radiophans are vying with one another these days in turning out the smallest possible receivers.

One which is possibly the smallest, at least the most unique, has been constructed by C. D. Duganne, an employe of the Federal Trade commission. It is a crystal receiving set in a small finger ring.



The now famous No. 65 Audio Frequency Transformer is but one of over 130 radio parts designed, manufactured and guaranteed by Federal.

\$7.00



The Sign of Reliable Radio Dealers

You Don't Know How Thrilling Radio Reception Can Be, Until You've Used



Federal

Standard RADIO Products

THE only difference between the program at the broadcasting station and as you receive it in your own home is the origin of its source, if you use Federal Radio Equipment. The reproduction is truly amazing in fidelity and naturalness of tone.

This guaranteed mechanical perfection is the result of the same tremendous experimental and engineering resources that makes every Federal Radio Set and every one of Federal's 130 different radio units, the last word in Radio Equipment.

Federal Telephone and Telegraph Company

Factory: BUFFALO, N. Y.

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

BEFORE THEY THOUGHT OF "MIKES"



Warren R. Cox, WHK himself, was the serious-minded baby shown at the left in last week's picture.

Warren R. Cox, WHK

IT WOULD seem that Warren R. Cox, (WHK himself) had always a penchant for things electrical. We find him first making ignition apparatus for automobiles, but when Radio sprang into glorious being like Minerva from the head of Jove, Warren R. lost all interest in spark plugs and bestowed it on spark sets.

His first thought was to build equipment, but inasmuch as he had such a good record as a salesman, Mr. Westinghouse's company suggested that he sell their goods in Cleveland and vicinity. Always polite and accommodating, Mr. Cox obliged in this instance and soon was handling products of the Radio Corporation and Western Electric company in the capacity of distributor.

Then came his station, WHK, where Mr. Cox provides entertainment of unusual interest; combining the grave and the gay, bits of science and philosophy, and musical numbers appealing to the heart rather than to the feet.

Warren R. Cox is a big man in every sense; as broad-minded as he is broad-shouldered, and the audience of WHK comes into closer touch with the personality of the man behind the announcer's voice than may be possible from many another station.



The curly-headed little fellow standing in front of his dad has not changed since this picture was taken when he was three years old. His pleasant voice has brought thousands of letters from all over the country.

This little sober-faced fellow dressed with all the ruffles, was born across the sea, but has lived in this country since a babe. He announces for a large newspaper station and his name is—oh, well, we'll tell you next week.



The little fellow shown last week, wrapped in the bear skin, was none other than the popular announcer, Sen Kaney, formerly of KYW and now of WGN.

A. W. Sen Kaney, WGN

SEN KANEY'S voice has become so popular with Chicago listeners that WGN, the Tribune-Zenith station on April 11 stole him away from KYW, the Westinghouse Chicago plant, where he made hundreds of thousands of friends as Captain of the KYW "mike" for over a year. Being very busy making the change in positions, Sen had very little to say for himself and had to be cross-examined. The result, following a series of questions Lambdin Kay of WSB proposed and used against himself sometime ago, proved adequate in the emergency.

Age: 30; birthday: August 19; height:

5 feet 9 inches; eyes: blue (with no black around it); hair: blond and plenty; mustache: excellent health; condition of servitude: single, but it being leap year, he hopes for the best; habits: all of them; hobby: Casino and talking (Sally Menkes of KYW says it's women); experience: crap shooter, gob, broker till broke, announcer—now look at him, says he, nothing to start and now, twice as much; politics: \$2 a vote; ambition: polishing a harp; aversion: Volstead, alarm clocks, static, landlords, long winded talkers; birthplace and why: Cincinnati so he could say he came from there to live in Chicago; gifts from fans: 20 live chicks, 7 pounds

of pork sausage, catnip for the mysterious KYW Kat, pair of garters (the latter probably coming from an ardent supporter), no Rolls Royce yet waiting for the mail man.

When asked why he won the baby prize at Columbus, Ohio, when two years old, he replied that he knew he was going to be an announcer and lived a proper youthful life accordingly.

Sen's creed as announcer is simple. He says, "An announcer must have a genial disposition and not talk too much, but when he does talk, he should put a smile in his voice. He should say what he thinks—and not think too much."

CLASS "B" DEMAND INCREASES; 49 NOW

PLANS ARE AFOOT FOR 14 MORE SUCH PLANTS

Chicago Undergoes Reorganization of Super Broadcasting; New Stations Open

WASHINGTON, D. C.—An increased demand exists for licenses for Class B broadcasting stations from various sections of the country, according to officials of the Radio section of the Department of Commerce.

At the present time there are forty-nine Class B broadcasting stations, the records show, while there are several requests for such licenses.

Plans are afoot for the erection of at least fourteen new Class B broadcasting stations, and seven are already under construction. With the development of the art more powerful stations have come into vogue. As a result bigger and better stations are being planned in New York, Chicago, New Orleans, Denver, Hartford, Houston, Hot Springs, Cincinnati, Fort Bragg, N. C., and Berrien Springs, Mich.

Seven More Large Plants Planned

Although seven large stations are known to be under construction, the department has not yet issued licenses and will not announce the names of the prospective owners.

In Chicago, a sort of reorganization in super broadcasting is under way. WJAZ, the well-known station of the Chicago Radio laboratory, has become Station WGN. Its call is significant of the Chicago Tribune, which will now use this station on 370 meters instead of 448 meters. The Herald-Examiner, with Sears-Roebuck company, will share a new B station which will operate on 345 meters, splitting time on sharing this wave length with WCBD at Zion, Ill. The Daily News, Station WMAQ, will operate on 448 meters, dividing time with the Rainbo Gardens-Calumet Baking Powder company, two Chicago firms whose station is now under construction. No call for the latter has been announced yet.

The British Broadcasting company plans to open a district Radio broadcasting station in Belfast, Ireland, by the first of June, advices from Belfast state. The new station will be similar to 2LO, London, and will operate a full program directed by its own officials.

HOOVER, FANS' FRIEND, OPPOSES 10 PCT. TAX

WASHINGTON, D. C.—Secretary of Commerce Hoover, friend of the Radiophans of the country, has come out definitely, along with President Coolidge, as opposed to the Radio tax of ten per cent suggested by the finance committee of the Senate in reporting the revenue bill to the Senate. Senator McClean, of Connecticut, was proposer of the Radio tax.

Follow Ponies by Air in Cleveland

Bookmakers, One Jump Ahead of Cops, Take to Ether Instead of Woods

CLEVELAND.—Since the police department has become active against bookmakers and others of the gambling fraternity and have extended their surveillance to telephone circuits, it seemed for a while that placing a bet would be rather difficult of accomplishment. It is said, however, that returns are now being received with customary regularity and no one need be denied participation in buying limousines for the bookmakers.

According to rumor, transmitting sets of low power are being installed in suburban villages outside the limits of Cuyahoga County, and these stations receive track news in the usual manner. Receiving sets are installed in Cleveland. Thus the glad tidings are transmitted by the suburban stations and picked up by the local receivers without fear of detection.

Prearranged codes are employed, it is said, the words meaning nothing to the uninitiated. If there is any redeeming feature in this arrangement it is that horse racing is not carried on at night, so that the da-da-dit-dah of the code cannot interfere with reception of broadcast programs. Every cloud, etc.

Army Plant Asks Kicks as Argument for Funds

COLUMBUS, O.—Listeners in and about Columbus have been bothered considerably in recent weeks by code signals sent out from the station at the general army reserve depot at East Columbus. Officials at the depot have requested listeners to mail in their complaints so that they can

offer them as an argument in a request for government funds to eliminate the interference. The cost of such elimination is estimated at only \$200.

Capitol Hears First Test of Leavenworth Station

WASHINGTON.—Last week the Army Message Center here was for the first time in direct touch with its new Radio station at Fort Leavenworth, Kans. The new circuit of about 1,000 miles was opened for tests, and mechanical transmission was tried out. WBC, the call of Leavenworth was heard for the first time by operators at WVA, the call of the Army Message Center in the Munitions building.

Being Sick in Omaha Has Its Advantages

Pastor Installs Headsets in Every Room of Hospital

OMAHA.—Being sick in an Omaha hospital has its advantages, according to patients who have been enjoying the special efforts that are being made to entertain them, chief of which is Radio in every room.

Heretofore, only a few patients were able to hear the Radio programs, but the Rev. D. E. Cleveland, chaplain of the Lord Lister hospital, has overcome this difficulty by installing a headset in every room.

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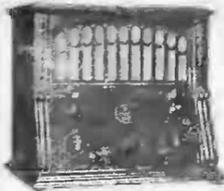
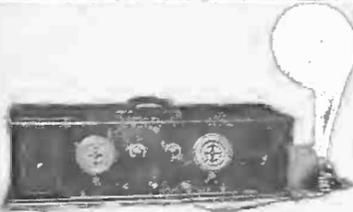
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	Radiola Balanced Amplifier To be used with Radiola III. With two WD-11 Radiotrons.*	\$30	Gives Loudspeaker operation with Radiola III up to 1500 miles under favorable conditions.	Outdoor or indoor antenna.	
	Radiola III-A with four WD-11 Radiotrons,* head telephones and Radiola Loudspeaker.	\$100	Loudspeaker operation up to 1500 miles under favorable conditions.	Outdoor or indoor antenna.	Improved selectivity. Minimum radiation.
	Same without Loudspeaker.	\$65			
	Radiola Regenoflex with four WD-11 Radiotrons,* and Radiola Loudspeaker.	\$206	Loudspeaker operation up to 2000 miles under favorable conditions.	Outdoor or indoor antenna.	Extraordinary selectivity. Non-radiating.
	Same without Radiotrons or Loudspeaker.	\$150			
	Radiola X with four WD-11 Radiotrons.* Loudspeaker built-in.	\$245	Loudspeaker operation up to 2000 miles under favorable conditions.	Outdoor or indoor antenna.	Extraordinary selectivity. Non-radiating.
	Radiola Super-Heterodyne with six UV-199 Radiotrons and Radiola Loudspeaker.	\$286	Loudspeaker operation up to 2000 miles with internal loop. With external loop up to 3000 miles under favorable conditions.	No antenna. (Concealed small loop built into set.)	Super-selectivity. Non-radiating.
	Same without Radiotrons or Loudspeaker.	\$220			
	Radiola Super-VIII with six UV-199 Radiotrons.* Loudspeaker is built-in.	\$425	Loudspeaker operation up to 3000 miles under favorable conditions.	No antenna. (Concealed large loop built into set.)	Super-selectivity. Non-radiating.

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* Only dry batteries used.

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"STORY LADY" WINS BOYS, AGES 40, 70

BABES LIKE TO HEAR HER CROW LIKE ROOSTER

Few Hold Warmer Spots in Kiddies' Hearts Than Georgene Faulkner of WMAQ

By Vera Brady Shipman

CHICAGO.—"This is the Chicago Daily News, WMAQ, introducing the Story Lady."

There are few individuals in America today closer to the child heart than the original "Story Lady," known to the everyday world as Mis Georgene Faulkner of Chicago. She has told stories in school, chautauqua, parties, overseas and has been children's editor of the Chicago Tribune and the Ladies' Home Journal, has numerous books published, Victor records made and now—Radio every Wednesday night.

Her life has been a daily affiliation with children, as kindergarten teacher, entertainer and "Auntie of the AEF" in the World War. She began telling stories to groups when but a schoolgirl, in vacation schools or in crowded settlement houses, returning to entertain the children of the rich, in costume, at afternoon parties in homes or fashionable clubs.

Small Boys, Ages 40 and 70, Listen

With Radio, the bedtime story has become an evening institution. Each broadcasting station has its Dream Daddy or its Bonnie or its Uncle WIP to tell the children just what Peter Rabbit did. And WMAQ has the Story Lady herself, the originator of the title, for a half hour every week. Children old and children young listen in. One letter to the Story Lady said:

"We are two small boys listening in to your stories. I am a father-in-law of 70 and my son-in-law with me is 44."

A daddy of a babe too young to form the letters, writes that the programs interest them all. "Even the baby listens in as you crow like a rooster," he adds.

Letters pour in to the office after each Wednesday's stories. They come from everywhere.

Children Tell Truth

"I want the children to write me" says Miss Faulkner, "they tell me truthfully what they do or do not like and ask for what they want to hear. Children as well

GEORGENE FAULKNER TALKS TO CHILDREN



Georgene Faulkner talking to WMAQ's children, in her role of "Story Lady."

as grownups like to hear their names called. One unselfish little boy asks that the name of his little brother be called, not asking for himself at all. Another child writes that his Daddy has repaired the aerial on the house next door, climbing out onto the roof to do it, where the little neighbor has a broken leg.

"And now," the good Samaritan writes, "you have two little Radiophans instead of one." A woman stopped me on the street the next day and thanked me for telling of that small boy and his Daddy's kindness. The woman said, "It set me thinking and I am looking for someone in my neighborhood to listen in with me."

Like Sentimental Songs Best

"COLUMBUS, O.—Songs with a sentimental twist are in favor with fans in WBAV's territory, according to a recent contest staged by that station. A song about "Mother and Dad" won easily, with a song about Radio running a poor third.

Use WGR to Identify Owner of \$1,651 Roll

Police Call on Radio to Help Find His Missing Kin

BUFFALO, N. Y.—WGR was used recently to assist in identification of the owner of \$1,651.

Theodore Van Aucker, a man of sixty years, was picked up by the police while wandering aimlessly about some railroad yards at the rail-head entering Canada and displaying a large roll of bills.

At the police station \$450 in small bills were found on him and later more than a thousand dollars was discovered secreted in different parts of his clothing.

Only meager details of his life and an incoherent story which involved Cleveland, Detroit, Chicago and other western points as well as Toronto, Can., could be obtained from the man. The court ordered him sent to the city hospital for observation, pending the location of friends and relatives. To the latter end, WGR went on the air with a lengthy description of the man and a statement of the affair.

France Features Radio at Exhibit in Gotham

Will Exchange Greetings with America by Airwaves

NEW YORK.—Radio is a feature of the French exposition now being held at the Grand Central Palace here under the official patronage of the French government. Ambassador Jusserand opened the exposition on the evening of April 22. Speeches are being broadcast and it is expected that arrangements will be made between stations in France and America for the exchange of greetings.

Latest of DX Claims; Hears 61 Stations in One Night

BLENHEIM, Ont.—Hearing sixty-one stations in one night is the latest claim to the DX crown, made by Clifford Riseborough, (Canadian 3RM) of this city. The stations were heard on a detector and one stage of amplification, beginning at 6:10 p. m. Eastern time, and ending at 12:53 p. m. Adding the various distances, Mr. Riseborough "traveled" close to 21,000 miles.

HOLDS RADIO LEADS TO WORLD TONGUE

ENGLISH FORESEEN AS AIR LANGUAGE OF ALL

Esperantists, However, Organize to Set Up "Artificial" Rival as Need Grows

NEW YORK.—That Radio broadcast will lead to the development of a single language used throughout the world is one of the latest predictions brought forward by experts.

What that universal language will be is problematical, for almost simultaneous with the prediction by Guy E. Tripp, an electrical expert of this city, that instead of an artificial tongue, English will become the world's Radio language, it was announced that an organization has been formed in London to establish Esperanto as the medium of Radio communication.



GUY E. TRIPP

Mr. Tripp expressed the opinion that when Europe, Asia, Africa and other foreign regions will become enmeshed in Radio waves bearing an incessant chatter of mixed and confusing tongues there will be a resultant curiosity to learn what is being said. Thus, his belief that only one language can satisfy when this time comes.

Will Mean Many Things

"Radio, with its international exchanges of messages," Mr. Tripp declared, "will break down all barriers to international communication. This will mean many things for the people of the world, too many for anyone to attempt to forecast. But one thing may be predicted with comparative safety: that is the establishing of a universal language."

The London group sponsoring Esperanto, an "artificial" language, is known as the International Radio Association. The forming of the organization is the first definite step toward a world Radio tongue.

(Continued on Page 8)



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PATENT COMMITTEE HOLDS DILL CONFAB

HEARS BROADCASTER SIDE OF COPYRIGHT LAW

Senator Dill Explains Proposed Amendment—Thousands of Telegrams Supporting Bill Set Record

WASHINGTON, D. C.—The interests of Radiophans throughout the country were well taken care of recently at the hearing held here before the Senate committee on patents on the so-called Dill bill which would amend the copyright laws that broadcasters would be allowed to use popular songs, stories, etc., without unjustly paying tribute to the publishers and composers. The public was represented by the National Association of Broadcasters.

Senator Dill in opening the hearings told briefly why he had introduced the bill. He stated that the newspapers of the northwest including the Seattle Post-Intelligencer, the Oregonian, and others have broadcasting stations from which they receive no revenue. While the papers create good will, they are spending large sums of money from which they are realizing no returns.

Amends 1909 Copyright Law

In connection with his bill Senator Dill stated that he had taken the copyright law of 1919 and with few exceptions had followed that closely making one amendment relative to Radio which is as follows:

"And provided further, That the copyright control shall not extend to public performances whether for profit or without profit, of musical compositions where such performance is made from printed or written sheets or by reproducing devices issued under the authority of the owner of the copyright, or by use of the Radio or telephone or both."

He said that his purpose was to see that the copyright law control shall not affect Radio broadcasting. He spoke briefly of the various taxes put on Radio fans in foreign countries and said that in his opinion this tends to discourage Radio.

Thousands of telegrams and letters were received by the committee in favor

WHITE PUSHES WORK ON NEW RADIO LAW

WASHINGTON.—The first conference on the White bill was held April 12 by the Radio subcommittee, when a number of recommended changes were considered. It is understood that Representative White of Maine, chairman of the committee, will insist that the body continue its work until ready to report the bill to Congress.

of the bill and the Senator stated that he had been told by the telegraph officials that no such number of telegrams have been received in connection with any Congressional matter since the declaration of war with Germany.

E. F. McDonald, Jr., representing the National Association of Broadcasters, told the committee the broadcasters of the country do not favor collections from the public to pay for programs. He went into some detail regarding the activities of the American Society of Composers, Authors and Publishers and stated that up to a year or so ago any songs could be broadcast free. Relative to profits derived by broadcasters he stated that the Radio apparatus manufacturers of the country could stop broadcasting any day and their profits would go on just the same.

Charles H. Tuttle, counsel for the broadcaster's association was the principal witness and he presented a very good case in favor of the bill particularly from

the legal standpoint. He said that if the position of the opposition is upheld that either the broadcasters will have to go out of business or they will have to receive some remuneration.

Mr. Tuttle told the committee that the music publishers have a 100 per cent monopoly. He said that the composers have pooled their interests. He spoke also of the conference held between the composers and the broadcasters at which it was stated that 90 per cent of the publishers belong to the association. He said that a large part of the broadcast songs are copyrighted.

Says American Society Is Illegal

The publisher's association, he said, is an organization in restraint of trade. He told the committee that the public is vitally interested because they know what is at stake. He contended that the Dill bill is not contrary to the copyright law, as it deals with Radio, which was not heard of when the copyright bill was passed. He spoke also of publicity given the music publishers by the Radio broadcasters. He spoke also of the cost of popularizing music and said that the publishers are now asking the broadcasters to send out their music, aside from the association. The issue, he concluded, is between the small number of music publishers, composers, etc., and the American Radiophans.

Frank Sheridan, an independent music publisher, told the committee of the value of Radio publicity and said that four-fifths of the sales of one of his popular songs was directly traceable to Radio publicity.

The second phase of the battle was scheduled to take place before the Senate patent committee April 17. Opponents to

TAX BILL PROTESTS FLOOD IN SENATE

WASHINGTON.—Thousands of protests against the proposed ten per cent Radio tax have been received from Radiophans and from almost every Radio manufacturer in the United States, according to the finance committee of the Senate. It is believed the flood of protests may do much to defeat the passing of the tax.

TALK WORLD TONGUE

(Continued from page 7)

The perfection of an Esperanto-Radio dictionary is one of its first intentions.

Dr. Pierre Corret of Versailles, France, an Esperantist and Radio expert, has been selected as president. Harry A. Upton, of the British Esperanto Association of London, honorary secretary said the organization welcomes members from the world's Radio fans, whether they are Esperantists or not.

Esperanto, it is explained, was established twenty-eight years ago and is briefly being described as being formed from the best of six existing languages.

the Dill bill were to be heard then. Representatives of the Society of Composers, Authors and Publishers were to appear.

What method of attack the veteran society lobbyists would take was a question. It was believed that they would use tactics similar to those successful in by-gone days.

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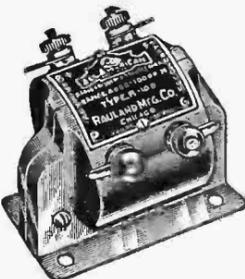
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WHB's "Invisible Theater" Offers Seats for "Soup and Fish" and Gallery Gods

E. J. Sweeney, Operator of Kansas City Station, Says "One Half the World's a Stage and the Other Half's Audience"—Advances Subscription Plan

By Vera Brady Shipman
SHAKESPEARE was half right when he said "All the world's a stage," according to E. J. Sweeney, president and owner of the Sweeney Automotive and Electrical School which operates WHB broadcasting station. Mr. Sweeney says that half the world is the stage and the other half is the audience of "The Invisible Theater" for which WHB is selling seats for the year's broadcasting programs. After two years of paying the bills for educational and entertaining programs, a definite plan to suggest how the other half of the combine—the listeners—may pay their part, has brought a flood of comment.

Seats in this vast invisible theater range from a dollar to ten dollars. Certificates of sale are mailed to the purchaser with reserved seat checks according to your choice on the seat diagram accompanying your order blank. Honorable mention is also made over the Radio.

Tune in With Soup and Fish!
For a dollar you may be a gallery god and for ten dollars you may enjoy all the pleasures of a tuxedo, opera hat and wifey's new evening gown, and never leave your comfortable fireside the while. It saves taxi fare, too!

You have an opportunity to give your program preference with your ticket order by checking the desired kind of music or lectures.

This novel plan is sent out to the WHB fan mailing list. George H. Stone is listed as the director of the new invisible theater.

But the story of E. J. Sweeney himself, his rise to fame with his motor school, is worth telling here, for you must know a bit about Sweeney to appreciate this scheme of endowing WHB programs for the coming year.

WHB Started on Seventy-Six Dollars
The Sweeney school is the result of one man's mind and labor. With actual capital of seventy-six dollars, E. J. Sweeney began operating his motor instruction school in one room in Kansas City, for the young man who, mechanically inclined, could not afford an engineering course. The practical man organized a practical school where short time courses turned out

garage and airplane mechanics, Radio operators and assemblers.

Born in Illinois and moving to Kansas City at an early age, a youth with vision but little capital, his present home at Indian Hill, a Kansas City subdivision, is a showplace of comfort and happiness—a real home for his ten rollicking children.

The war opened the Sweeney doors to service and the school became a training school for overseas mechanics. More than 6,000 men passed through Sweeney's short time war course into the service.

Getting Acquainted with WHB
With peace came Radio development. Naturally the Sweeney school was an early exponent, for the automobile and Radio are first cousins. The heart of the true mechanic turns to both. In June, 1922 WHB was opened. Its two aerial towers rise 175 feet each above the ten-story building, bringing the aerial to a height of 305 feet above the ground. Five rooms on the top floor have been given over to the Station WHB.

Broadcasting on 411 meters as a class B plant, Tuesday, Thursday, and Sunday evenings are filled with musical programs. Markets, stocks and weather reports are given all day long. WHB has its own orchestra and Kansas City soloists as well as visiting artists have helped make WHB's high standard.

The regular announcer for WHB since its beginning has been John T. Schilling. The Radiophan knows Schilling's voice the instant he tunes in.

Sweeney Personality Reflects in WHB
In this age of Radio efficiency and primary grade broadcasting (for we have left our infancy in the first year) it has been interesting to watch the growth of a Radio station, which is filled with one man's identity. The ingenious spirit which reflects the man himself is evident.

"WHB programs are high grade," said Mr. Sweeney to the interviewer, "because its listeners want them to be so. The farmer in Kansas, the banker in Kansas City, the Radiophan in the north Wisconsin woods and the far Hawaiian islands, each listens in to WHB programs with a feeling of potentiality. We want him to feel that WHB is HIS station."

BEST IN LAND WHEN ANNOUNCING SPORTS



Major J. Andrew White, known to thousands as the "Radio Sporting Reporter," has become famous for his ability to visualize the quick action in all kinds of sports from football and championship pugilistic encounters to the World Series baseball games. He is indeed king of sports announcers. Int. Photo

WJZ Announcer Taken for Better or Worse

Milton J. Cross Puts One Over on His Listeners

NEW YORK.—Milton J. Cross, better known to hundreds of thousands of listeners throughout the country as "AJN," one of the most popular announcers of dual Stations WJZ and WJY, was married on a recent Sunday afternoon unknown to the listeners in, for the ceremony took place early enough for him to be before the microphone of WJY at 2:30 o'clock to introduce the broadcast artists just as though nothing unusual had happened.

Mr. Cross made his debut as announcer in the fall of 1922 from Station WJZ in Newark, N. J. When WJZ moved to its present home in the Aeolian building, New York, Cross was heard from both Station WJZ and its twin station, WJY.

COLLEGE PROFS GIVE TALK SERIES AT WGY

POLITICS, DRAMA, HEREDITY AMONG SUBJECTS

Members of Faculty of School in Schenectady Present Educational Lectures

SCHENECTADY, N. Y.—Members of the faculty of Union college here are giving a series of fifteen-minute educational talks from WGY, the Schenectady station of the General Electric company. Dean Edward Effery, professor of chemistry at Union and national secretary of Sigma Xi, delivered the first talk, speaking on "The Real Present Day Undergraduate."

Dr. James H. Stoller, professor of geology, was to tell of "Mountains and Mountain Scenery," Tuesday evening, April 22. Dr. Stoller has prepared a geological survey of the Adirondack and Helderberg sections for the state.

"The Bloc in Present Politics" will be the topic of Dr. W. Leon Godshall, assistant professor of political science, April 29.

Heredity and Drama Covered
Dr. James W. Mavor, associate professor of biology and internationally known for his work on the effect of X-ray on heredity, will speak on "Facts and Fallacies About Heredity," Tuesday night, May 6.

Dr. Edward Everett Hale, professor of English and author of many books, among them "Present Day Dramatists," now in its ninth edition, will give a fifteen minute address on "Modern Phases of Drama," May 13.

In addition to the foregoing other addresses will be offered by members of the Union College faculty. It is expected that these talks will prove so popular and instructive that there will be a demand from the Radio listener for their continuance.

Business and Social Life of Farmer Aided by Radio

WASHINGTON, D. C.—Radio on the farms of western Canada is doing much towards relieving the farmer and his family from the lonely life experienced frequently where farmhouses are so widely separated, according to Consul General Brittain, Winnipeg.

BRISTOL SINGLE CONTROL RADIO RECEIVER



Most Simple to Operate
The set for those who want results with little effort. Anyone in the family can quickly learn to operate it because technicalities and guesswork are eliminated—One Control Dial does it all.

Does Not Interfere With Your Neighbor
Other close by reception is not disturbed when you tune in with this non-reradiating Receiving Set. It gives you a comfortable sensation of freedom to be able to change from one station to another knowing that you will not interfere with your neighbor's receiving.

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Where conditions make it difficult to install an outside aerial, as in congested sections of cities, good results can usually be had by using inside Loop. In fact, the directional feature of the Loop often brings in stations not possible with a stationary aerial.

Mounted in solid mahogany case with walnut finish, the Bristol Single Control Radio Receiver is handsome in appearance. The price is \$190.00. Bulletin AY-3013 describing this set will be mailed on request.

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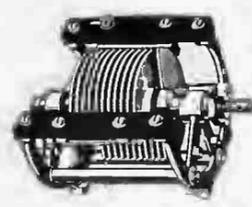


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This is known everywhere as the Loud Speaker with the quality tone. Not only is the tone natural and without mechanical distortion, but is sufficiently big in volume to be easily heard in a large room or all through the house. Comes to you ready to use—no auxiliary batteries are required.

Made in three models:
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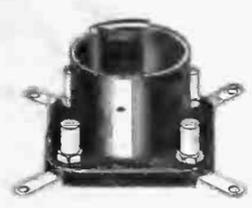
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The Buell Condenser is the utmost in skillful construction and scientific design. Built to last, to stand more than ordinary abuse, it is extra rugged; it is as near electrical and mechanical perfection as human ingenuity can make it. Supplied in .0005 mfd. capacity. Price . . . \$7.00



The Buell Tuner is more than an ordinary piece of tuning apparatus; it is designed and constructed with the same painstaking care as all other Buell Parts. It is built to produce satisfactory results and render the acme of service. Price \$8.00



Short direct terminals; contacts of the improved "side-wiping" design are the secret of the Buell Socket. This socket is surprising in its performance. The positive contacts assure permanent connections and elimination of so called "tube noises" that many times are the result of a faulty socket. Price \$1.00

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NEVER BEFORE in Radio History has there been a proposition like this, NOW bringing the finest and most efficient of radio down to the level of everybody's purse. Here is luxurious beauty that a millionaire can envy. Here is the design and the power to gather in broadcasts from coast to coast. No money could ever buy greater Handsomeness. Three to five times the price cannot NOW buy better Results. You must and will be SATISFIED, or your money is returned.



5 TUBE GENUINE HAZELTINE NEUTRODYNE Knock-Down Set COMPLETE

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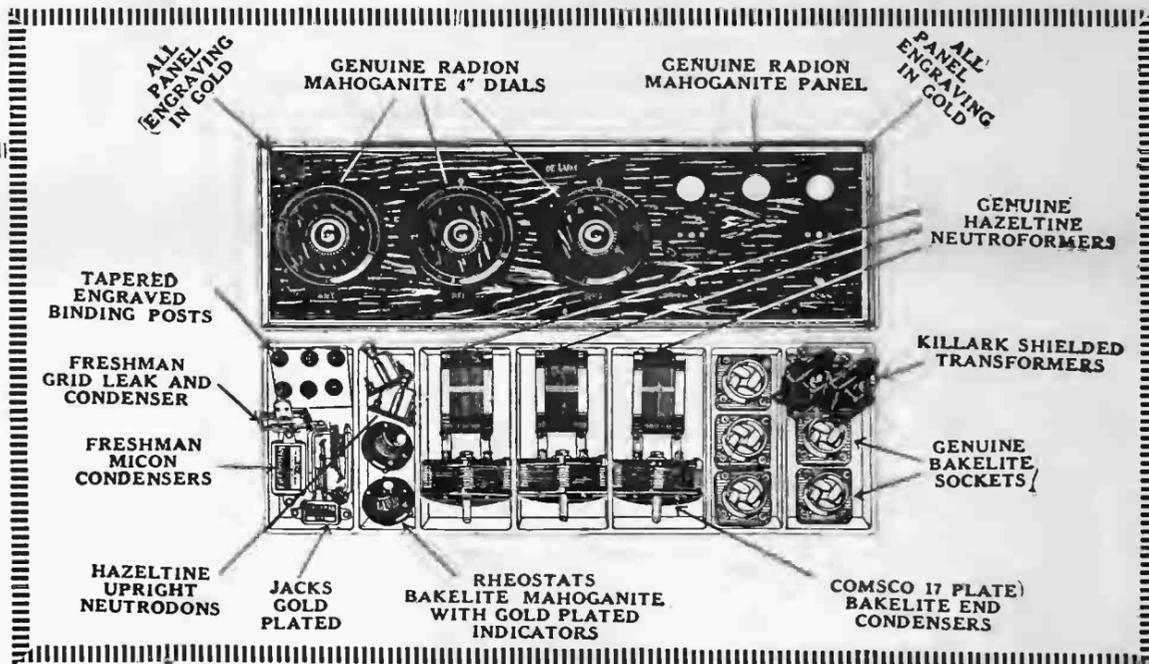
"From Clawson, Michigan, I get from Coast to Coast on my horn, including Honolulu Hawaii, on the night of March 21, at 2:05 A. M."

"Received my set at 6:30 p. m. Had it assembled and working at 9 p. m."

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Demonstrators Wanted

We want a live young man in every town, and in every section of large cities, to own, operate and demonstrate "The DeLuxe Neutrodyne." Set furnished you at discount, and special financial arrangements. Write fully about yourself to Mr. Perry, Executive Offices, The Radio Shack, America's Largest Radio Dealers, 55 Vesey St., Dept. RD 426, New York City.

We acknowledge all orders same day received. We ship same day or following day. We answer EVERY LETTER we get on the same day we get it. WRITTEN Money-Back Guarantee with every purchase.

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- 1-DRILLED Radion Mahogany Panel, Engraved in Gold.
- 3-Four-inch Radion Mahogany Dials, Gold Engraved.
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- 5-Bakelite Sockets.
- 1-6-Ohm Rheostat with Gold Plated Knob to Match Panel.
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- 2-Genuine Killark Completely Shielded Audio Transformers.
- 1-Baseboard.
- 20-Feet Tinned Bus-bar.
- 1-.00025 Freshman Grid Condenser.
- 1-Tubular Glass Grid Leak.
- 1-Set Engraved Binding Posts.
- 1-.002 Micon Condenser.
- 1-.006 Micon Condenser.
- Exact Size Special Panel.
- Exact Size Special Base.
- Complete Instructions.
- Fine, Clear Blue-print.

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- These accessories, added to the above list of parts, are absolutely all the parts necessary for a complete set in operating condition.
- 5 Tested Type 201A Tubes.....\$19.50
 - 2 45 Volt Extra Large Variable "B" Batteries..... 6.50
 - 1 60 Ampere Hour Storage Battery, Guaranteed 2 Years..... 11.25
 - 1 Pair Turney 3000 Ohm Head Phones and Cord..... 3.75
 - 1 Phone Plug, Double..... .90
 - 1 Antenna Outfit, Complete..... 1.50
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All Packed in Handsome, Large, Partitioned Box which can be used as a tool box. Complete assembly

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Send in your order NOW for 1 5 Tube Kit.....\$34.49 1 Set Accessories..... 43.40 Total.....\$77.89 And we will send you FREE a Beautiful Mahogany Finish Cabinet for the Set, with Our Compliments.

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Mark X here ONLY if you want Radio Set.

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Mark X here ONLY if you want all additional accessories.

Ship me C. O. D., subject to your WRITTEN Money-Back Guarantee, the goods for which I have marked X in the proper square (or squares). I will pay postman on delivery.

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Largest Radio Dealers in America



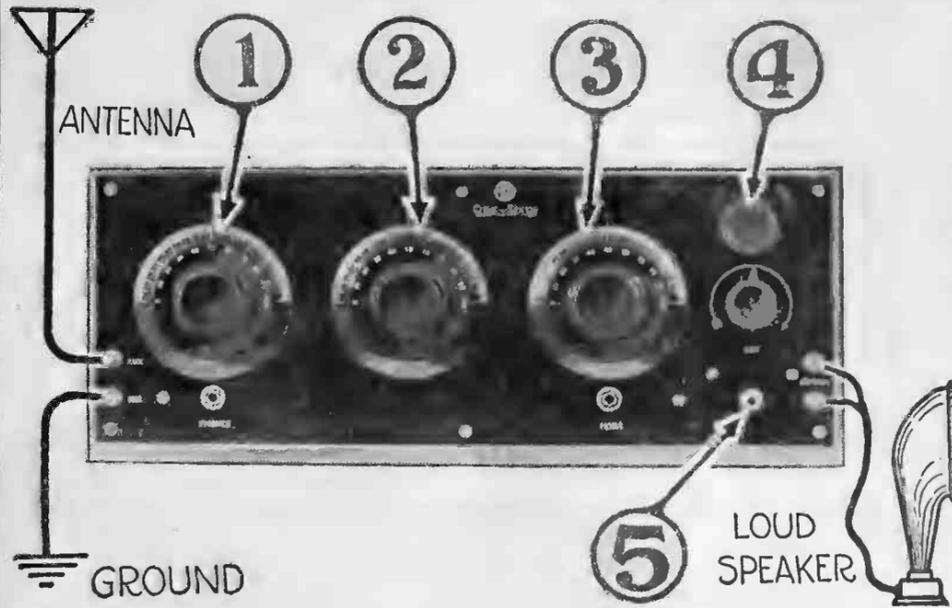
OPERATING AND TROUBLE SHOOTING

For the Owner of a FADA "One-Sixty" 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 broadcast listener, who has purchased such a set, how he can operate it to get the best there is in it and how he can overcome minor difficulties which may be causing some trouble. On pages 11 and 12 this week, the Fada "One-Sixty" Receiver is described. Radiophans with other sets will also find these articles worth reading, particularly the notes on trouble finding.

THIS Fada "One-Sixty" neodyne receiver incorporates a new circuit invented by Professor L. A. Hazeltine of Stevens Institute of Technology at Hoboken, N. J.

Using only four vacuum tubes the receiver actually does the work of five tubes. Technically it is a tuning device, two stages of tuned Radio frequency amplification, vacuum tube detector and two stages of audio frequency amplification. One of the features about the "One-Sixty" is the fact that it can be very easily tuned and the method of tuning is in itself extremely simple. The Fada "One-Sixty" with only three dials and with two of them rotating practically at the same settings, becomes exceedingly simple to operate.



Battery Connections

Connecting the A and B batteries to the receiver is a simple task. The drawing showing the battery connections will aid in understanding where the wires should go. An insulated shelf extends through the rear right hand end of the "One-Sixty" and on this is mounted the battery binding posts.

Both the A and B batteries have a certain polarity. That is, there is a positive terminal (marked +) and a negative terminal (marked -) to each battery. On both A and B batteries the positive terminal is usually painted red or has a red connection wire attached.

From the positive terminal of the A battery a wire should be connected directly to the positive (+) A battery binding post to the rear of the receiver. From the other or negative (-) terminal of the A battery a wire should be connected directly to the negative A battery binding post of the receiver.

A switch 5, is provided in the "One-Sixty" receiver to turn on or off the current from the A battery. The switch is

located on the front of the panel at the extreme right and below the rheostat knob. It should be pulled out to light the tubes and pushed in to turn out the tubes.

The B batteries are made in blocks of 45-volts each. Three of these batteries are connected as shown in the drawing. The negative (-) and positive (+) terminals of the B batteries will be found marked in the insulated wax on the top of the battery. To make the series battery connection wires should connect from the positive (+) terminal of one battery to the negative (-) terminal of the second battery, and from the positive (+) terminal of the second battery to the negative (-) terminal of the third battery. This will leave the positive and negative B battery terminal and wires should connect from the negative (-) terminal to the second negative or center binding post on the receiver shelf, and from the remaining positive B battery terminal to the extreme left hand binding post on the receiver shelf marked "amplifier positive."

Now only one binding post on the rear of the receiver shelf remains free. A connection wire should go from this bind-

ing post to the center terminal of the last B battery. The first B battery is the one to which the wire from the center receiver binding post is connected. The drawing shows the position of the various battery terminals and it will be noted that these terminals are marked from 16 to 22½. It may be found desirable to connect the detector or positive lead to either of these terminals giving adjustment of from 16 to 22½-volts. Trial alone will determine which works best.

Connecting the batteries as above gives the full voltage of the B battery to the amplifier tubes. The detector tube B battery voltage may be varied by connecting a wire on any of the voltages between 16 and 22½. To decrease the amplifier B battery voltage shift the extreme right hand connection wire from one terminal to the other of the B batteries.

As a rule from 90 to 110 volts will be found to be the best operating voltage for the amplifier tubes. It will be usually found that 90 volts is best, gives sufficient volume and with 10 percent distortion.

How to Tune In

These tuning instructions should be read carefully and the manner of adjusting thoroughly understood, otherwise the receiver will seemingly be inefficient, the fault, however, being with the operator.

No dial settings are shown for dial 1, as the position of this dial will vary with the specific antenna used, but with an average antenna dial 1 will take approximately the same settings as dial 2, dial 3, as a rule being from five to ten degrees lower.

The procedure of tuning a "One-Sixty" receiver, providing antenna, ground and all battery connections have been properly made, is as follows:

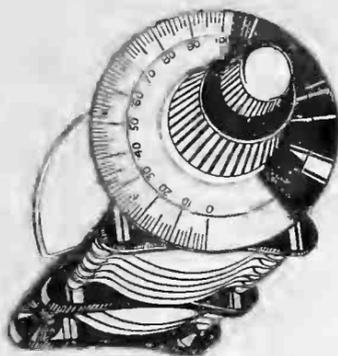
Insert the recommended tube in their respective sockets and with the power rheostat at its correct position for the type of tubes you are using, and with rheostat knob 4 turned to the left as far as possible, and with the plug of the loud speaker inserted in the "Horn" jack pull out the knob of the filament switch on the panel front, causing the three amplifier tubes to light.

Turn the detector rheostat number 4 to the right slowly. When the filament current is turned on the first indication that it

(Continued on page 12)



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The most ingenious variable air condenser ever conceived
No outside Spring Connections—True Capacities.

and Remember the Bronze Bushings!

Bronze Bushings for Permanent Contact—A Comsco Feature

11 plate plain	\$2.00	16 plate vernier	\$4.00
17 plate plain	2.25	26 plate vernier	4.50
23 plate plain	2.75	46 plate vernier	5.50
43 plate plain	3.50	All Tested Instruments	

MADE BY THE MAKERS OF
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BULL DOG GRIP TELEPHONE PLUG

For One Pair Phones
\$1.00



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THE De Forest name

has been in the forefront of radio research for twenty-three years. De Forest invented the three-electrode vacuum tube which makes present-day radio possible. The sets and parts made today by the De Forest Company are worthy of the De Forest name.

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OPERATION, TROUBLES

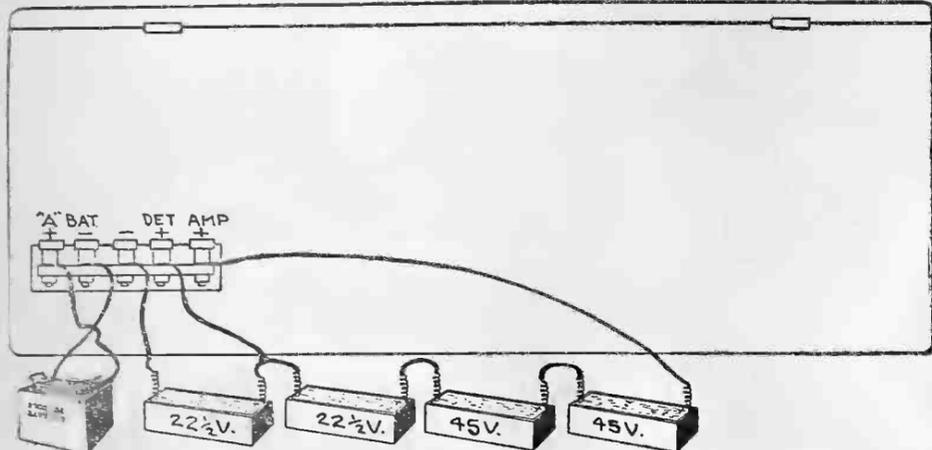
(Continued from page 11)

receiver is functioning properly will be indicated by hearing a slight noise in the phones. As the rheostat knob is turned further to the right this slight sensitivity indication does not increase in volume until a point near the end of the rheostat adjustment is reached. At this point will begin a comparatively loud hissing and frying noise, which is objectionable. For the best reception the rheostat should be turned back slightly to a point just before this hissing and frying starts. This hissing noise will not occur except with a soft or very sensitive detector tube. That is, it will probably be entirely absent with a WD-12 or UV-199 or C-399 tube and on these tubes the position of the detector rheostat does not materially affect their efficiency of operation, nor is

Then with dials 2 and 3 on the setting for a particular station dial 1 is rotated until signals come in with maximum strength and clarity. Tune with both hands. Do not attempt to tune or move dials 2 and 3 separately. Use both hands and move them in unison.

The sharpness of tuning using a short indoor antenna is much greater than when using an outdoor antenna, although the signal strength is much less, and care should be taken in adjusting the receiver when the indoor antenna or loop is used, particularly the adjustment of dial 1.

In tuning the Fada "One-Sixty" the stations will not be picked up by hearing the beat notes and the usual regenerative whistling. As the dials are rotated from division to division the program of different stations will be heard first gradually and then with greater intensity and clarity, as all adjustments are properly made



their efficiency of operation at any time as good as with the soft tube.

With detector tube at approximately its right operating point the receiver will be in tune for a wave length of 492 meters. This we will consider to be 65 on dial 2 and 66 on dial 3. Actually use the numbers written in ink for the particular receiver for which the calibration is made. Now bring the dial 1 to the same position as dial 2 and then move slowly up a few divisions and then down slowly to about 50, possibly as low as 40. If any broadcasting station is at the particular time transmitting at 492 meters, it will be heard at a maximum setting on the dial 1 approximately in the range of from 5 divisions above dial 2 to 20 divisions below dial 2.

When the signals from any particular broadcasting station are coming in it is advisable to slightly readjust dials 1, 2 and 3 and possibly also the rheostat, in order to increase the intensity and at the same time to bring signals in without distortion. In tuning, the dials should not be moved faster than a few divisions per second. With either the headphones or loud speaker plugged into either the "Phone" or "Horn" jack it will be found that the tuning adjustment may need to be changed slightly when shifting from one jack to the other.

for the particular station you wish to hear.

As the user succeeds in picking up programs from various stations notations should be made in a log book of the call letters and dial settings, and if at a later date one desires to listen to the same station, it is merely necessary to reset the dials to these same positions. If the particular station is operating at this time their signals will be heard.

(ANOTHER SET NEXT WEEK.)

Switch Knob

To make a simple switch knob, cut the top of an ordinary spool off at the place where it ceases to taper, and sandpaper until it is clean and smooth. It is then given two or three coats of black enamel to improve its appearance. This makes the knob. A long threaded bolt of sufficient thickness to fit snugly into the hole in the knob is then pushed through the knob. The top of the hole is then countersunk, so that the head of the bolt lies flush with the top of the knob. The contact arm is cut from a strip of brass or copper. A hole is made in one end, and the arm is then tightened to the knob by means of a nut. On the other side of the panel the usual arrangement of washers, tension spring, nuts and wire connection is followed.

5 Tube Neutrodyne

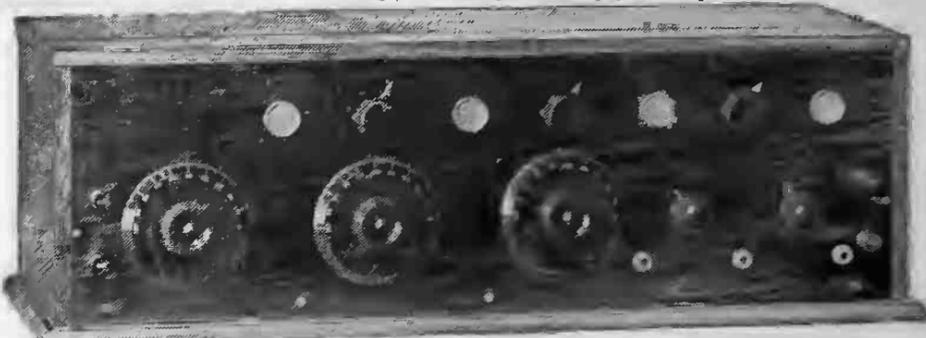
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\$12.50 CABINET FREE

Special Ten Day Offer with Each Set

On account of this special offer you must pay the express



8x26x8, Mahogany, Walnut, Oak, with Piano Hinges

ALL STANDARD PARTS

WHEN you get this magnificent looking set wired and hooked up, you will be able to hear all stations without interference. All parts are same as illustrated in Radio Digest, Feb. 2nd. Panel is mahogany with beautiful mahogany dials—a set fitted for the most exclusive home.

- 2 Rheostats, 25 ohms, Howard.....\$ 2.00
- 1 Rheostat, 6 ohms, Howard..... .90
- 3 Air Core R. F. Transformers, mounted on condensers, and 2 balancing condensers..... 20.00
- 1 Potentiometer, 1850 ohms, Federal..... 1.85
- 3 Jacks, Carter..... 2.70
- 2 .006 Condensers..... .40
- 1 Grid Leak with Condenser, Walnut..... .65
- 5 Sockets, Kellogg's..... 5.00
- 2 Transformers, All-American..... 9.50
- 9 Readem Binding Posts..... .85
- 1 8x26 Mahogany Panel..... 3.64
- 4 Bezels..... .80
- 3 Dials, Mahogany, 4 in..... 4.50
- 1 Baseboard..... .50
- 24 ft. Square Bus Wire..... .60
- 24 ft. Spaghetti..... .80

BLUE PRINT FREE
EASY TO WIRE

\$48⁵⁰

SEE BELOW

For Ten Days, Cabinet..... \$54.69
..... \$67.19

Mounted on Panel and Baseboard

- 3 RHEOSTATS 2 250HM, 16 OHM, HOWARD
- 2 TRANSFORMERS ALL AMERICAN
- 4 BEZELS
- 3 13-PL. VARIABLE CONDENSERS
- 1 POTENTIOMETER, 1850 OHMS FEDERAL
- 1 GRID LEAK AND CONDENSER WALNART
- 3 DIALS MAHOGANY 4 ON FRONT
- 1 8'X26'X 3/16" MAHOGANY PANEL
- 3 AIR CORE R.F. TRANSFORMERS, MOUNTED ON CONDENSERS
- 3 JACKS CARTER
- 9 READEM BINDING POSTS
- 5 SOCKETS KELLOGG'S
- 2 BALANCING CONDENSERS
- 2 .006 MFD. FIXED CONDENSERS
- 24 FT. SPAGETTI TUBING.
- 24 FT. SQUARE TINNED BUS WIRE
- 1 7 1/2' X 25' X 1/8" BASE BOARD

Panel not mounted or drilled, only \$45.50 with \$12.50 Cabinet and blueprints FREE.

COMPLETE WITH ALL EQUIPMENT

IN ADDITION TO ABOVE PARTS

5 Tubes.....	\$25.00	2 22 1/2 Volt B Batteries.....	\$ 6.00
1 110 Ampere Storage Battery.....	18.00		
1 Deluxe Homecharger.....	18.00		\$86.00
1 Headset.....	12.00	Loud Speaker.....	12.50
1 Complete Aerial Equipment.....	1.50		
1 45 Volt B Battery.....	5.50		
		TOTAL.....	\$98.50

The above parts and equipment complete would cost you \$159.50! **Our Price \$125.00**

Written Money Back Guarantee with Each Set

Special Sale on Webster Condensers, Fine for Super-Heterodyne

Variable Condenser, .0005 (same as 23 plate), **\$2.98** Variable Condenser, .001 (same as 45 plate), **\$2.98**
list, \$5.50. While they last—Bargain at..... list, \$6.00. Big buy at.....

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for
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Selectivity—which is merely the ability to cut out interference—is the dominating difference between the very expensive sets and the moderately priced ones. Why pay \$50.00 to \$200.00 extra for increased selectivity, when for \$8.50 you can get a FERBEND WAVE TRAP which will absolutely cut out any interfering station, no matter how loud, how close by or how troublesome.

Add a Ferbend Wave Trap to Your Set

You will find it a valuable addition. It is designed and manufactured complete by us, after years of careful experimenting. It is not to be confused with imitations hastily assembled from ordinary parts. The price is \$8.50. Shipment is made parcel post C. O. D. plus a few cents postage. If you prefer, you can send cash in full with er and we will ship postage prepaid. Send us your order today.



We guarantee that the Ferbend Wave Trap, when properly connected to any workable receiving set, will tune out any interfering station

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Descriptive Folder on Request

FERBEND
Wave Trap

What's Wrong with Your Receiving Set?

Chapter IX—Assembling and Wiring Neutrodyne Receivers

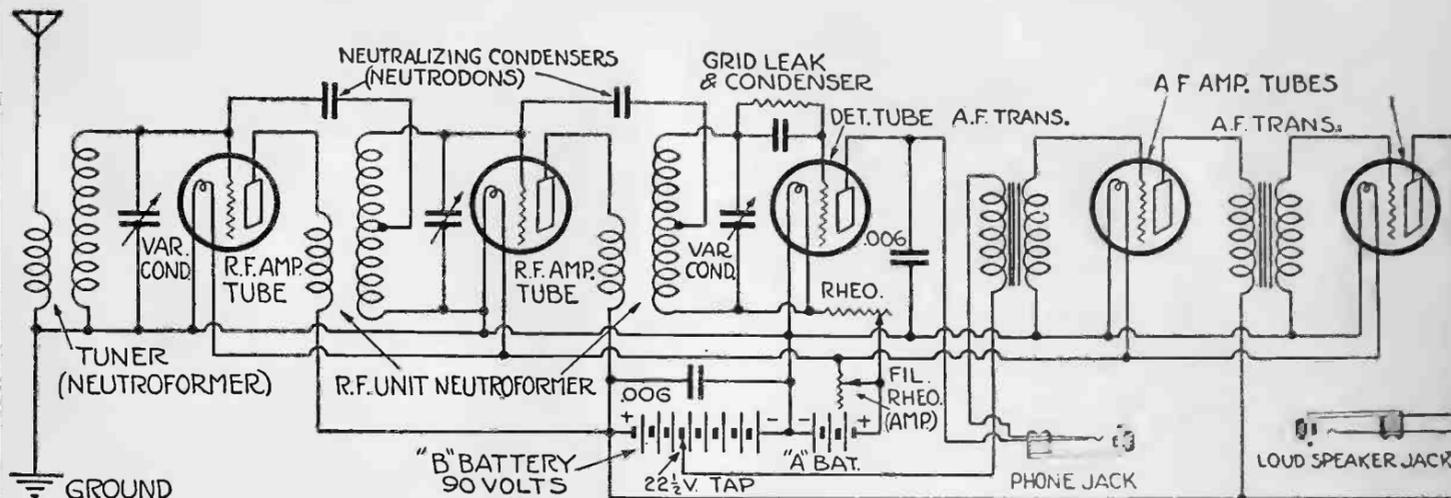
By Peter J. M. Clute

THE diagram of the five-tube receiver as shown is the original circuit that was designed for operation on the neutrodyne principle. Two stages of neutralized tuned Radio frequency amplification (neutrostages), detector and two stages of straight audio frequency amplification are provided in this circuit. Neutroformers are used for tuning and for interstage coupling for the Radio frequency amplifying tubes. Standard transformers are employed in the audio frequency amplifying stages. The two stages of audio frequency amplification will adapt the receiver for use with a loud speaking device.

Three neutroformers (mounted on standard variable condensers) and two neutrotons are necessary whether the Radiophan builds the three-tube, four-tube, or five-tube neutrodyne receiver.

In general, there will be little advantage in signal strength gained by the five-tube receiver. It differs from the four-tube reflex in that the two Radio frequency amplifying tubes are used for Radio frequency amplification only, while in the four-tube receiver one of them is also employed simultaneously as an audio frequency amplifier. The four-tube reflex receiver will be found a little harder to adjust at first, but when functioning properly it will produce satisfactory results with almost equal volume.

In the preceding discussion, there has been presented several of the popular types of neutrodyne circuit receivers, namely, the three-tube, the four-tube reflex, and the five-tube sets. It is recommended that a careful consideration of the details and expected performances of these various types be given before finally deciding which to construct. Neutrodyne receivers because of their selectivity, their DX scope and their utmost simplicity of operation commend themselves to the large host of Radiophans. With the introduction of these receivers, it was clearly demonstrated to the skeptical class of fans that it was possible to construct a receiver which combines a very high de-



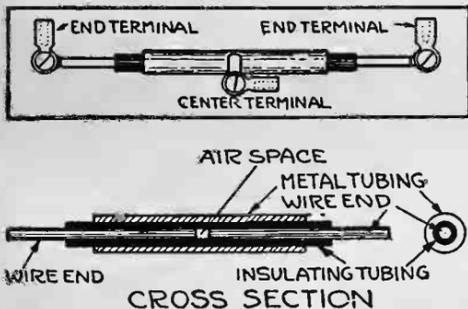
whole, but the omission of one tube by reflexing cuts down the cost of the receiver a little, by economy in tubes and current consumption. The four-tube outfit will undoubtedly be a trifle more difficult to adjust, but when it is operating properly very satisfactory results may be obtained. The three-tube set will be found suitable for receiving local or nearby stations, using only phones, and the addition of two stages of audio frequency amplification will give results equivalent to those obtained with the five-tube set.

Neutroformers and Neutrotons

It will be noted from the circuit diagrams presented in the previous article that three neutroformers and two neutrotons are necessary whether a three, four, or five-tube receiver is contemplated. These are special pieces of apparatus especially designed for the neutrodyne circuit. The regular type of Radio frequency amplifying transformers cannot be used since the ratio of turns and the neutroton tap are of utmost importance in the proper operation of this type of circuit.

The neutroformer is one of the essential parts of the neutrodyne circuit and it is constructed by mounting the special tuned Radio frequency amplifying transformer on a standard variable condenser. The various characteristics of the unit, such as, distributed capacity and inductance of the windings, mutual inductance, degree of coupling, position of taps, step-up ratio of turns, and arrangement of the windings are of great importance.

The entire adjustment of the neutrodyne circuit is centered in the neutrotons, or grid balancing condensers, which consequently should have extremely small losses at high frequencies. The neutroton is a special variable condenser with an extremely low capacity of from 1 to 10 micro-farads. It consists essentially of an insulating tube of high dielectric value, over which slides a metal tube, the latter forming a condenser capacity with the two wires connected to the end terminals and separated by about 1/8-inch inside the insulating tube. The effect is equivalent to two condensers in series. Adjustment of the metal tube and the wires permits of a very minute control of low capacity value. A top and a longitudinal cross-section view of a neutroton is shown in the diagram.



gree of efficiency with ease and operating simplicity.

Obviously, with the neutrodyne receiver, as with any other type, the efficiency of operation is dependent to a great extent upon the quality of the equipment, the care and accuracy exercised in construction, and finally upon the skill of the operator. Needless to say, the five-tube receiver is the most efficient of the types presented, giving exceptionally good volume and clarity of tone. The use of only four tubes with one stage reflexed, while giving about the same volume as the straight five-tube set, will not result in an increase in efficiency of the circuit as a

Dial Settings for Wavelength

Manufacturers of neutrodyne parts make it easy for the Radiophan to secure the nucleus for neutrodyne receiver construction by furnishing a combination package containing three neutroformers and two neutrotons. Each of these transformers has previously been connected so as to form a closed circuit and calibrated for frequency, thus ensuring that the three neutroformers in a single package will function at practically identical dial settings for any given wave length. The oft-repeated advice to buy and use only the best applies particularly to equipment for this circuit. While it is advisable to purchase neutroformer coils of some reliable make and guaranteed for electrical and mechanical efficiency, if any of the mechanically inclined Radiophans desire information for constructing their own coils, it will be furnished on request.

The three neutroformers are mounted on the panel first. The panel drilling should be such as to place the neutroformers at 6-inch centers and so mounted that they are approximately at an angle of 60 degrees with the horizontal. Accurate tests have demonstrated that best results are obtained by placing them at an

angle of 54.7 degrees. Mounting the neutroformers at this angle will prevent magnetic coupling or interaction between the coils.

While it is desirable to use a separate filament control rheostat for each circuit, it is not absolutely necessary. A rheostat for the detector tube and another for all the amplifying tubes together will generally suffice. It is recommended, however, that a standard vernier rheostat be provided for controlling the detector filament current.

Spacing the Tubes

In arranging the sockets for the Radio frequency amplifying tubes, care should be exercised to place them sufficiently far apart to prevent intertube capacity effects. The detector and audio frequency amplifying tubes can be mounted close together without being susceptible to interference. The sockets used should be of the panel mounted variety, with sufficient room for mounting the control rheostats between the rear of panel and the socket where necessary. Before assembling the sockets on the panel it is advisable to ascertain if the contact springs are firmly attached to the base of the socket, and

(Continued on page 26)

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Complete Parts for Neutrodyne 5 Tube Set 1 7x26 Panel 2 Single Sockets 1 Triple Socket 2 Neutrotons 3 Neutroformers 2 All American Transformers 1 Battery Switch 3 4" Dials Fada Type 1 Power Rheostat 1 Binding Rheostat 8 Binding Posts 1 Closed Circuit Jack 1 Filament Control Jack 27 Ft. Insulated Tubing 27 Ft. Tinned Bus Bar 2 Fixed Condensers .006 Mfd. 1 Fixed Condenser .00025 Mfd. 1 Grid Leak 2 Megohms 1 Diagram for Above Set OUR PRICE \$32.50	Complete Parts for Ambassador 1 Tube Set 1 Ambassador Coil 1 U. S. L. 23 Pl. Var. Condenser 1 Tillman 6 Ohm Rheostat 1 Bell Bakelite Socket 1 .00025 Fixed Dublifier Cond. 1 3" Dial Fada Type 1 7x12 Panel 1 Single Circuit Jack 6 Marked Binding Posts 12 Ft. Tinned Bus Bar 1 Diagram for Above Set Our Price \$12.25	Complete Parts for Erla 1 Tube Set 1 Hilco Varlocoupler 1 Signal 23 Pl. Var. Cond. 1 Bell Socket 1 Erla Reflex Transformer 1 Erla Audio Transformer 1 .002 Fixed Dublifier Cond. 1 .00025 Fixed Dublifier Cond. 1 3" Dials Fada Type 2 6 Ohm Tillman Rheostat 8 Marked Binding Posts 12 Switch Points 4 Stops 1 Erla Fixed Crystal Detector. 1 Erla Blue Print Our Price \$19.45
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MISCELLANEOUS Bell Socket, Bakelite Panel Mounting\$.69 AmSCO 6 ohm Rheostat..... .95 AmSCO 20 ohm Rheostat..... 1.15 AmSCO 30 ohm Rheostat..... 1.25 AmSCO 400 ohm Potentiometer. 1.40 Cutler-Hammer 6 ohm Rheostat, Plain95 Cutler-Hammer 6 ohm Rheostat, Vernier 1.20 ELECTRAHDT Solder Iron..... 2.50 New Improved Cockaday Coil..... 5.50 Pathé Pulsiformers\$8.50 New Improved Cockaday Coils, silk wound..... 5.50	Cutler-Hammer 30 ohm Rheostat, Plain\$1.20 Cutler-Hammer 400 ohm Potentiometer 1.20 Filkostat 1.85 Bradleystat or Bradleyleak..... 1.70 Bruno 14 Tap Inductance Sw.70 Sta-put Phone Plug..... .35 Phone Plug for 6 pr. Phones..... 1.25 Phone Plug for 2 pr. Phones..... .60 Single Circuit Jacks..... .35 Double Circuit Jacks..... .45 4" Dials, Fada Type..... .45 3" Dials, Fada Type..... .30 Triple Sockets, Fada Style..... 2.65 Marked Eby. Bind. Posts, Ea.17 Ambassador Coil 5.95	Shelton Midget Vernier.....\$1.40 Freshman Grid Leak & Cond.75 Federal Sockets95 General Radio 10 ohm Rheo..... 1.20 General Radio 30 ohm Rheo..... 1.20 General Radio Potentiometer, 200 ohms 1.25 General Radio Potentiometer, 400 ohms 2.85 PANELS 7x10\$.80 7x12 1.05 7x14 1.15 7x18 1.50 7x21 1.70 7x24 1.95 7x26 2.30
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AN EVENING AT HOME WITH THE LISTENER IN (SEE INSTRUCTIONS FOR USE BELOW)

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

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.

Don't take your ground connection for granted. Look it over once in a while, as corrosion sets in and makes a good ground a poor one in four or five months.

Most people simply open the window, bring the lead-in across the sill and close the window. A short piece of porcelain tubing should be used to prevent leakage.

2-LO, LONDON, ENGLAND ON ONE TUBE Another Record for the ELGIN SUPER-REINARTZ

Tuesday, November 27, during the test period between 9 and 9:30 P. M., Rev. E. A. Cole in the residence of J. A. McIver, of Roodhouse, Ill., while operating a set made of materials and in accordance with the hookup furnished by the ELGIN RADIO SUPPLY CO., tuned in 2-LO, London, England, using receivers and but one tube. Later another tube was lighted and the loud speaker used, so that four people could hear the program and concluding announcement. The numbers, time, and the order in which they were played were

Officially Confirmed

by the St. Louis Post Dispatch in conjunction with the National Association of Broadcasters, who had charge of the tests. (See page 34, St. Louis Post Dispatch, Dec. 2, 1923.) This same hookup has been advertised extensively as the one which brings in stations 2000 miles overland on a loud speaker and one tube; and this has been demonstrated so often as to need no repetition.

Send a two-cent stamp for circular giving one, two, and three tube hookup, and price list of parts for this remarkable circuit. Address the

ELGIN RADIO SUPPLY CO.

207 Chicago St.

ELGIN, ILL.

The Reader's View

First Organization on Interference In your issue of January 26, I read with interest the letter of B. C. L. of Seymour, Mo., on interference. We in St. Louis and suburbs have founded an organization expressly for the purpose of dealing with interference. Through our congressmen, we are trying to have the wave length of ship stations changed or a change in the present wave length of broadcasting stations. We have a committee appointed to run down all local interference caused by amateur broadcasters, power leaks or the thousand and one causes of interference. All that would care to join our organization or start a branch, please communicate with Mr. Julius R. Nolte, president

of the Missouri Radio Listeners' Association, First National Bank Building, Clayton, Mo.—Another B. C. L.

A Hint for the Clergy

One of the greatest pleasures of my wife and myself is to listen to the Sunday evening services over the country. When we are alone, we use headphones and low amperage tubes to save our batteries, as we are a long way from a charging station. Ordinary speaking tone is just right, but when a speaker shouts it is truly painful to our ears, and we frequently lose the shouted words.

As an example of distinct, yet forceful delivery pleasant to hear, I recommend Rev. Bowen of Hillsdale, Ill., who spoke from WOC Sunday evening, January 20.—J. E. Burch, La Junta, Col.

From time to time the aerial should be lowered and the insulators cleaned off to avoid leakage.

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NEW COCKADAY DISTORTIONLESS AMPLIFIER Complete Parts Exactly as Specified by Mr. Cockaday List Price \$40. OUR PRICE for above complete parts \$32.00

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COCKADAY Four-Circuit Receiver 3000 MILES Genuine complete parts exactly as specified by Mr. Cockaday. 1—Cockaday Coil—Precision 2—Amsco 26-Pl. Cond. 4" dial 2—Switch Stays 1—Bradley Leak, 1/4 to 10 meg. 5—Melco Sockets 1—Amsco 6 ohm Rheostat 3—Amsco 20 ohm Rheostats 1—Patent Single Jack 2—Patent Double Jacks 2—American Transformers 1—Come Push-Pull Transformer—Input 1—Come Push-Pull Transformer—Output 11—Switch Levers 11—Switch Points 2—Switch Stays 1—Dubilier Condenser—.0005 1—Dubilier Condenser—.00025 with Meunt 1—Durham Variable Grid Leak 3—Lavite Resistances—48,000 ohms 1—Amsco 400 ohm Potentiometer 1—7"x24" Panel 1—3"x2 1/2" Sub Panel 1—1"x12" Panel OUR PRICE \$55.00

Genuine 4 Tube Superdyne Complete Parts 1—Superdyne Coupler 2—23-Plate Variable Condensers, .0005 mfd. 1—Variable Grid-Leak 1—.00025 mfd. Fixed Condenser 3—Rheostats 2—Switch Levers 4—Switch Points 4—Switch Stays 4—V. T. Sockets 2—Acme Audie Transformers 1—Single Circuit Jack 1—Double Circuit Jack 7"x24" Panel Bus Wires, Spaghetti and Diagram Special Price \$275.00 \$100 Melco complete parts including walnut cabinet for the Melco 4 tube Supreme Receiver \$85.00 The Ultimate in Radio

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PHONES \$ 5.00 Turney, 3000 ohms... \$ 2.75 12.00 Western Electric... 8.75 6.00 Brandes Superior... 4.70 12.00 Baldwin Type C... 7.95 7.00 Federal... 4.85 5.50 Stromberg Carlson... 4.50 12.00 Dr. Seibt 6000 ohms... 5.75 LOUD SPEAKERS \$30.00 Music Master... \$24.00 35.00 Manarox (New Type)... 28.50 36.00 Radiola U. Z. 1320... 30.00 10.00 Brandes Table Talker... 6.50 Baldwin Unit... 4.65 Amer. Radiophone Unit... 3.95 Geraco Music Master Unit... 9.00 TRANSFORMERS 7.00 Federal No. 65... 5.25 5.00 Acme... 3.75 5.00 All-American... 3.80 7.00 Amertran... 5.50 12.50 Como Duplex P. P... 10.00 12.50 Modern Push-Pull... 10.00 5.00 Erla... 4.25 12.00 All-American P. P... 10.00 5.00 General Radio... 4.35 POTENTIOMETERS 1.25 Patent... 1.10 1.50 Amsco... 1.25 1.50 Cutler Hammer... 1.15 1.50 Klossner... 1.25 DIALS AND SOCKETS 3" Amsco Bakelite... .45 4" Amsco Bakelite... .80 Bell Socket... .65 Melco Socket... .80 Bakelite Socket... .45 Chelton Socket... .65 MISCELLANEOUS Pathé Phisifermers... 7.95 Ambassador Coils... 5.25 Cockaday Coils, Precision... 4.50 Cockaday Coils, Eastern... 3.35

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WEEK OF PROGRAMS ON THE AIR



Gladys Atwood, favorite feminine reader and impersonator, broadcasts quite frequently from WGR at Buffalo. Miss Atwood has received numerous letters commenting on her Hebrew dialect readings.

accompanist; Mrs. L. Fudge, soprano; R. J. Hannan, baritone; L. the Lloyd, soprano; Ila Islamoff, bass-baritone; Mrs. John Madsen, soprano; W. E. Scott, tenor; Gladys Robinson, contralto; Doris Schaller, soprano; "The Plattsburg Training Camp." Dr. Charles H. Johnson; Troy Pupils' Chorus; Mrs. Duncan Kaye, soprano; Ernest Gray, tenor; Unaccompanied quartet; Jessie Mixer, contralto; John Rexford, bass.

WHAA, Iowa City, Ia. (Central, 484), 7:30-9:00 p. m., Garden week program auspices Iowa Federation of Women's Clubs.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater orchestra; Walnut Theater Orchestra, Walter Davison, director; Alamo Theater organ; 7:30-9:00, Concert, auspices Mrs. Robert K. Van Pelt; University of Kentucky Glee Club, N. R. Elliott, director; Four-Minute digest of International Sunday School Lesson, Huston Quin; Radio Forum talk.

WHB, Kansas City, Mo. (Central, 411), 12:35-1:00 p. m., Popular program, Sweeney Radio Orchestra; 2:00-3:00, Ladies' hour program, Sweeney Radio Orchestra; 7:00-8:00, Solos by members of the Sweeney Radio Orchestra; 8:00-10:00, Program broadcast from Indian Village, Sweeney Radio Orchestra; solos, Nell O'Brien.

WHN, New York, N. Y. (Eastern, 360), 2:15-2:30 p. m., Jerome H. Remick Music Co.; 4:30-5:30, "The Original Charleston Five," Wm. P. Somerville, leader; 9:30-10:00, Lou Gold's Wigwam Club Orchestra; 10:00-10:10, Sara V. Turitz, soprano; 10:10-11:00, Program by the All Nations Association, Henry Tuton Mason, founder; 11:15-12:00, Sam Lannin's Roseland Dance Orchestra.

WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Gimbel Brothers Tea Room Orchestra, Ray Steen, director; 3:00, Recital by pupils Nan Woerner studios; Gertrude Sack soprano, Elsie Henrick, mezzo soprano; 6:05, Harold Leonard's Red Jackets from Club Madrid; 7:00, Uncle Wip's bedtime stories; 8:15, Talk, Harold W. Lane; 9:30, Hon. George W. Norris, Governor of Federal Reserve Bank of Philadelphia; 10:30, Karl Bonawitz, Organ recital; 11:15, Ted Weems and his Cafe L'Aiglon Orchestra.

WJAX, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Musical selections, Members Music Department, Cleveland Federation Women's Club; Address, D. C. Willis, Chairman, Board, Cleveland District Federal Reserve Bank; Musical selections; Address, Frank Fry, Assistant Treasurer Union Trust Company; Musical selection; Address, Mrs. W. W. Miller, of Ohio Federation Women's Clubs; 11:00 p. m., Organ recital from Cleveland Public Auditorium, Vincent H. Percy, organist.

WJY, New York, N. Y. (Eastern, 405), 7:30 p. m., "Credit, the Development of the Clearing House Principal and Its Applianc to Credit," George Hetzel; 7:45, Mabel Schwab, pianist; 8:00, F. N. Shephard, speaker; 8:30, Lecture, "Magazine History," Glenn Frank; 9:30, Mabel Schwab, pianist; 9:45, "Golf," Innis Brown; 10:00, Abraham Znaida, tenor; 10:30, Dance program, Hotel Majestic Dance Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 12:45 p. m., Pennsylvania Concert Orchestra; Nathan Abas, director; 3:00, Afternoon Auditorium concert; 4:00, Fashion talk, Elinor Gunn; 4:10, "May Day," Capriola W. Ashworth; 4:20, American Pen Women; 4:30, "Kandy Kiddies," Sarita MacLeary; 4:45, Harper's Bazaar, Lucy Park; 5:00, Thomas Dunn, baritone; 7:00, Uncle Dave Cory's "Jack Rabbit Stories," 7:30, Time's Pop Question Game; 8:00, "Problems of Crime," Dr. Henry P. Fairchild; 8:30, Wanamaker organ recital; 9:15, American Newspaper Publishers' Association dinner; speaker, Sir Esme Howard.

WLAG, Minneapolis-St. Paul, Minn. (Central, 417), 10:45-11:15 a. m., Household hints; 11:35-12:00 m., Surprise hour; 2:00-2:30 p. m., "Forty Wigglers," Tess Cooperman; 2:40-4:00, Daylight concert, Beata Hansen, violinist; Helen Posnick, reader; Mrs. Geo. Orms, soprano; 4:00-4:30, Magazine reading; 5:30-6:00, Children's stories, Mary Tillisch; 6:00-6:15, "Every Home a Court," Stanley Gillam; 6:15-7:00, Dinner hour concert; 7:30-8:15, Farm lectures; "Majoring with Peony and Iris," Mrs. H. B. Tillotson; "A Hole in Our Forest Pocketbook," Dr. Rafael Zon.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Adelaide Apfel, pianist; Talk, representative of the League of Women Voters; 10:00, Schima Kaufman, violinist; Program, Cincinnati Conservatory of Music, Waldene Johnston, violinist; Mitchell Humphries, violinist; Russel Moore, violist; Evangelina Otto, cellist; Genevieve Goodman, pianist; Coda, Disher, reader; Sextette, Grace Record, Marion Sold, Roxine Beard, Martha Short, Antoinette Terron, Wilma Cameron; 11:00, Doherty's Melody Boys.

WMAQ, Chicago, Ill. (Central, 447.5), 3:30 p. m., Lessons in cookery, Mrs. Elizabeth O. Hillier; 4:20, Items of interest to women; 4:30, Illinois Federation of Women's Clubs' Co-operation with the Ex-Service Men, Myrtle Carpenter; 7:00, Boy Scouts' weekly talk; Talk, Rockwell R. Stephens; "The National Parks," Ellis Prentice Cole; Talk, Ray Munger; 8:10, LaSalle Orchestra; 9:00, Lecture, University of Chicago; 9:15, Drexel Quartet.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Ahern and her Chisca Hotel Philharmonic Orchestra.

WOAW, Omaha, Neb. (Central, 526), 6:00 p. m., Children's stories, by Grace Sorenson; 6:30, Orchestra; 9:00, Creston (Iowa) Concert Orchestra.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Peptic Ulcer," Karl G. Stephan; 5:45, Chimes; 6:30, Sandmen's visit; 7:00, The History and Aim of Old Fellowship; Justin Washburn; 9:00, The Palmer School Radio Orchestra; V. B. Roethe, baritone.

WDD, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:02 p. m., Wana-

Where to Hear Talks

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

Tuesday: KDKA, KFAF, KGW, KHJ, KYW, WAAM, WCAE, WCAL, WDAF, WDAE, WFAA, WGI, WGY, WHB, WIP, WJY, WKAR, WLAG, WMAQ, WMC, WOC, WSB, WWJ.

Wednesday: KDKA, KFAE, KFKB, KFOA, KGO, KGW, KPO, KYW, WAAM, WBAH, WBZ, WDAF, WDAE, WFAA, WGI, WHA, WJZ, WHAR, WLAG, WMAQ, WOC, WOR, WOS, WWJ.

Thursday: KDKA, KYW, WAAW, WAAM, WAAW, WBZ, WCAE, WDAF, WDAE, WFAA, WGI, WJZ, WHA, WJZ, WHAR, WLAG, WMAQ, WOC, WOR, WOS, WWJ.

WLAG, WLW, WMAQ, WOC, WOR, WWJ.

Friday: KDKA, KFAE, KFOA, KGW, KHJ, KLZ, KYW, WAAW, WBZ, WCAL, WDAE, WFAA, WGI, WGY, WHA, WHB, WIP, WJZ, WLAG, WLW, WMAQ, WOC, WOS, WWJ.

Saturday: KDKA, KYW, WBAH, WBAP, WDAF, WFAA, WFL, WGI, WHAA, WIP, WLAG, WMC, WOAW, WOC.

Monday: CKY, KDKA, KFAE, WAAM, WBZ, WDAE, WFAA, WGI, WGR, WGY, WHAZ, WIP, WLAG, WOC.

Tuesday: WDAF, WHAA, WHB, WIP.

maker Crystal Tea Room Orchestra, Robert E. Golden, director; 4:45, Organ recital, Mary E. Vogt.

WDO, Kansas City, Mo. (Central, 360), 7:00-7:30 p. m., Edison recreation program; 8:00-9:15 p. m., Benzo Gas program.

WDR, Newark, N. J. (Eastern, 405), 2:30-2:45 p. m., Recital by Freda Benneche, coloratura soprano; 3:15-3:30, Freda Benneche; 3:30-4:00; Gotham Entertainers; 6:15-8:30, Albert E. Sonn, on Radio for the Layman; 6:30-7:30, Frank Reilly's Country Club Orchestra.

WSB, Atlanta, Ga. (Central, 429), 12:00-1:00 p. m., Noon entertainment; 3:30-4:00, Howard Theater Orchestra; 5:30, Howard Theater Orchestra; 8:00-9:00, Musical entertainment; "The Bankers' Obligation," Robert F. Maddox; 10:45, Organ concert, Dr. Charles A. Sheldon.

WWJ, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises, R. J. Horton, Y. M. C. A.; 12 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 8:30, News Orchestra; St. Joseph's Church choir, T. E. Okroy, director; 10:00, Goldkette's Orchestra; 11:00, News Orchestra.

WDAF, Kansas City, Mo. (Central, 411), 3:00-4:30 p. m., Musical matinee, regular "request" program by the Leo R. Davis Orchestra; 6:00-7:00 p. m., School of the Air; Piano tuning-in number, Du-Art; Address, speaker under the auspices of the Kansas City Children's Bureau; Tell-Me-a-Story Lady Fritz Hanlein's Trianon Ensemble; 8:00-9:15, Program broadcast from Ivanhoe Hotel; 11:45 p. m., Nighthawk frolic, the "Merry Old Chief" and the Coon-Sanders Orchestra.

WDAP, Chicago, Ill. (Central, 360), 7:00-8:30 p. m., Drake Concert Ensemble and Blakstone String Quintette; 10:00, Wm. Benson, Barton organ, Ralph Emerson, Cambridge Sisters, Jack Chapman's Orchestra.

WDAE, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily almanac; 12:02 p. m., Organ recital, Stanley Theater; 12:30, Arcadia Cafe Concert Orchestra; 2:00, Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 10:10, Howard Lannin's Arcadia Cafe Dance Orchestra; Special "Morning Glory Club Features"; Songs by Harry Glyn; Musical comedy stars from Philadelphia's leading theaters.

WEAF, New York, N. Y. (Eastern, 492), 4:00 p. m., The 400 Club Orchestra; 5:00, Children's Hour Program; 7:10, Sigmund Kemper, xylophonist; 7:30, Thornton Fisher; 7:50, Crisco program; 8:00, B. J. Jones and Ernest Harty; 8:30, World Mutual Insurance Co.; 9:00, Astor Coffee Dance Orchestra.

WEAO, Columbus, Ohio (Eastern, 360), 4:00 p. m., Educational lecture, member Ohio State University faculty; Music, university talent.

WFAA, Dallas, Texas (Central, 476), 12:3-1:00, Address, Dr. Robert Stewart Hyer; 6:15-7:00, Address, "The Wonders of Alaska"; 8:30-9:30, Recital, W. A. Green Company Choral Club, Earle D. Behrends, director.

WFL, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano recital, Loreta Kern; 6:00, Sunny Jim, the Kiddies' Pal; 6:30, Meyer Davis Bellevue Stratford Concert Orchestra.

WGAZ, South Bend, Ind. (Central, 360), 7:0-8:30 p. m., Big Five Orchestra; Elton Crepeau, baritone; Charles Krueger, tenor.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selections on the Ampico in the Chickering; Marjorie Drew's ten minutes; 7:00, Meeting of the Amrad Big Brother Club; 7:30, Selected verses, Charles L. H. Wegner, Radio poet; "What to Eat," Henry Copley Green; Toreador Club.

WGN, Chicago, Ill. (Central, 370), 7:00-8:00 p. m., Dorothy Jensen, violinist; Louise Gordon, contralto; Oriole Orchestra; 9:00-11:00, Mary Love Hawkins, soprano; Henry Jordan, tenor; Ruth Meiner, cellist; Oriole Orchestra.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., Albert Bouchard, organist; 2:30-4:00, The Radio Dealers' Musical Program; 6:30-7:30 and 11:15, Vincent Lopez Hotel Statler Orchestra; 6:45-9:15, Hotel Statler grill room, program of Bethlehem Presbyterian Church Choir, direction C. B. Deater; 9:15-11:15, Concert, direction of Howard G. Boyce.

WGY, Schenectady, N. Y. (Eastern, 380), 2:30 p. m., Music and household hints from the U. S. Department of Agriculture; 6:30, Children's program; 7:45, Health talk, N. Y. State Department of Health; 7:45, "Such a Little Queen," WGY Players; WGY Orchestra; 10:30, Blue Bird Dance Orchestra.

WHA, Madison, Wis. (Central, 360), 7:30 p. m., "Why We Need Forestry," E. E. Hubert; "Keeping Fires Out of Wisconsin Forests," C. L. Harrington.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Walnut Theater Orchestra; Strand Theater Orchestra; Alamo Theater organ; 7:30-9:00, Concert, Junior Class of the Louisville Conservatory of Music, Helen Anderson, president; Frank Harmon, sponsor; Reading; An interesting historical episode.

WIB, Kansas City, Mo. (Central, 411), 12:35-1:00 p. m., Popular program, Sweeney Radio Orchestra; 2:00-3:00 p. m., Ladies' hour program, Sweeney Radio Orchestra; 7:00-8:00 p. m., Sweeney Radio Orchestra.

WHK, Cleveland, Ohio (Eastern, 283), 9:00 p. m., Program arranged by Cleveland Radio Dealers' Association; Dance program by Louis Rich and his orchestra; solo numbers by favorite artists.

WHN, New York, N. Y. (Eastern, 360), 2:15-3:00 p. m., "Original Indiana Five," Tom Norton, leader; 3:00-3:15, Marguerite Ackerman, soprano; 3:45-4:00, Al Novins and Clint Sommer in songs; 4:15-4:30, Joe Handor and Larry McCarthy; 4:30-5:00, "Happy Trio," 10:45-2:00 a. m., "Midnight Bohemia," S. Jay Kaufman, Sir Jos. Ginzburg, Harry Richman and others.

WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Gimbel Brothers' Tea Room Orchestra, Ray Steen, director; 3:00, Penn Relay Races, direct from Penn Stadium; 6:05, Jordan Lewis Dance Orchestra; 7:00, Uncle Wip's bedtime stories.

WJY, New York, N. Y. (Eastern, 405), 7:30 p. m., Elias Cohen, violinist; Keith McLeod, accompanist; 7:50, "Income Taxes," Frank Shevit, 8:00, Elias Cohen, violinist; 8:30, Iran Frank, tenor; Erich Lukaszek, accompanist; 8:35, Legislative review, Hon. Julius Berg; 8:45, Standard Oil Company Band of Elizabeth; 9:15, "The Tolorama," D. McFarlan Moore; 10:00, Alex Maltzoff, tenor.

WJZ, New York, N. Y. (Eastern, 455), 12:10 p. m., Friday noon hour of music, Brick Presbyterian Church; 1:00, Henry Van Der Zander's Hotel Ambassador Trio; 3:30, Hotel Astor organ recital, Leo Ross; 4:00, Fashion talk, Elinor Gunn; 4:10, "Buying Happiness via the Budget," Edith McClure Patterson; 4:30, "Fashions of the Stage," Vera Moore; 4:45, "Concerning the Young Child," Adelle Ries; 4:55, "Arts and Decorations," S. L. Systematic Psychology; Dean James E. Lough; 7:00, Jack Fox's Clover Garden Orchestra; 7:30, Berlitz French lesson; 8:00, Dorothy MacDonough, soprano; Creighton Allen, pianist; 8:15, Don Marquis; 8:30, Dorothy MacDonough, soprano; Creighton Allen, pianist; 8:45, Eunice Howard and Georgiana Martinez, pianists; 9:30, Book chat, Grace Isabel Colburn; 9:10, Chilean program, auspices Pan American Union, Leopoldo Gutierrez, baritone; 10:30, Paul Street radio program.

WLAG, Minneapolis-St. Paul, Minn. (Central, 417), 10:15-11:15 a. m., Household hints; 11:51-12:00 m., Surprise hour; 2:00-2:30, "Child Welfare Work in Minnesota," Mrs. Robbins Gilman; "Cleaner Week Talk," 2:40-4:00, Concert, "Roaming's Air Raiders Orchestra," 4:00-4:30, Magazine reading; 5:30-6:00, Weekly meeting Children's Radio Health & Toothbrush Club of America, Dr. F. W. Pepper, president; 6:00-6:30, "Radio," Ray R. Sweet; "Tight Roofs for Rainy Days," John Bond; 7:30-8:15, Farm recital; "Special program by Garden City, Minnesota Consolidated High School," M. O. Stavland, director.

Friday, April 25

CKAC, Montreal, Can. (Eastern, 425), 1:45 p. m., Mt. Royal Hotel Concert Orchestra; 4:30, Mt. Royal Hotel Dance Orchestra.

CKY, Winnipeg, Can. (Central, 450), 8:15 p. m., Band concert, Salvation Army.

KFA, E. Pittsburgh, Pa. (Eastern, 326), 12:15 p. m., Concert, 8:15, Dinner concert, Westinghouse Band; 8:00, Radio Boy Scout meeting; 8:15, Feature; 8:30, Concert, Westinghouse Employees Band; Eleanor March, soprano; Jack Smalley, baritone.

KFAE, Pullman, Wash. (Pacific, 330), 7:30 p. m., "The League of Nations—Its Achievements and Failures," Prof. N. J. Aiken; "Treatment of Foul Brood of Bees," E. A. Slocum; Mildred Smaling, contralto; Vincent Hagen, cellist.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Instrumental concert, Lillian Hassler's Novelty Five Orchestra; 8:00-9:00, Evening Herald concert; 9:00-10:00, Examiner concert; 10:00-11:00, Vocal and instrumental concert, Myra Belle Vickers; 11:00-12:00, Ambassador-Max Fischer Coconut Grove Orchestra.

KFN, Shenandoah, Iowa (Central, 266), 3:00 p. m., Program of music, inmates of State School for the Blind; 7:30, Musicale by talent from Bedford, Iowa.

KFA, Seattle, Wash. (Pacific, 455), 8:30 p. m., Program, Seattle Chamber of Commerce.

KSG, Los Angeles, Calif. (Pacific, 278), 3:30-4:30 p. m., Concert program, direction of Gladwyn N. Nichols, musical director of Angelus Temple; 6:30-7:00, Review of International Sunday School Lesson for Sunday, April 27, by Mrs. M. Kennedy; 8:00-9:15, Revival services, conducted by Almee Semple McPherson; 9:15-10:00, Musical entertainment presented by the Angelus Temple Band and Crusaders; 10:02-10:10, The family altar and prayer, led by Almee Semple McPherson; The Angelus Temple Chimes will close.

KGO, Oakland, Calif. (Pacific, 312), 8:00 p. m., University Christian Church Orchestra; Deisy O'Brien, soprano; Mme. Swartfager, violinist; Georgia Carpenter, soprano.

KGW, Portland, Ore. (Pacific, 492), 12:30 p. m., Program, Peck Holton's Orchestra; 3:30, Lecture, Esther B. Cooley, clothing expert of Extension Service; 8:00, Lecture, Extension Division of University of Oregon; 10:30, Hoot Owls.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Program, concert selections; 2:30-3:30, Program through courtesy of Barker Brothers; 6:30-7:00, Children's program, presenting Richard Headrick, silver-sheet juvenile; Prof. Walter Sylvester Hertzog; Bedtime story; 7:00-7:30, Organ recital from First Methodist Episcopal Church, Arthur Blakeley, organist; 8:00-10:00, Program presenting Ruth Markell, soprano; A play by the Pasadena Community Broadcasters, Edward Murphey, director; Gladys Terrell, soprano; Sol Cohen, violinist; Mina Hellekson, pianist; 10:00-11:00, Art Hickman's Orchestra.

KLA, Bakersfield, Calif. (Pacific, 509), 8:00-10:00 p. m., Jeanne Eubank Edwards, soprano; Nadine Shepherd, pianist; Belmont Trio, Matilda Stross, soprano; E. E. Lichtig, baritone; Ethel Irwin, violinist; J. C. Tripp, accompanist; Ev. Sutherland's Oakland Syncopters.

KLZ, Denver, Colo. (Mountain, 360), 7:30 p. m., "The Boy Builders of City and State," George W. Olinger, Originator of the Olinger Highlanders.

KPO, San Francisco, Calif. (Pacific, 423), 1:00-2:00 p. m., Rudy Selger's Fairmont Hotel Orchestra; 2:30-3:30, Organ recital, Theodore J. Irwin; 4:30-5:30, Rudy Selger's Fairmont Hotel Orchestra.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., Studio recital, Mrs. John E. Stoker soprano; Hunter Jones, pianist.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 6:00-6:30 p. m., Spanish lesson, Prof. A. A. Braschi; 6:45, Children's bedtime story, "Uncle Bob"; 7:00-7:30, Dinner concert, Congress Hotel, Joska DeBabary's Orchestra, Clyde Deert's Orchestra; 10:00-2:00 a. m., Midnight Revue.

WAAW, Omaha, Neb. (Central, 360), 8:00 p. m., Lessons in bridge, by Mrs. Guy U. Purdy.

WBAH, Minneapolis, Minn. (Central, 417), 12:30-1:30 p. m., Dick Long's Trio and soloist; 7:00-7:30, Besreat Serenaders.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Concert by old-time fiddlers of Lewisville, Tex.; C. C. Robertson, director; 9:30-10:45, Concert, Lone Star Hawaiian Trio of Alamo, Tex.

WBZ, Springfield, Mass. (Eastern, 337), 11:55 a. m., Hotel Kimball studio; 6:0 p. m., Dinner concert; WRZ Orchestra; 7:00, "The Stampede," Youth's Companion; 7:30, Bedtime story for the kiddies, Hotel Kimball studio; 11:00, Chamber music, WRZ Orchestra; Fred W. Gardner, tenor; Grace L. Kemp-ton, soprano.

WCAE, Pittsburgh, Pa. (Eastern, 462), 4:30 p. m., Children's program, Sunshine Girl, Uncle Kaybee; 6:30, Dinner concert, William Penn Hotel; 7:30, Uncle Kaybee; 8:30, Musical program, Ted Newlin's Orchestra.

WCL, Northfield, Minn. (Central, 360), 9:45 a. m., St. Olaf College chapel services; 8:30 p. m., Rock talk, "Rereading the Ancient Classics," Dr. George Weida.

WCX, Detroit, Mich. (Eastern, 517), 4:15 p. m., Musical program; 6:00, Dinner concert, Hotel Tullier; 7:00, Music.

(Continued on page 18)

Friday, April 25

(Continued from page 17)

"Consolidated Schools," Geo. W. Seife; High School Orchestra; John Thomas, tenor; 9:15. Business message; 9:30-10:45. Program, Band of Carver, Minnesota; 10:45-12:00. Dance program, St. Paul Hotel Casino Orchestra, Sam J. Heiman, director.

Saturday, April 26

CKAC, Montreal, Can. (Eastern, 425), 7:00 p. m., Kiddies stories in French and English; 7:30. Rex Battle and his Mt. Royal Hotel Concert Orchestra; 8:30. Frontenac Brewery's Band and artists; 10:30. Joseph C. Smith and his Mt. Royal Hotel Dance Orchestra.

Davis Bellevue Stratford Concert Orchestra; 7:00. Sol Zaleb and his Rose Tree Theater Cafe Orchestra; 8:00. Medical talk, Dr. George Wilson; 10:10. Charlie Kerr and his Symphonite Dance Orchestra from Majestic Hotel.

WFAA, Dallas, Tex. (Central, 476), 12:30-1:00 p. m., Address, "Earth History in Rocks," Dr. Ellis W. Shuler; 8:30-9:30. Piano recital, Julius A. Jahn; 11:00-12:00. Dance music, Adolphus Hotel Orchestra.

WFAA, Dallas, Tex. (Central, 476), 12:30-1:00 p. m., Address, "Earth History in Rocks," Dr. Ellis W. Shuler; 8:30-9:30. Piano recital, Julius A. Jahn; 11:00-12:00. Dance music, Adolphus Hotel Orchestra.

Monday, April 28

Sunday, April 27

Tuesday, April 29

(Continued on page 24)

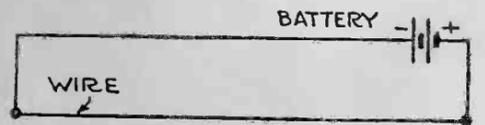
30 Minute A-B-C Lessons for Radio Beginners

Part VI—Uses of Resistance in Radio

By P. E. Edelman

IN this series of articles the story of Radio is told in so simple a manner that the uninitiated can follow theory and practice whether he knows anything about electricity or its application to broadcasting and reception or not. The series consists of twenty-five chapters, of which the five next will be: Chapter VII—Essentials of Radio Electricity. Chapter VIII—The Key to Radio Circuits. Chapter IX—Radio's Cast of Characters. Chapter X—What a Vacuum Tube Does. Chapter XI—The Shorthand of Radio—Diagram Reading.

WHEN A CROWD tries to get home from a baseball game, there is a rush for the gates and only a certain number of people can pass through the gates at a time. Thus the gates have



A WIRE HAS RESISTANCE, REPRESENTED THUS Figure 59

resistance to the flow of the crowd much as a wire offers resistance to the flow of electrons (electric current) through it.

When a battery is connected to a wire, Figure 59, the electrons have to be pushed

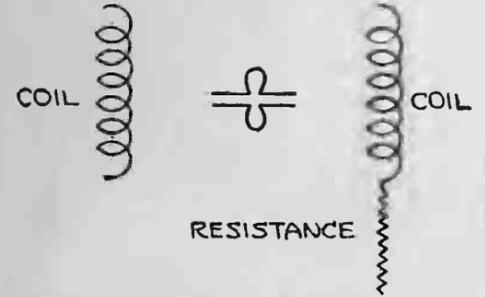
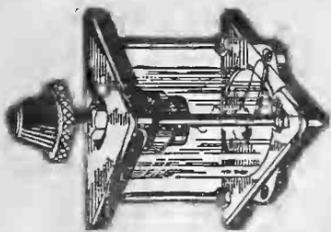


Figure 60

through the molecules in it. The smaller the wire the harder this will be. Thus

Double Adjustable FRESHMAN Crystal Detector



for base or panel mounting. When mounted on panel only the knob shows on the front. No more searching for the sensitive spot. Merely turn the knob as you would a dial thus adjusting the crystal instead of the cats-whisker. Best for both Reflex and Crystal sets.

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Radio Condenser Products
106 Seventh Ave. N. Y. C.

any coil of wire, Figure 60, has resistance and acts in a circuit as though it were in two parts, one a coil, and two a resistance.

Rheostat

A common form of resistance is the RESISTANCE WIRE

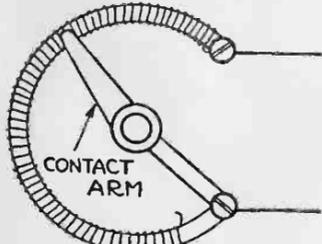


Figure 61

rheostat, which is merely an adjustable resistance and, in Radio, usually is employed to control the amount of current supplied to a vacuum tube filament. A

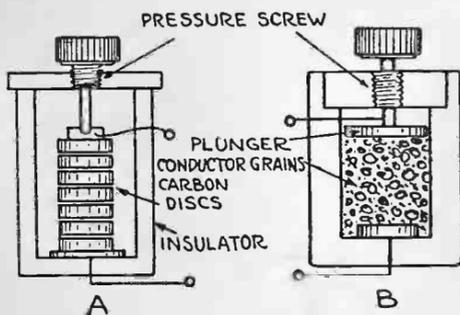
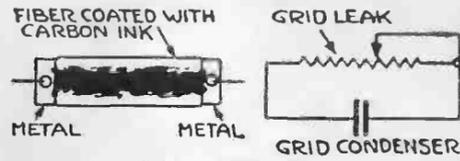


Figure 62

wire rheostat is diagrammed in Figure 61. Instead of wire, graphite discs can be used, Figure 62A. As the pressure on the

discs is increased the resistance is decreased. Sometimes grains or powder, as shown in Figure 62B, will be adjusted by



Figures 63 and 64

means of a plunger, to vary the resistance. Devices using the principles shown in Figure 62 usually give finer regulation than the wire resistances.

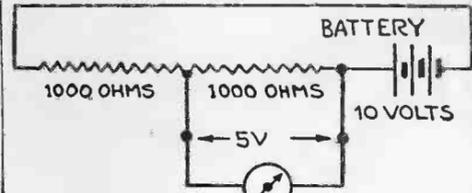


Figure 65

The unit of resistance is called the ohm. A form of rheostat now in much use can

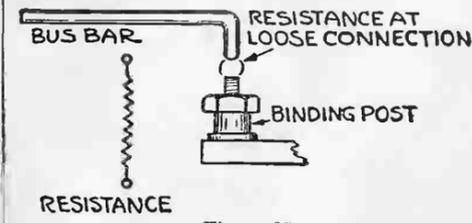


Figure 66

be gradually varied from less than one-

half an ohm to more than thirty ohms. Grid Leak Is a Resistance

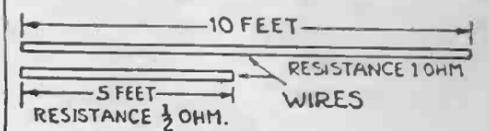


Figure 67

as grid leaks. A grid leak may have as much as ten million ohms or as little as 50,000 ohms according to the purpose. (Continued on page 24)



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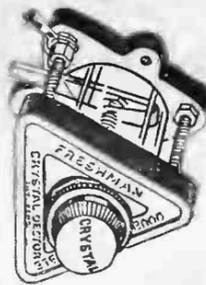
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Radio Digest

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Radio Monopoly Can Be Prevented

There Is No Government Regulation on Air

FEAR of a monopoly that will seriously affect broadcasting has gripped the Radio world. The A. T. & T. company are trying to assure the public that this is not their intention, but give this charitably inclined organization one inch and it will take a mile.

People commonly believe that the government controls the air, but it does not under the present law. The Department of Commerce has tried to control it, and considering the tools of law and money they have been doing a mighty good job, but the art and business of Radio has outgrown the present system, and we require an up-to-date law and set of regulations.

The two laws governing Radio in the United States have outgrown their usefulness, because neither deals specifically with the most important branch of Radio, and that is broadcasting. Neither gives the Secretary of Commerce the right to refuse licenses. If any person desires to do so they can put in a station, demand a license, put on a business, phonograph, or other kind of program for twenty-four hours a day. Under the present laws it would be impossible to stop them, as long as the business has proper attention and did not cause malicious interference.

There is nothing in the laws of today that will prevent a Radio monopoly, and as long as we leave Radio open to a possible monopoly, there will always be some person or group trying to find a way to do it. Right now, if the A. T. & T. company succeeds in putting forward a license that stops at 500 watts and does not provide for the use of wires outside of the studio, they will have all stations "sewed up." In other words, no other broadcasting stations will be able to relay programs. And by the exclusive use of high power, they could blanket every station in existence and lease outside wires only to their own stations.

Apparently some law must be passed to prevent such eventualities. There was a time when there were so few in Radio that the public had to swallow many things, but today, with millions of persons and dollars interested, we have the power to control this new publicity utility.

About three years ago, Wallace H. White, Jr., congressman from Maine, wisely visioned the growth of Radio and studied it with a view to preserving its usefulness to the people by a correct law. The present session of Congress is the third time that he has tried to pass this bill. Two years ago it died because of lack of interest; last year it passed the House, but died in the Senate because there was undoubtedly plenty of push against it because of its anti-monopoly clause.

The bill is up for consideration again. Now is the time to pass it. The Army and Navy have asked revisions. So have various private interests. But Congressman White is well versed in Radio and its needs. Any amendments he accepts will not weaken the power with which it was originally blessed. But if harmful amendments come into it everybody interested in Radio is duty-bound to oppose these amendments.

The White bill will give the Department of Commerce the power to police the air. It is our duty to see that this bill goes through. Every Radio fan and Radio business man should write individually to his congressman and senator to interest himself in this legislation and to help its passage.

Household Necessity

Set as Much Needed as the Kitchen Stove

THE time has passed, with the year 1923, when Radio is looked upon as a plaything or as a child's toy. It has passed through the preliminary the same as the telephone and electric light in the latter 70's. It has come to the point where the public expects service and amusement of high class. If nearby stations do not furnish the kind of program desired it is only a matter of a few moments to turn them out and tune in the distant ones. Some stations broadcast every half hour during the day and night, giving the important news and market reports in a few minutes. Radio is fast assuming a household necessity, and is found in millions of homes today for service as well as amusement.

RADIO INDI-GEST

Tragedy of Distances

*They listened to the same music,
But together, they couldn't dance,
For she was in Chicago
And he in Paris, France.*

FIDDLE D. DIAL.

We Hear 'Em, Too. It's WNP, the Eskimos

Dear Indi: A youthful friend of mine recently completed a flivver set. When I asked how it was working he replied, "I can't get anything but Cuba. I get Cuba every night, but that's all."

"That's strange. How do you know it's Cuba? I queried. "Well," he came back, "I can't understand what the announcer says. I can't understand Spanish, so it must be Spanish, and Cuba's the place where the announcer talks Spanish." A. D. S.

Curses on the Major. A Good One Spoiled

Dear Indi: Remember the old joke that used to be played on all new electrician's helpers? Remember how they used to hunt for a "frequency changer" for the boss? Well, it's all over now. The other day one was sent on such an errand and what do you think he brought back? A HETERODYNE! HI HI. CUL OM. 73. 2 PUNK.

Stumped

(A Tragedy In One Act)

Husband:

(Calling down stairs to wife)

"I say, Love, the baby's crying.
O quick, Love, he must be lying
On a nail or open safety-pin."

(Gets excited and rushes to head of stairs)

"He'll 'larm the neighborhood.
Please, Love, won't you be good
Enough to see what's hurting him?"

Wife:

(Replying to husband)

"Hush, Dear, (sniff) the baby's sleeping.
'Twas I, Dear (sniff, sniff), that you heard weeping,
Despairing, crying, soft and low.
And the cause (more sniffs) of all my tears—
Realization of my fears—
(Very angry) I simply can't out-talk this Radio."

J. M. ALVEY.

Mrs. Partington Speaks Out

Dear Indi: Mrs. Partington says she seen it in the paper where some Methodist preachers got together and wants a new law passed to make Radios use a censor and to "Broadcast Religious Devotion" every day. Everybody but them knows you couldn't compel people to listen to it even if it was coming through their horns free.

One preacher named Hanna, and it sounds like him, said he had heard unmoral things through his head set, and she says she is going to get her a good head set right away, as she has been listening all winter, has heard 120 stations, only on the loud speaker, and she ain't heard nothing yet that decent folks shouldn't listen at; she fears she has been missing something. She says it ain't any more needful to have a censor than it is to use head sets and keyholes just to hear and see unmoral things. SIGNING OFF.



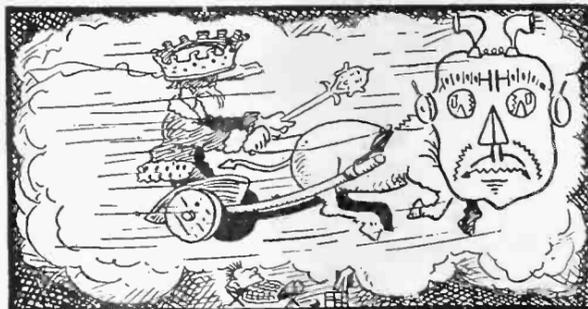
Sing a Song of License Fees

*Oh sing me a song,
Oh sing if you must—
But sing me a song
Not owned by the Trust.*

ELSIE.

A Midmiloplex Night's Dream

*At 12 I hauled in Cuba,
At 1 I heard a tuba,
At 2 I ate mince meat pie,
At 3 I in bed did lie,
At 4 I heard an awful roar.
I then looked, and in the door,*



*May Indi turn my gizzard blue,
Was Kink M. and his Plexy true.
I made a grab for pen and paper
But Kink M.'s latest cut a caper
And oh! Boy, how I did see stars,
Said wife, "Silence or they'll be scars."
G. W. T., Jr.*

Have been reading a book of Radio poems by Charles L. H. Wagner, just published by the B. J. Brimmer Co., Boston. They're good, but that goes without saying to readers of his contris to this column. INDI.

If Dreams Come True



Condensed

By DIELECTRIC

Broadcasting studios in theaters are becoming more and more the fashion—and with reason. Those theaters boasting Radio audiences have a greater number of people interested in them than where the Radio publicity agency is lacking. Down in Houston, Texas, there soon will be two large theaters giving free entertainment, as well as the box office variety. The Iris theater will have to share honors with the Texan, when that largest of south Texas houses is completed.

At times we hear of crystal set owners hearing stations so many miles away that tubes seem to be a needless indulgence. When the records are examined carefully, it is usually found a mistake exists and, with regret, the tube set is again turned to. When the crystals in Winnipeg, Canada, confided to their owners the information that "This is KYW," reporting the startling fact in as loud a tone as though the local station was announcing, excitement ran high. BUT, it was the local station CKY relaying Chicago's program. A crystal's a crystal after all. Without it, where would Radiophony be today though?

I can find no reasonable excuse for expecting broadcasting stations to censor each item on their programs. CKY, the Winnipeg station, entertains a sane attitude on the subject in my estimation. In so far as morals are concerned, censorship is imperative. Beyond that point the program director should not go. Daily papers often carry stuff in their columns having a decidedly immoral tone. Not all those who hear can read, however. A great variety of viewpoints are held (on as many subjects) by those who listen to Radio, and it is the listener whose attention is asked for. "Let the people decide" should apply to all features, except the one mentioned above. It is no trouble to turn a dial and—it's out!

When no word was received from the Bowdoin after the middle of February, people interested in the ship and its passengers became anxious. Capt. MacMillan had been sending Radio messages from the far north at frequent intervals up to that time and all the world knew of his location and state of health. He and his son had been able to pick up not only messages broadcast from Chicago, but also from countries outside of the United States. It is thought that the absence of Capt. MacMillan from the ship accounts for the absence of any messages.

New York is to have its own station after all. The Westinghouse company agreed to install the plant for the city, which news appears to carry the key to the "King Telephone" situation. The activities of the Democratic Convention in New York are not to be broadcast by a single station but by possibly three stations: WJZ, WEA and the city. The important thing to note is the name of the company installing the city plant. It would appear as though the "trust" agreements were losing their strength. At any rate, WEA will not broadcast city programs.

King George of England has taken a fancy to the game of "listening in" having secured a super set: one which needs neither aerial nor ground. Copper plates are attached to the top and bottom in lieu of such commonplace appurtenances. His Majesty may be able to listen to the renowned song of the nightingale, as it is proposed attempting to broadcast the song of this bird. When he desires hearing something really good, of course the relayed concerts from our stations will be tuned in.

Latest Inductance Tuned Circuit Explained

Variometers Used Instead of Condensers

By H. M. Taylor

DURING the last few months the inductance tuned circuit has received widespread attention from Radio enthusiasts. Just what is this inductance tuning that has recently aroused so much interest?

Fundamentally it means tuning by inductances, such as variometers, instead of variable condensers.

It is conceded by engineers that inductance tuning gives best results, because the voltage built up to affect the vacuum tube has a greater value.

Why Inductance Tuning is Efficient

The vacuum tube, which detects the music or broadcasting, is a voltage operated device. It is only the voltage (the force which pushes the current through the electric circuit) of the energy picked up by the antenna which affects the vacuum tube detector. It is the voltage impressed between the grid and the filament of a tube which changes the flow of current through the telephones, B batteries, and plate and filament circuit of the tube. It is this change in current through the telephone which vibrates the diaphragm of the receiver, and so produces the sound which is heard. It is not just the amount of current through the telephone which counts for strength of signals, but of more importance, the percentage change or fluctuation in the current flowing through the telephone receivers. The greater this variation in current the more the diaphragm is warbled up and down. Naturally, the greater the vibration of the diaphragm, the louder are the signals.

Accordingly, it is plain to see that in order to obtain the loudest signals, it is necessary to impress the highest possible voltage between the grid and the filament of the vacuum tube, thus causing the greatest change in the plate circuit.

Inductance vs. Capacity

How can the highest voltage be produced? By using a predominance of inductance in the tuning circuits, rather than capacity. It is a law of electric circuits that the greater the inductance in



proportion to the capacity, the greater is the voltage set up.

However, most of the popular Radio frequency hook-ups are capacity tuned. They are easier to balance. On the other hand, building a successful inductance tuned receiver requires careful balancing of each part, but once accomplished gives a receiver inherently better inductance because it is in keeping with the law of electric circuits.

Some New England engineers have developed an inductance tuned circuit which is entirely practical.

First of all it has simplicity of operation—at most, only two dial controls. The dials can be calibrated for wave lengths, and if properly adjusted both will read nearly alike. For instance, on a set of this kind a given station may come in at 30 on single-dial tuning, and on two-dial tuning both dials may read, say, 43. This enables you to log the stations you

want—to quickly turn to them any time.

Selective Features

In the inductance tuned circuit there is unusual selectivity because of the extremely low capacity with respect to the inductance—the decrement is lower. This

makes it possible to eliminate interference between stations, and with careful operation, good tubes and batteries, exceptional volume and clarity of tone are obtained. This combination of fundamentals is exceptional, for often to get volume you must force the tubes until the broadcasting is distorted.

A study of the wiring diagram reveals a hook-up which is different in two or three essential respects from any that have been published heretofore. This will be apparent at once to the experienced experimenter, but to those building their first set the following details are of information:

This inductance tuned circuit uses four tubes, one Radio frequency amplifier, one detector and two audio frequency amplifiers. Aside from the detector tube control, which is not very critical, there is only one other element which enters into the tuning control. This is the stabilizer, which controls the Radio frequency tube. This consists of two potentiometers (60-ohm resistance each) with connection arms mounted on a single shaft and connected together electrically. Two 60-ohm rheostats can be used for this purpose.

Uses Special Variometers

Standard parts may be used throughout, except the variometers must have their distributed capacity reduced to a very low minimum. This, in fact, is the (Continued on page 22)

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So far I have heard besides all Kansas City Stations, KFKX, Hastings, Neb.; WOAW, Omaha; WDAP, Chicago; WSAI, Cincinnati, and Fort Worth, Tex. I have just an ordinary two-slide tuner crystal set.

It is certainly a pleasure to be able to hear outside stations with a crystal set, without expense of batteries, tubes, etc.

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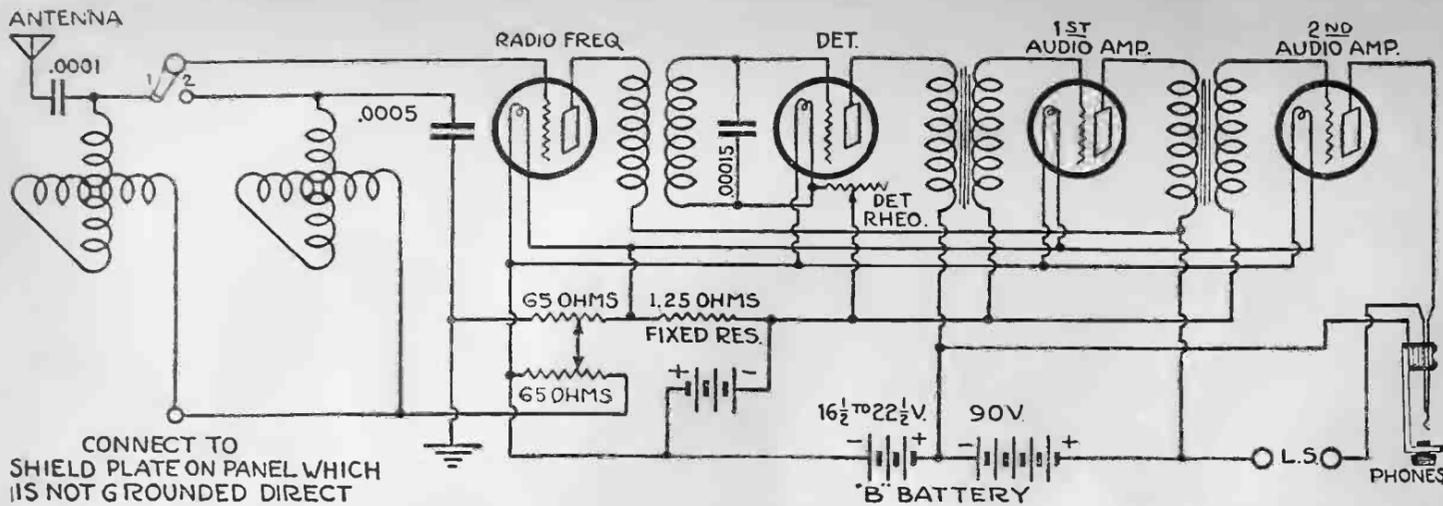
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STEINITE LABORATORIES



LATEST TUNED CIRCUIT

(Continued from page 21)

heart of the set, and if you have too much capacity between turns by using an inferior variometer, you will lose all the value of general engineering principle of inductance tuning.

Caution

In using inductance tuned receivers employing this circuit, care must be taken to eliminate all "stray capacities" which come from poorly soldered connections or careless placing of various parts in their relation one to another. The aerial must

not be too long—about 75 feet, including the lead-in, and it must hang clear of all obstructions, such as trees, tin roofs, water spouts, etc. A good ground is very essential. The radio frequency tube must be carefully selected. Silver-coated tubes such as the UV-201A are satisfactory as audio amplifiers, but a purplish-yellow coated 201A must be used as the Radio frequency amplifier. Any C-301A tube is satisfactory as an amplifier. The detector tube must have the right plate voltage—between 16 1/2 to 22 1/2.

If you carefully follow out the hook-up pictured here, you will not have any trouble with whistling and other noises

common in the other average home-built sets.

Referring to the diagram, you will notice a small switch between the two variometers. When this switch is on point 1, you are using one tuning element; on point 2, both variometers are cut into the circuit. The former is single circuit, the latter double circuit for extreme selectivity.

The writer has been able to cut out immediately nearby local stations and bring in distance with this tuning. The use of one dial cuts down selectivity somewhat, but increases sensitivity.

Cold Electron Emission Is a Future Possibility

A most remarkable development which will exert a very great influence on future means of communication is proceeding rapidly as a result of the impetus given to research work by the popularity of Radiophone broadcasting. Slowly but surely we are approaching the possibility of obtaining electron emission from a cold electrode.

Just as "cold" light is the goal of all illuminating engineers, so is "cold" emission that of the Radio experimenter. It has been recognized for several years that a great deal of the energy expended

in producing light within an electric bulb is dissipated in unnecessary heat. No one wants the heat, but every one desires the light, therefore if the heat could be eliminated without affecting the brilliancy of the lamp everybody's electric light bills would be immediately reduced and the energy now wasted in producing the unwelcome heat could be applied more usefully.

In Radio apparatus the vacuum tube is the element supreme. Most of us know in a general way just how it functions. We know that as soon as the filament inside it is heated up an electronic stream is shot off. We know, too, that it is this stream of electrons which plays such an important part in the operation of the tube.

When placed in operating condition the vacuum tube lights up just like an ordinary electric light bulb, but the light in this case is unnecessary and useless to us. So is the heat, which accompanies it. All evidence of the uselessness of the light is furnished by the type of tube which employs an oxide-coated platinum filament. In some tubes the best operation is obtained with the filament scarcely aglow.

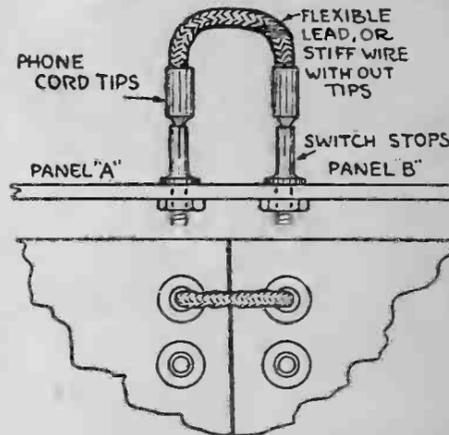
Heat in the vacuum tube is just as useless as the light. The nearest approach

that has yet been made toward cold emission is in the new thoriated-tungsten tubes, the latest development in the art. Up to a couple of years ago a tube which consumed less than an ampere was not thought of, but the rapid development of treated filaments has changed all this and opened up wonderful possibilities for the future.

This development will undoubtedly have a material effect on transmission, directly as well as indirectly. It means that all transmitting stations can be heard over greater distances because a greater number of tubes can be operated on a smaller amount of initial energy and consequently more sensitive receiving sets can be constructed.

Plug-In Connection

For the fellow who likes plug-in connections here is a useful article, both efficient and sightly. The drawings are self-explanatory. The switch stops are drilled in a lathe to make the hole perfectly central and then the stud is slotted



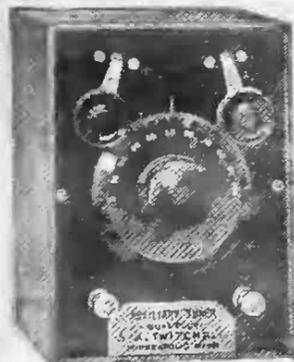
both ways. Use a jeweler's saw for doing the slotting. The holes drilled in the stop should be of a size to take the phone tips. This device is particularly useful in panel mounting to panel connections in unit panel construction.—George Seaman, Perth Amboy, N. J.

The Twitchell Auxiliary Tuner

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These TUNERS are in daily use within 400 feet of large broadcasting stations and enable their owners to easily and completely cut out the local station and bring in distant stations at any time on a loud speaker.

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Copyrighted diagram of this tuner, 50c, or with all parts, \$9.00. Complete instrument in walnut cabinet, ready to use, \$15.00.

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Selection of Sets Having Desirable Hook-Up

Part III—Assembly and Wiring of Set

By Thomas W. Benson

THE two previous chapters covered the selection and construction of the apparatus in a regenerative circuit in which the aim was to eliminate all losses. Now we shall take up the assembly of the instruments in the set.

Fans as a rule fail to realize the importance of the proper arrangement and mounting of the apparatus. How many have built sets that worked good and then fell flat when mounted in the cabinet. This is due to the inductances being mounted too close to the woodwork, or placed too near excessive metal. These add to the resistance of the circuit. As the ideal set does not use shielding of any kind to prevent body capacity, we tackle the mounting with this in mind. It will not be necessary to give dimensions of all the parts, the idea of the article being to show how the instruments in any set should be mounted for highest efficiency.

Four Main Controls

In the circuit under consideration we have four main controls, the grid variometer, grid condenser, tickler feedback and rheostat. Body capacity acts chiefly upon the three first mentioned and they are mounted at least 4 inches behind the panel, with the shafts extending to the dials on the front of the panel. This is easily done with the knitting needle used in the variocoupler described in the second part of this series.

The variometer by the way must meet certain specifications. Use one that has the least amount of solid material in its form. There are several on the market meeting this specification but the one of the basket ball type is ideal. The honeycomb wound variometers are also good, as well as the bank wound type. Leave molded instruments and wood block variometers for the other fellow, they look good enough to eat but they have high dielectric losses at short wavelengths.

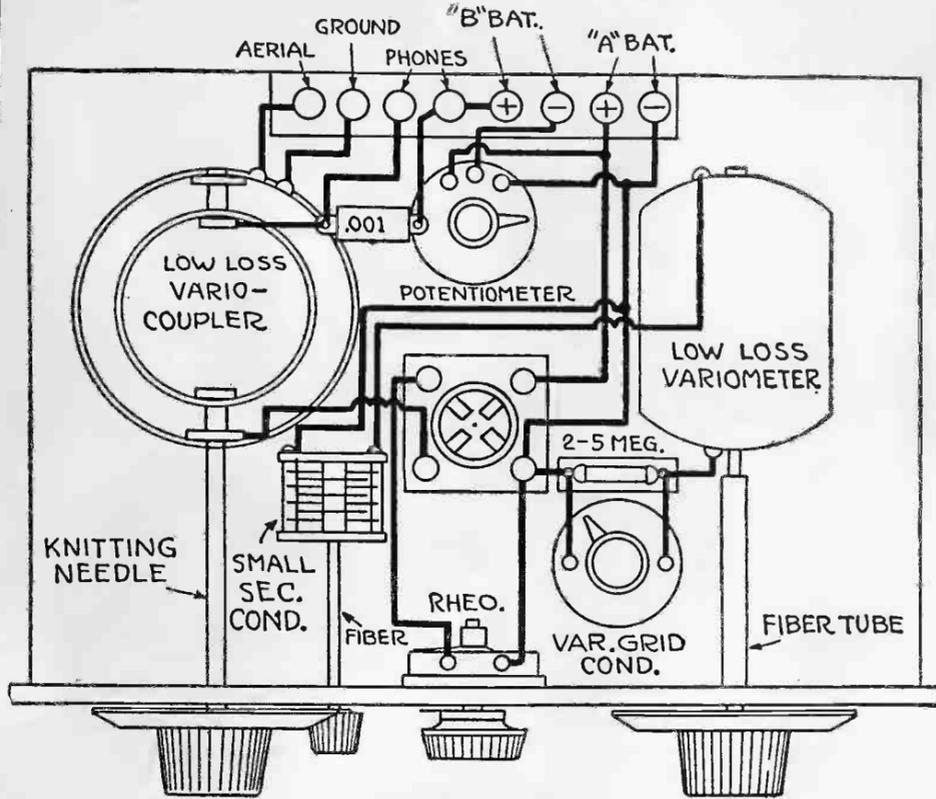
Mount the variable condenser across the secondary winding at a small angle and back from the panel, extending the shaft by using fiber tubing. We have overcome body capacity and kept the resistance low. As recommended previously, a variable air dielectric grid condenser is recommended. This can be of the midget type and mounted on the base back of the panel as shown in the illustration. The grid leak is mounted along the side of the condenser, the potentiometer being placed at the rear of the baseboard.

A vernier rheostat is mounted on the panel. Use only the best. The writer prefers the wire wound instruments. Don't try to save money on the socket. Get the best molded one you can buy. If you can pick out a porcelain socket that holds the tube fairly tight, it is the best, but as a rule they allow the tube to fit loose.

The binding posts for the set are mounted on a bakelite strip at the rear of the baseboard. The phone posts are also mounted here with the bypass condenser connected directly beneath the posts. Don't put jacks in the circuit if you want to be sure of best results. They may not do any harm but do not take chances.

Wiring the Set

Use bare tinned bus wire for the circuit which is run in the open. Do not let the wire touch anything but the terminals of the apparatus and do not use spaghetti tubing. There is some good spaghetti on



the market but if you can't be sure it is the best, it is better to leave it off entirely. Don't worry very much about sharp square corners on the wiring, take the shortest route between two points but keep the wires separated as much as possible. The illustration shows some of the wiring in place and will give an idea of how it should be laid out. The complete wiring diagram was given in the last chapter.

The set may be enclosed in a cabinet which should be at least 10 inches deep to give plenty of clearance, with the lid arranged so it can be swung back. Connections to the batteries and phones may now be made and the set is ready for testing. When dry cell tubes or hard tubes are used the potentiometer may be omitted, but for the regular detector tubes such as the UV-200 or C-300 they should be included.

We are all ready to go. Insert the tube in the socket and turn on filament rheostat until a rushing sound is heard in the phones. Then turn back rheostat until this stops and try to pick up a station by adjusting the variometer, keeping the tickler at right angles to the stator winding. When a station is heard, tune it in as loud as possible with the variometer and small variable condenser, making necessary adjustments of the filament brilliancy.

When maximum signal strength is reached try changing the plate potential by tapping back on the plate battery and adjusting the potentiometer. Then vary the tickler and grid condenser until the signals are at their maximum. It is not the easiest thing in the world to get all the factors in the circuit properly balanced out and you should keep making adjustments of plate voltage, grid capacity and lead until maximum signals

are obtained. It takes a little time to get them just right but once they are adjusted you begin to realize the sensitivity of the soft detector tube.

Volume of the Set

This set will be found to be a real getter as to range and volume and will be working consistently when the trick circuits are simply doing tricks. The principles underlying its efficiency can be applied to any receiver if the general rules followed in its construction are kept in mind when building other sets.

First of all leave out everything that

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means extra wire or resistance, this means jacks, switches, etc. It is practically impossible to tune an outdoor aerial sharply because of its resistance on untuned primaries.

Do not use inductances wound on solid supports. They all add resistance and it is not wanted.

Keep metal away from inductances as much as possible. This means no shields and fiber control rods.

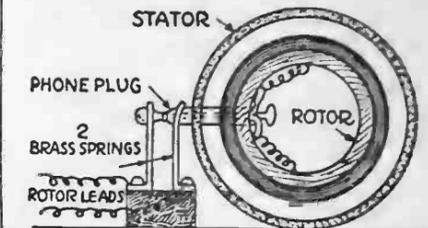
Keep all wiring in the open and separated as much as possible, running the wires direct from point to point.

Last but not least, it's not the circuit, but the stuff put in the set and how it's put in that makes or breaks it.

(THE END.)

Rotor Connections

The leads from the rotor are sometimes twisted off, especially when there are no stops used to prevent the rotor from turning a full circle. I have made use of an



old phone plug, as shown in the illustration, however an insulated shaft may be used instead. The two brass springs keep the rotor from turning too freely.—E. J. Moline, Minneapolis, Minn.



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STAR-RITE BATTERY CO.
LOUISVILLE, KY.

Department 5

THIRTY MINUTE A-B-C

(Continued from page 19)

is to be used for. A million ohms sound like a great deal but is comprised simply, Figure 63, by a piece of paper soaked in

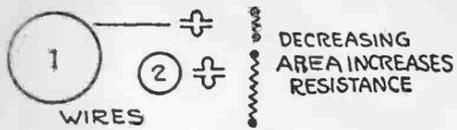


Figure 63

India ink and dried. Variable grid leaks are made in several forms for use as indicated by Figure 64 in combination with a tiny condenser.

Another form of resistance used in some Radio sets is called a potentiometer. It resembles a rheostat but has a higher resistance, such as 400 ohms, with the switch arm arranged as a movable tap. The principle of a potentiometer is shown in Figure 65.

The resistance, in this case 2,000 ohms, is connected across a battery. A voltmeter or other output circuit is connected between one end of the battery and the switch arm. The voltage across this output depends on the position of the switch arm, so a potentiometer is used to obtain a finely adjustable source of voltage or potential.

Resistance in Poor Connections

If a bus bar is loosely (cold soldered) to a binding post a loose connection hav-

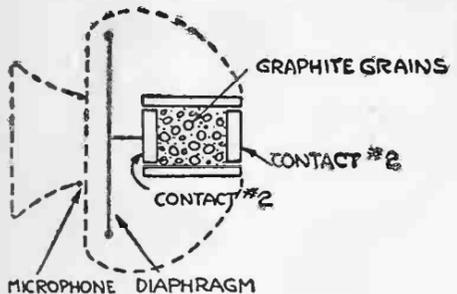


Figure 69

A MICROPHONE IS A RESISTANCE WHICH SOUND WAVES CAN VARY.

ing a high resistance may result, as illustrated in Figure 66. A wire 10 feet long has twice the resistance as if it were only 5 feet long, Figure 67. Increasing the area of a wire decreases its resistance, Figure 68.

A microphone is made up of graphite grains held between two contacts which

can be vibrated by a diaphragm, thus changing the resistance.

Ohms Law

There is a fundamental relation of resistance to current and voltage, called Ohms Law. This is illustrated by Figure 70. When a battery having 6-volts is connected to a wire having 6-ohms resistance, a current of 1 ampere can flow through this wire.

Current equals voltage divided by resistance—

Or Resistance multiplied by current gives the potential or voltage.

To put more current through a wire with a fixed resistance, the applied voltage must be raised.

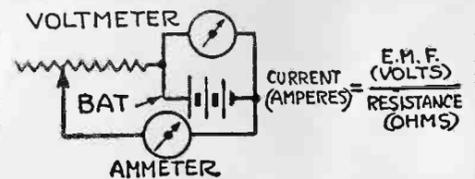


Figure 70

Headsets used in Radio are often designated as 2000 ohms, 3000 ohms, etc. This is not a reliable measure of the merit of the phones, but expresses the direct current resistance offered by the windings thereof.

(TO BE CONTINUED.)

ADVANCE PROGRAMS

(Continued from page 18)

- WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Concert, Dot Echols McCutchan and assisting artists; 9:30-10:45, Concert, E. Clyde Whitlock's Violin Ensemble.
- WCAL, Northfield, Minn. (Central, 360), 9:45 a. m., St. Olaf College chapel services.
- WCX, Detroit, Mich. (Eastern, 517), 6:00 p. m., Dinner concert; 10:00, Red Apple Club, Eddie Guest night.
- WDAF, Kansas City, Mo., Star (Central, 411), 3:30-4:30 p. m., Musical matinee, Joseph Black's Sexton Cafe Orchestra; 6:00-7:00, School of the Air; Piano tuning in number, Duo-Art; Address, speaker under the auspices of the Meat Council of Kansas City; Address, speaker from the Kansas City Junior College; The Tell-Me-a-Story Lady; Fritz Hanlen's Trianon Ensemble; 11:45 p. m.-1 a. m., Nighthawk Frolic, the "Merry Old Chief" and the Coon-Saunders Orchestra.
- WDAF, Chicago, Ill. (Central, 360), 7:00-8:00 p. m., Drake Concert Ensemble and Blackstone String Quintette; 8:00-8:30, Barton organ, played by Ralph Emerson; 10:00, Rosemary Hughes, Frederick W. Agard, Frank Greif, Jack Chapman's Orchestra.
- WDAF, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Organ recital, Stanley Theater; 12:30, Arcadia Cafe Concert Orchestra; 2:00, Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories.
- WEAF, New York, N. Y. (Eastern, 492), 11:15 a. m., Board of Education; 11:55, Motion Picture Talk; 4:00 p. m., George A. Leach, baritone; 4:30, Gertrude Bronenkaut, soprano; 5:00, Children's Hour Program; 7:30, Thornton Fisher; 7:40, C. Baldwin Allen, baritone; 8:00, Corn Products Orchestra; 8:30, Brooklyn Daily Eagle news review; 9:00, W. LeRoy Ralsch,

- planist; 9:15, Mildred Rose, soprano; 9:45, Maurice Brown, cellist; 10:00, Eveready program.
- WFAA, Dallas, Tex. (Central, 476), 12:30-1:00 p. m., Address, DeWitt McMurray; 8:30-9:30, Musical recital, Miss Davis, Miss Tally, Mrs. Max Spangler, and the Universal Male Quartet; 11:00-12:00, Musical recital, Circle Theater Orchestra.
- WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano recital, Loreta Kerk; 6:00, Sunny Jim, the Kiddies' Pat; 6:30, Meyer Davis Bellevue Stratford Concert Orchestra; 10:10, Charlie Kerk and his Synchronic Dance Orchestra from Hotel Maestric.
- WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Radio Dealers musical program; 6:00-7:30, Chamber music recital.
- WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., Music, "My Patch of Blue," Mary Newland Paison; 6:30, Dinner music, Instrumental Trio of Hotel Ten Eyck; 7:45, "Mountains and Mountain Scenery," Dr. James H. Stoller; "The Bloc in Present Politics," Dr. W. Leon Godshall; 8:00, Comic opera, "The Pirates of Penzance," WGY Light Opera Company.
- WHAA, Iowa City, Iowa (Central, 484), 8:00 p. m., Readings, Alice Mills; Gladys Obrecht, soprano; Dorothy Holdoegel, pianist.
- WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; Walnut Theater Orchestra; Alamo Theater organ; 7:30-9:00, Agricultural tabloid

- talk; Concert, Louisville Syncopators; Reading, Mrs. Corita Greer Petrie.
- WHB, Kansas City, Mo. (Central, 411), 12:35-1:00 p. m., Popular program, Sweeney Radio Orchestra; 2:00-3:00, Ladies' hour program, Sweeney Radio Orchestra; 7:00-7:45 p. m., Solos and orchestra numbers, Sweeney Radio Orchestra; 8:00-10:00 p. m., First part of program, Sweeney Radio Orchestra; Program, Lawrence, Kans.
- WHN, New York, N. Y. (Eastern, 360), 2:15-2:45 p. m., Edw. B. Marks Music Co.; 3:45-4:30, Bob Schaefer and His Entertainers, assisted by the Original Georgia Five; 4:45-5:00, K. J. K. Entertainers; 5:15-5:30, Fritz Leyton, in songs; 9:30-10:00, Fletcher Henderson's Alabam Club Orchestra; 10:30-11:00, Bertram J. Goodman's Orchestra; 11:15-11:45, Shapiro Bernstein Music Co.
- WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Organ recital, Karl Bonawitz; 6:05, Dick Began's WIP Little Symphony Orchestra 7:00, Uncle Wip's bedtime stories; 8:15, Philadelphia Police Band, Lieut

(Continued on page 26)



Prices effective to May 3. In ordering, state whether substitutions may be made should article ordered be out of stock.

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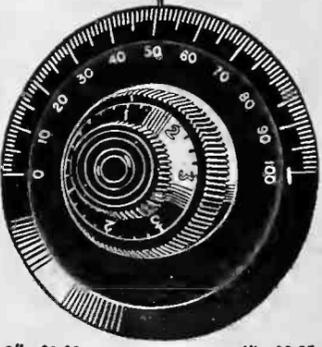
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Meditations by the Inventor of King Miloplex

Part XXVII—Life History of the King Mystery Man

By the Mystery Man

WHAT do you think about the influx of foreign immigration?" was the first question asked by the guy sent over to interview me, and right back at him in order that he would realize one interview more or less meant little in my young life, I snapped the answer—Why! Certainly! and then soz he wouldn't get sore and write a lot of scandal about me stealing the Hope Diamond or marrying the beautiful Princess I said—Let's eat and interview afterwards—Man! Man! But was he the hungry wolf—Eat—say Dinty Moore never cooked enough corned beef and cabbage to pack his mail pouch. After the interview Maggie estimated 'or was it figured he et nearly ninety cents worth and its some dock walloper that can carry ninety cents worth of cornbeefan', let alone eating it. No more Lets Eat for that dude—we'll spend the time on interviews—the nearest he will come to eating in flat A will be listening to Maggie tell about a guy that raised doughnuts with canary seed.

But I knew he'd make a flat wheel on the story and it would sure land in the Hell box so as he went out of the door I agreed to rewrite his stuff so he could have "to have and to hold" one more pay day before the shovel specialists threw dirt in his face—therefore here it is.

Yes! Sir! I was fortunate enough to have been born along about the time that genuine buffalo coats were fashionable and the question of Milady's hosiery was a subject only discussed behind the folding doors of the parlor, and Indians were trading scalps for soft lead. As I recall the incident—neighbors were so scarce that when one finally came over to see the new boy and kiss his cute tootsy-wootsies, Mother made me stop bawling until properly introduced.

Father at all times took not only the usual fatherly interest in me, but never seemed to regard my face as a work of art, and confined his expression of adoration for his son more in the light of continually fearing my settee might freeze and thus kept it quite warm. Sort of a daily warming up exercise. In later years when questioned upon this subject his reply was as the lawyers say—"Not of fact, irrelevant and having no pertinency" that's what I thought it was also, unless all the above indicates his fondness for anatomy, with posterior priority as the dominating factor.

My childhood passed without accomplishing much in the way of wealth or possessions, other than the tails of nine cats, I didn't care about being brutal as Indians were—and thus scalping them, but I did realize I most desired a cat-o-nine tails and recognizing that our kitty-cat apparently was denied the sanctuary of her home without interference from some Tom broadcasting to her on 600 meters—spark I think—I therefore divided my working hours into two parts—namely—those when I wasn't cutting Tom cats tails off and those when I was. She was very grateful, when I secured my cat-o-nine tails—

Then I fell in love—no I didn't slip, I saw the ice was slippery and fell hard

—listen stranger—no man ever drew a face so beautiful—mercy I never could understand why her mother insisted upon washing it—Was I madly in love with her? You tell 'em goldfish, you're good as gold. Why on Christmas she gave me a card that must have set her back 3 cents and I was so tickled I sent her two bottles of perfume that took five weeks salary to pay for—in fact I quite distinctly remember a new smarty coming to town just as I paid the druggist the last installment due—Yes—she fell for this new city feller—but man I felled him many times for his lack of propriety. They let me go to school. Well—I don't know as I would exactly say Let—but am frank to say that teacher had a dray whip hanging near her desk as a sort of reminder that it was in danger of being stolen and I figured it was very important that I did not miss a day because it was my job to watch the whip. Occasionally I couldn't watch it because she tried to hide it thru keeping it back of me—but I could always feel it so quite understood that "The whip was still there." Oh! Long may it wave.

Mother always claimed I advanced very rapidly as I seemed to keep going forward and teacher supported her to the limit in her contention that I not only advanced but went forward regularly to the command of "Come up here young man" but I could never get thru school—many have I know—but I couldn't—as I recall it my batting average was about 6% because for some unknown reason I never got any further than teachers desk.

Yet—now that I think of it in retrospect I quite appreciate that after all there were few if any in our class that "dear teacher" thought so much of as I—it must have been terribly embarrassing to the rest of the scholars—Why night after night she would invite me to stay with her after school. And then when we were quite alone—I'd write "I'll be a good boy" one hundred times on the black-board, occasionally just to break the monotony I'd put down the multiplication tables up to the 24's and at other times realizing she could not do her work and gaze at my beautiful face—I would relieve her embarrassment by standing in the corner with my face to the wall. You know there are few children that teachers become so attached to—you know what I mean.

In order not to break up the class they allowed me to graduate—you know—one of those Father and Mother meetings wherein the professor gives you a piece of paper that later on goes in the family album and the girls all just can't decide what finishing school they will attend—or will they go back of the ribbon counter and the guy with the timothy whiskers as President of the school board listens patiently to the valedictorian, the while not forgetting

that tonight's his regular night to grease his boots.

Then they sent me to college—you know before you go to college people say "I believe that fellow has brains" then when you return they make it singular by wondering if you have a brain—Naturally there's worse places than college but I can't remember where—you know the fundamental idea back of a college education is to see that you develop a nice high forehead like a cow and be able to write a hypothetical thesis upon the exact translation of Cleopatra's meaning when she induced Mark Anthony to face the gang and remark "Here lies Caesar." You know what I mean.

There was some controversy at college relating to my eligibility because I insisted the B battery flowed from minus to positive in fact it became such a current topic and in order to not embarrass them I begged to be excused, they didn't vote on it, a policeman brought their acceptance and five hours to prove I wasn't there.

From College—get me right—I say from college until married I lead a diversified existence, sometimes sinkers and coffee, other times, "and expenses paid."

My married life has been—well I've got a darned good cook who quite consistently answered on 22,000 meters when I holler Maggie, another addition is a 12 year old boy who also stays after school.

Radio Digest discovered me quite by accident and the Editor and I have had many an argument as to whether my stories to "My Gang" have made me popular or notorious.

I started the whole thing through writing a letter to the divisional bean eater Radio supervisor bawling him out for claiming my circuit oskulated and enclosing diagram to prove it. The mall man took it to Radio Digest by mistake and they being short of copy ran it as a fill in—then you guys hollered for more and I had to stick.

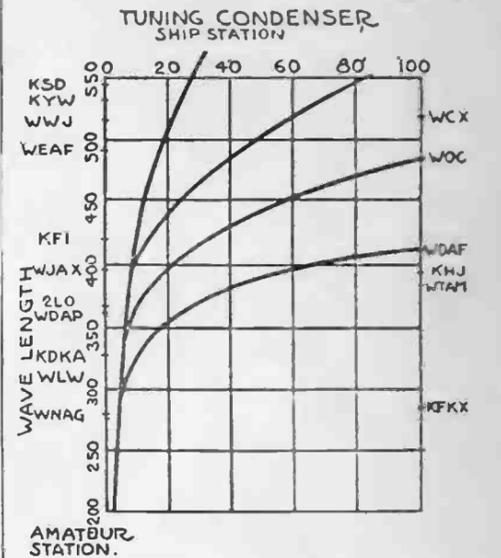
That's the interview—that's that—you know who I am—where I was and how I was raised. Some government has become so concerned over my signing off

as Lets Eat that they have assigned me a special wave length with call letters M. A. G.

Lets Eat.
(TO BE CONTINUED.)

Why 100-Foot Aerial Is Best

The accompanying chart shows actual dial readings plotted according to the wave length. The 100-foot aerial shows all broadcasting stations included in 25 points on the principle tuning dial, while



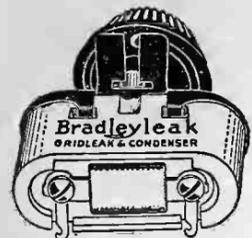
using a 100-foot aerial, 85 points are indicated making separation of stations correspondingly easier.

The curves for 75-foot and 50-foot antennas show that condensers of smaller capacity should be used.—E. C. Hoffman, Cleveland, Ohio.

In putting up a pole for an aerial, put a pulley on top of it so the aerial can be lowered.

Bradleyleak

THE PERFECT GRID LEAK



\$1.85
Condenser
35c
At All
Dealers

For Highest Tube Efficiency

Every radio fan knows that the grid circuit is the most sensitive part of the radio set. Therefore, it is most important that your grid leak is precisely correct.

The Bradleyleak gives a stepless range from 1/4 to 10 megohms. Try one, tonight!

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Manufacturers of the Universal Bradleyet at

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CONDENSERS

11 Plate	R. C.	Comsro
23 Plate	\$1.05	\$1.85
43 Plate	1.29	1.85
11 Plate vernier	1.45	2.10
23 Plate vernier	2.98	
43 Plate vernier	3.29	

VARIOMETERS AND COUPLERS

647 VARIOMETER—FISHER TYPE	2.10
646 Variometer—Pathé Moulded	2.25
643 Variocoupler—Pathé	2.15
640 Variocoupler—Silk Wound	1.49
602 COCKADAY COIL WITH HOOK-UP	1.85
622 COMSCO NEUTRO-FORMER KIT	12.79

TRANSFORMERS

639 Jefferson Star. 3 to 1	2.69
686 Jefferson Star 6 to 1	3.09
637 ACME AUDIO	3.79
654 Acme Radio	3.79
636 Erla Reflex	4.15

PHONES

678 PACENT, 2200 ohms	3.35
687 American, 2200 ohms	3.25

MISCELLANEOUS

633 SOCKET—BAKELITE	.44
632 Socket—Metal	.39
629 Rheostat, 6 ohms	.39
630 RHEOSTAT, 30 ohms	.49
656 Spagueti Tubing, per yard	.09
657 Rus Bar Wire, 2 ft. length	.04
663 Dials and Knobs, 3 inch	.30
668 Freshman G. L. & Cond.	.89
674 Double Phone Plug	.55
677 Single Circuit Jack	.35
678 Double Circuit Jack	.45

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Incorporated
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3000 miles on a loud speaker with the Shamrock circuit

RADIO fans are hanging up remarkable distance records with our circuit—built with the Shamrock Kit.

Those revolutionary kits contain two of our new balancing condensers—and three Shamrock air core transformers mounted and properly balanced on U. S. Tool condensers, made expressly for Shamrock.

Inspect this kit at your dealer's today. If your dealer hasn't the kit in stock, send us the coupon below.

List Price \$20
SHAMROCK MANUFACTURING CO., Dept. 25, Market Street, Newark, N. J.

SHAMROCK FOR SELECTIVE TUNING

SHAMROCK MFG. CO., Dept. 25, Market St., Newark, N. J.

Gentlemen: Send me detailed information on the Shamrock circuit and kit.

Name

Address

Dealer's Name

FIXING WHAT'S WRONG

(Continued from page 13.)

so arranged and adjusted as to insure good contact pressure when the tubes are inserted.

The two neutrotons or neutralizing condensers are mounted on the baseboard between the first and second and the second and third neutroformers. This is the most logical place to mount them so as to have them as near as possible to the neutroformer coils for shortest leads. The adjustable metal tubes of the neutrotons should be placed at about the center of the insulating tubes, under the fastening-down clamp.

Two audio frequency amplifying transformers are employed in both the four and the five-tube receivers. To reduce magnetic interaction to a minimum, it is customary to mount the transformers with their cores at right angles to each other. This precaution need not be taken when the transformer is covered with a sheet steel shell or casing. When placing the audio frequency transformers, it is advisable to arrange that all wiring to the transformer be as short and direct as possible.

Arrangement of Apparatus

In any circuit employing Radio frequency amplification, the problem of where and how to arrange the apparatus becomes of paramount importance. Wiring should not be carelessly done, because inductive interference between leads must be reduced to a minimum. Likewise, in the type of circuit under consideration, capacity and inductive reaction between parts of the equipment, especially in the Radio frequency amplifying stages, demand careful thought in arranging the best possible layout. The panel layout consists in the correct disposition of the different instruments on the panel. In the assembly and wiring of the receiver, the Radiophon is given free reins not only for a display of fine workmanship and neatness in appearance, but also for carefulness in judgment. The Radio frequency apparatus in the circuit should be separated from the audio or low frequen-

cy apparatus and all wires from circuits of different frequencies should be kept well apart to prevent interaction and reaction between them.

The complete connection diagrams for three, four and five-tube receivers have been given. Before proceeding with the wiring, it is advisable to carefully study the diagram so as to get a general idea of the scheme of connections.

In wiring the set, all filament and A battery connections should be made first. All of the negative filament terminals should be joined by a common connection, which is extended to the ground binding post. Next the positive filament connections should be made, after which the amplifying tubes rheostat and the vernier rheostat for detector filament control can be wired up to the A battery.

The fixed condensers and the jacks, if used, should be connected next. In wiring the fixed condensers, if proper soldering can be done, the wires may be soldered to each lug or terminal of the condensers. This will hold the condensers rigidly in position. If the condensers have holes in the lugs, the wire can be looped around a terminal screw through the lug and clamped tightly by means of a nut. In this manner the danger of shorting the condenser during the soldering operation will be obviated.

Connecting Neutroformer Coils

In connecting up the neutroformer coils care should be taken not to make any connections to the tap on the secondary winding of the first neutroformer, which serves as part of the tuning element. The leads from the secondary taps of the neutroformers in the Radio frequency stages or neutrostages, should be connected directly to one terminal of the corresponding neutroton or neutralizing condenser. These neutroton tap connections are clearly shown in the diagrams.

In making connections to the neutrotons, it will be noted that three terminals are provided, thus furnishing three different ranges of capacity in each condenser by changing the connections to the

three terminals. The usual procedure is to make connections to the terminals at each end. However, when it is not possible to secure good minimum signal adjustment in this way, it is suggested that one of the connections be made to the center terminal. By thus providing greater capacity range to the condenser, the desired minimum signal balance may be obtained.

Some fans make it a practice to cover each wire connection with insulating tubing or spaghetti after it is cut to proper length; the bending being done after the tubing is in place. It is customary, however, to use spaghetti only on long leads, or where there is a possibility of contact with other leads.

Except for the special apparatus required for the neutrodyne circuit, the same general wiring hints apply as for other types of receivers. It will be noted that the wiring diagrams do not represent one wire as crossing another by a semi-circle. The conventional symbols have been used, namely, where two wires cross, they are represented by one line crossing the other, and where one wire connects to another, the connection is represented by a heavy black dot. In making connections, it is suggested that each lead shown on the diagram be carefully checked off after the respective wires are connected to the apparatus. In this way the builder will be provided with a ready check on the wiring as it progresses.

(TO BE CONTINUED.)

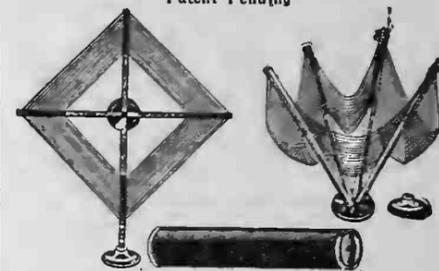
ADVANCE PROGRAMS

(Continued from page 24)

J. Kiefer, director; 10:10, Ted Weems Record-making Orchestra from Cafe L'Aiglon.
WJAX, Cleveland, Ohio (Eastern, 390), 7:30 p. m., Program arranged by Cleveland News-Leader: Bedtime story, E. G. Johnson; Radio Talk Cartoon, Don Palzner; Dance program and solo numbers, Bedford Glen's Dance Orchestra, Will F. Day, director; Solo numbers, Geraldine Watrous, soprano.
WLW, Cincinnati, Ohio (Eastern, 309), 10:00 p. m., Program, Cincinnati chapter of the Mothers of Democracy; Flora T. Rosenthal, vocalist; Mrs. Simon Henckle, violinist; Miss Phillips, pianist; Helen L. Nugent, soprano; Mrs. Grace Glause Raine, accompanist; Four-minute talk, Mrs. Andrew Foppe; 10:30,

"Famous Greenland Eskimo Orchestra," Songs, Margorie Chaplin.
WMAQ, Chicago, Ill. (Central, 447.5), 4:30 p. m., Pupils, Glenn Dillard Gunn School of Music; 5:00, Stories, Child Life; 7:00, Chemistry talk; Book review, Harry Hansen; Hotel La Salle Orchestra; 9:15, Lyon and Healy program.
WOAW, Omaha, Neb. (Central, 526), 6:30 p. m., Dinner program of dance music; 9:00, Plectra Banjo Club.

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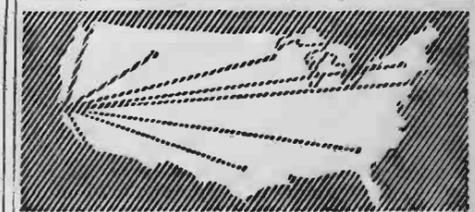
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WEST—I am sending you a list of some of the stations heard on one tube: WSB, WGY, KDKA every night. PWX, WWJ, WTAM, WLW every night. CFAC, CHCB. Not long ago I purchased another set of parts from you and first night got WGR Buffalo, and KDKA. Ione, Calif.
NORTH—Received coils O. K. If I have same results with these that I had with last will be wanting more. I am 1,500 miles from nearest station and have picked 56 to date. Chicago, Havana, Mobile, New Orleans and TWO IN ENGLAND. Lunenburg, Canada.

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Step Down Transformer Used for Low Voltage

Owing to the cost of the various magnetic rectifiers which are on the market, and of the inefficiency of the electrolyte type, I have devised a rectifier which

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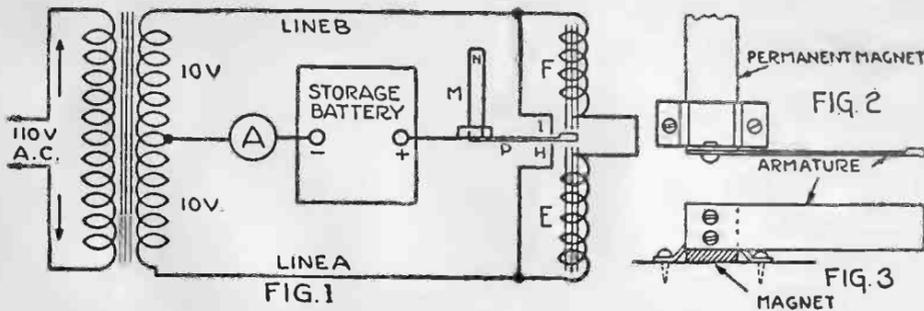
THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. 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,
123 W. Madison St., Chicago

uses a step down transformer to furnish the low voltage. I made it as follows:

Procure a step down transformer which consumes about 60 watts on the primary. This will give you approximately five amperes at 10-volts. This transformer should be tapped so that the current can be taken off at three different places, with a voltage of 10-volts between the taps. The middle tap supplies the negative current to the battery while the two extreme points supply the positive current. Two electro magnets, E and F, are required. Coil F must be wound clockwise and coil E must be wound counter clockwise. The beginnings of the two coils should be connected to the two extreme taps on the transformer, and wound with several layers of number 30 silk covered wire. The more wire put on, the higher the efficiency of the charger will be. The armature P is made from a piece of high tension steel 4-inches by 1/2-inch. It should not be more than 1/32-

CIRCUIT WITH COILS LOCATION



inch thick. A piece of hard steel is bolted on to the free end to increase the magnetic attraction. This armature is magnetized by the south pole of the permanent magnet M to which it is attached. The contacts H and I should be adjustable.

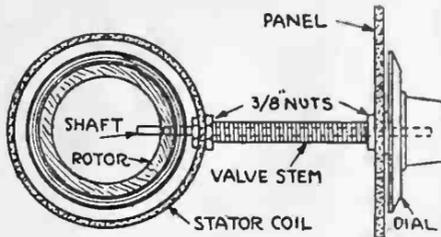
The operation of this rectifier is very simple. Suppose that in the first half of the cycle, the current flows by the way of B through the magnets F and E and back to the transformer through A. The polarity of the magnetic forces of the magnet F will be north while those of magnet E will be south. The polarity of the armature is also south. Unlike poles attract each other and like poles repel each other. Therefore the armature will be drawn over by the force magnet F will make contact with point I. Due to the high resistance of the coils E and F the largest part of the current will flow through the contact at I and through the armature to the positive terminal of the battery. There will still be a pressure of 10-volts on the magnets and the armature will be held against the contact I until the next half cycle when the current will flow the opposite direction and the two respective poles of the magnets will change their polarity, causing the armature to move over and make a contact with point H. As before, the current will take the shorter route through the battery. Thus in each half of the cycle a positive charge runs through the armature to the battery.

This rectifier has a greater efficiency than most types of magnetic rectifiers on

the market, and can be built at a much lower figure.—M. Bergerson, Hartford, Wash.

Use for Tire Valve

In a recent issue of Radio Digest in the Kinks Department, there was shown a use for a tire valve as a panel bushing. The accompanying illustration shows where one of these valves may be used as a



bracket, bushing and stabilizer. Drill a hole through the valve stem to fit the shaft used. Procure three 3/8-inch thin nuts, which are used in electric fixtures and use them to hold the stem to the stator and panel. The illustration shows the assembly.—E. J. Moline, Minneapolis, Minn.

On April 1, 569 American broadcasters were in operation. In Canada 36 stations were on the air.

Remedying Troubles in Variable Grid Leaks

Check up carefully all connections in the grid circuit, which applies equally to all other circuits of the hook-up. See that every connection is a tight one. It should be and that nothing but the very best variable grid leak is used. Some tubes may not require a grid leak at all. This trouble can be determined only by experiment. A loud humming noise is one of the indications of trouble in the grid circuit, though this noise may also be caused by alternating currents in the house lighting system. When ticks are heard in the head phones instead of good clear signals, there is something wrong with the adjustment of the grid control.

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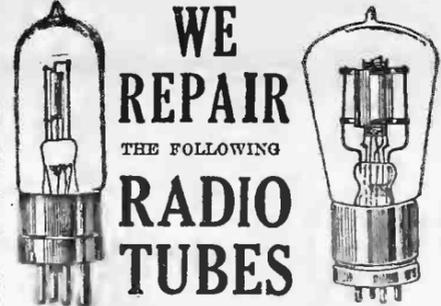
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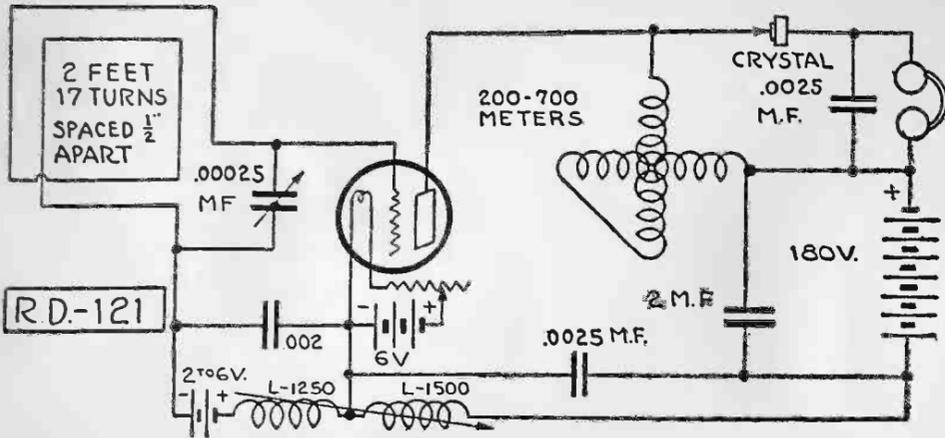
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IN THE ordinary single-tube super-regenerative circuits, the tube has to perform three functions—i. e. those of oscillating at the signal frequency, and oscillating at the quenching frequency, as well as of rectifying. Such circuits give best results on comparatively strong signals, and therefore if the tube could be relieved of one of its three duties, better results might be obtained when receiving comparatively weak signals.

This has been borne out in practice as exemplified in the circuit R. D.-121, in which the tube acts as an oscillator at signal and quenching frequencies in the guise of a high-frequency amplifier, while rectification is obtained by means of a crystal shunted across an inductance in the plate circuit of the tube. As might be expected, the circuit is not suitable for receiving extremely strong signals, owing to the current carrying limitation of the crystal, but with weak signals it is remarkably efficient.

The operation of the set is quite simple. First, the correct coupling between the honeycomb coils should be found—it will

usually be fairly loose, and once found little readjustment is necessary. The high-pitched whistle common to all super-regenerative circuits will then be heard, but it will not prove nearly so bothersome as with most other circuits, owing to the filtering action of the tuned plate circuit.

Capacity Effects Reduced

With a fixed and variable condenser of the capacities indicated the whole of the broadcasting range of wave lengths can be covered—the only tuning adjustments being those of the condenser and variometer.

Instead of a variometer, a suitable coil shunted by a vernier condenser can be used. It is to be noted that the only regenerative coupling between the grid and plate circuits is that provided by the inherent electrostatic capacity existing between grid and plate, owing to their construction and proximity.

The circuit may be found rather puzzling to operate at first, but the particular knack is very soon acquired and excellent results are obtained.

Review of Books

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, \$1.00.

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

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

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is a complete authentic and informative work on Radio. Fully illustrated. Price, \$1.50.

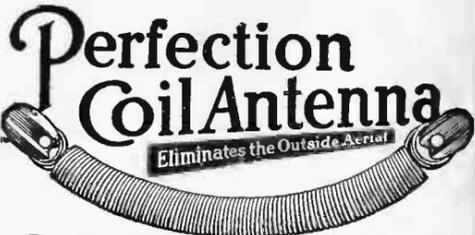
How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, \$2.

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

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

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

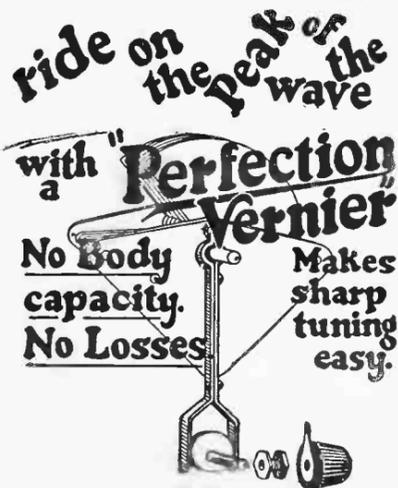
Ideas for the Radio Experimenter's Laboratory. By M. B. Sleeper. This book tells in a simple way the how and why of Radio apparatus. Comprehensive data are given on such necessary laboratory instruments as the oscillator, wavemeter, direction finder, Radio compass, vacuum tube,



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Dust Is an Enemy

Remember to dust the set every once in a while. This applies whether the set is or is not mounted in a cabinet. If the set is used extensively, dust is bound to get inside the cabinet. Dust carries moisture, which is harmful to the correct action of the receiver.

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Hint to Neutrodyne Builders

If you have trouble neutralizing your tubes and find that the tube is better neutralized with the neutrodon set either at minimum or very nearly so, try adding extra capacity across the grid and plate. This can be done by twisting two insulated wires together and soldering one to grid the other to plate. Be sure the bare wire of the free ends are not touching. You will then find that you have to increase your capacity of the neutrodon. This is especially valuable for those constructing neutrodyne sets using UV-199 tubes. I have built a set with these tubes and have had good results by this arrangement. I even found that this was necessary with one UV-201A in the first stage of Radio frequency.—Wm. F. Bruening, Concordia, Mo.

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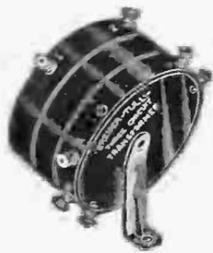
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Building Detectors and Amplifiers

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To see a vacuum tube made is as fascinating as to see a line of type set on a linotype machine, probably as fascinating a collection of machinery as ever has been devised by man.

In the comparatively brief period of years, in which large scale production of vacuum tubes has been developed, marvelous machinery has been devised and expert operators have been trained.

Let us start with the individual parts and follow the making of an audion from the glass department of the factory until it is a finished receiving tube.

Working the Glass

The stems are in the form of long glass tubes and are cut to the proper length on a carborundum wheel. Each piece is then held on a support and whirled in a gas flame. When it gets hot enough to show just the proper color, the operator inserts a tool in the softened end and flares it out to the proper cone shape, which will later seal the bulb. This is the first of the glass working operations, and it well illustrates the ease with which an exact operation can be done very rapidly by a carefully trained operator. If the glass is allowed to get just a little too hot, it will be too soft to take the proper shape; if it is not quite hot enough, it is very apt to crack. The flare must be just the right angle and size to seal into the bulb prop-

In Shipment Apparatus May Be Much Damaged

When buying a complete set of expensive parts check up on the apparatus before using it. Goods made by manufacturers of undoubted reputation may become damaged in transit while being handled in the store or while being carried home after purchase. This may happen only occasionally, but that fact does not help the fan who happens to be one to possess such damaged apparatus. Open circuits in coils (such as the rotors and stators of variocoupler, variometers, tuning coils, fixed resistances, rheostats, etc.), and shorted, fixed and variable condensers are fatal to the operation of any set.

Better results are sometimes obtained when using separate B batteries for the detector and amplifier.

The British Broadcasting company is planning an attempt during the spring to broadcast the song of the nightingale in its native haunts. A microphone and small transmitting set will be placed in a grove frequented by the feathered songsters and the bird notes amplified and re-broadcast by the London station, 2LO.

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erly without producing internal strains.

The flared stems are then passed to the first of the rotating tables, which perform the semi-automatic glass-working operations. The stems are fitted over a mandrel carrying the seven wires, which must be sealed in. Four of these will eventually connect with the four prong terminals on the bottom of the base, the other three being merely supporting brackets for the elements of the tube. These beginnings of the tube are then rotated slowly in three gas flames. The first two are warming fires, while the third finishes bringing the glass to the proper heat and at the same time begins to shape it down over the wires. At the end of this time two clamps come up and press the softened glass around the wires. Except for the feeding in of the stems and wires and the removal of the finished piece, the operation is entirely automatic.

Forming Operations

The stem then goes through two forming operations. The first cuts all the wires to exactly the right length with one blow; the second, in one motion, bends them into the proper shape to receive the elements of the tube. It is now ready to receive these elements, and the first one, the specially treated V-shaped filament, is spot welded onto its two supports. Spot welding is a remarkably quick way of firmly attaching one small piece of metal to another. The parts are pressed together between two copper electrodes, which passes a high current between them for a moment. Most of the resistance is located in the joint, and that spot gets hot enough for the metal to flow together and make a permanent joint.

The grid is the next element to be put in place. It is made by placing a supporting wire on each side of a rectangular frame and then winding the grid wire around it spirally. The spacing is automatic. Whenever the grid wire is brought across the support, the two are spot welded together. These grids are then taken to a machine, where the two vertical wires are spot welded to the supports in the stem. A rectangular plate is then slipped over the grid and spot welded to its two wires. Following this, a liner is inserted between the grid and plate to straighten them so that there is just the right space between the two all around. The final operation in assembly is the insertion of the top support for the filament. The hook on the support is lowered into the top of the grid; the filament is caught on it, lifted up and centered with the aid of a magnifying glass. The hook is then spot welded on the support which reaches up from the stem outside the filament.

Sealing Mount in Bulb

The mount is then ready to be sealed into the bulb. Before the bulb is ready the blanks must be tabulated. A hole is punched in the top by a flame and a glass tube sealed on. The tube is necessary so that there will be some opening for drawing off the air. After the audion is

finished the small tip on top is the only part of this tube left.

The mount is then sealed into the bulb by a series of four flames similar to the ones which sealed the wires into the stem. Each flame plays on the glass for 15 seconds. The first warms it up; the second starts to shape it down, while the third finishes the shaping so that the soft bulb makes contact with the flared stem all the way around and the two start to flow together. The fourth fire cuts off the bottom of the stem below the seal. As it comes out of this fire it is picked up by the operator, a tool is inserted in the stem and the mount is lined up while the glass is still soft.

Making the Vacuum

The audions are next placed on the exhausting manifold. While the air is being pumped out, they are heated so that there will be no chance of any moisture being left in the bulbs. The air and gases drawn out are led through a liquid air trap, which effectively removes all the moisture so that it will not interfere with the vacuum pump. The gases are then helped along with a blast of mercury vapor, which sweeps all the stray molecules along toward the rotary oil pump. The blast of mercury is condensed and removed before it reaches the oil.

While the audion is still connected to the exhausting manifold, the filament is lighted and 500 volts applied to the plate. This filament current heats the filament, and the space current with that plate voltage is enough to heat the plate. This heat drives off the last traces of gases which might be left in the metal parts and sets off the metallic chemical, a lump of which was placed on the plates when they were first put together. This chemical condenses on the inside of the tube, giving it the silvery appearance. Its function is to act as a scavenger to remove the last traces of gas which might be left in the tubes.

The tubes are then cut off from the vacuum pump and the vacuum measured. Unless it is just right, the leak is searched for with the aid of a spark coil. The faulty tube will have a deeper blue-purple color than the others. This process leaves the tubes the hardest of any of those built on a production basis.

Attaching the Bases

The tubes are then based; leads are

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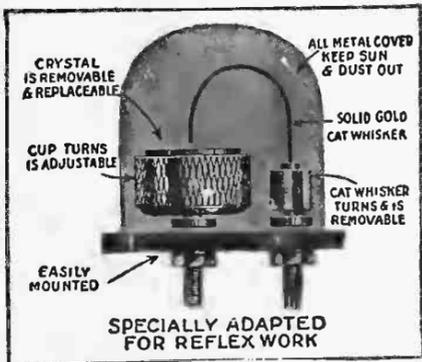
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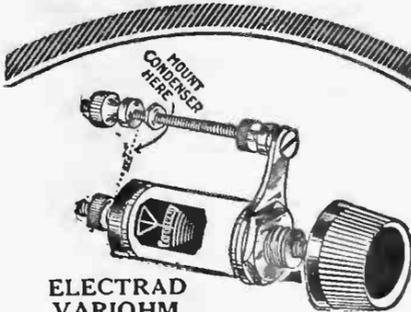
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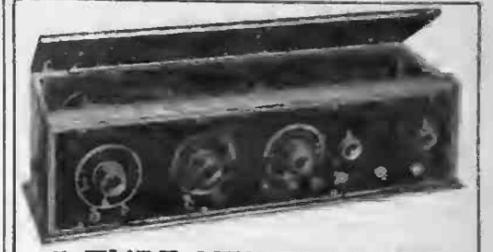
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threaded through the prongs in the bottom of the cup-shaped bases and the tube is baked into the basing cement, which has been previously spread around the inside of the cup. The lead wires are then clipped off and the end soldered to the prongs. It is necessary in this operation to make sure that none of the soldering flux gets up into the hollow prong, where it might cause corrosion.

The tubes are then seasoned at slightly above their rated voltage and are tested to see that they give the proper space, or plate current, on their rated voltage. An audibility test is made to see that all will amplify properly. They are continually checked against standards so that there will be no variation in the product, and are kept in the plant for a few weeks and retested, before they are ready for the market.



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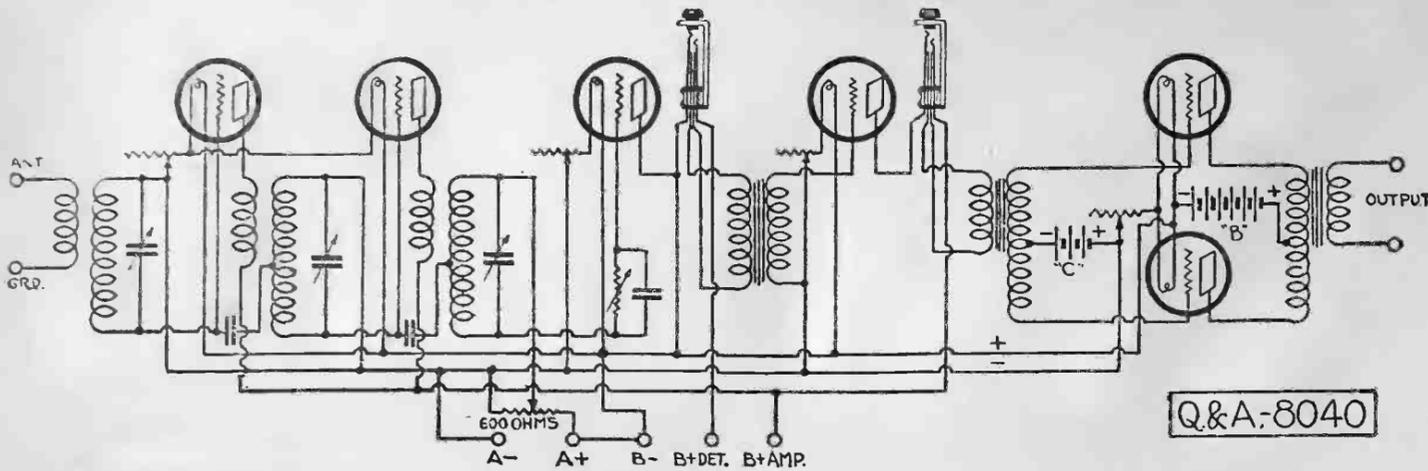
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Questions and Answers



Neutrodyne Push-Pull Circuit

(8040), EOS, Kausas City, Mo.
Can you furnish me with a hook-up showing push-pull plate amplification added after one stage of audio frequency in the neutrodyne circuit?

A.—The diagram Q&A-8040 illustrates a six-tube neutrodyne with two stages of Radio frequency, detector, one stage of straight audio frequency and one stage of push-pull amplification. Any of the typical push-pull transformers now on the market can be used in this circuit.

Re-Radiation

(5758) WEO, Connersville, Ind.
The article on page 7 of the October 20 issue of Radio Digest, "Sees Radio's Greatest Problems as Interference Caused by Re-Radiation," attracted my attention and in this connection I would like to ask you, is the Crosley model XJ a receiver that will cause the interference you refer to? I take it that you are familiar with this particular set, as I see it advertised in your publication.

The article referred to may be clear to an experienced Radio engineer but is not so to a novice: How am I to know when a tube is oscillating? What causes it to do so? How can I prevent it? I am quite sure no one would cause interference if he knew how to avoid it. I agree that it is a serious matter and I would do all I could to instruct others how to prevent it if I knew myself. This information, however, must be of such a character that anyone can understand it.

A.—Any standard regenerative receiver will re-radiate. If Radio frequency amplification is added, and tubes are acting as Radio frequency amplifiers and not as oscillators, re-radiation will not take place.

Correct tuning of a regenerative circuit will not permit the tube to pass the point

of oscillation at which it re-radiates. Without going into an exhaustive discussion, we can only advise that familiarity with the action of your circuit will enable you to determine this point and you should strive to keep your tickler at this critical adjustment at all times. This requires considerable skill, we will admit.

It can be determined if the tube is oscillating by inserting a milliampere meter in the plate lead of the tube. When it is oscillating, the reading will be much less than when not. A meter with an 0 to 10 scale will serve for such a test. Making a note of the adjustments at this point, you will soon be able to tune your set without interfering with your neighbors.

R. D.-99

(06573) CSG, Dover, N. H.
In the September 29, 1923 issue of your paper I noticed a long distance hook-up for three tubes, much after the ultra-audion. R. D.-99 was the number of the hook-up.

It mentioned that sixty turns of 22 dcc. were wound on a 3-inch tube. Would it be of any advantage to tap a coil like this and at what points would you recommend? If I should tap it, would it be better to tap from both ends, one for fine tuning and the other for course tuning? What is the meaning of dead end losses in a tapped coil and just how does it effect the working of a set?

How many turns of wire should be on the rotor of the variometer, and how many on the stator?

If I should use number 20 dcc. on stator and number 24 dcc. on rotor, would each have the same number of turns?

If I should wind my 60-turn coil on a tube, leave a space of half an inch and

then wind the stator of my variometer on the same tube, putting the rotor in its proper place, would it give a more efficient set or less than is described in this article?

What ratio transformers would you recommend for this set?

With my ultra-audion I have heard Ft. Worth, Texas; Omaha, Neb., and Davenport, Iowa. Would I get greater distance on the R. D.-99 hook-up?

The above named stations were heard during August and September.

A.—We are advising in your inquiry with reference to R. D.-99, that there would be no advantage in tapping coil, as suggested.

The unused portions of a tapped coil are left more or less closely coupled to the active portion, and in these unused turns induced currents will cause a loss and increase of the resistance of the main circuit which is characterized as dead end loss.

A variometer has from 50 to 60 turns of wire on rotor and stator alike, and should be number twenty on both. Winding coil in the manner of your descrip-

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tion would result in greater efficiency than by method of specifications.

Transformers should be of a five to one and three to one ratio on first and second stages respectively.

It is quite possible that a greater receiving range may be accomplished with the circuit of our discussion than with the ultra-audion, although it is largely a matter of conjecture.

Tube Does Not Work

(05841) RGB, Chicago, Ill.

A few months ago I bought a detector tube, C-300, Cunningham, and when I got it, it worked fine (couldn't be better); but now it will not oscillate or bring in out-of-town stations. Some people tell me it is polarized and by resting it a few weeks it will work again; but this I tried and had no success. I also tried burning the filament without any plate voltage on it for 20 minutes, but neither seems to work.

Is there any way of bringing life back into the tube?

A.—The action of your tube is due to insufficient B battery voltage, or possibly low A battery. Both should be tested to determine if they are functioning normally.

Polarization of tube is merely due to a loud signal and clears immediately with discontinuation of signal.

It is our opinion that attention to battery potentials will be all that is necessary to remedy the condition encountered.

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Arizona: Phoenix, KDYW, KFAD, KFCE Tucson, KFDD	Indiana: Greencastle, WLAX Greentown, WJAK Harrison, WCBN Indianapolis, WBBI, WBBZ, Laporte, WJAF Marion, WIAQ Mishawaka, WQAO South Bend, WGAZ West Lafayette, WBA	Minnesota: Duluth, KFMS Hutchinson, WFDN Minneapolis, KFDD, KFEX, KFMT, KFOB, WBAH, WCAS, WLAG, WLB Moorhead, WPAU Northfield, KFMX, WCAL St. Cloud, WFAM St. Paul, AV7, KFOY	North Carolina: Asheville, WFAJ Charlotte, WBT Wilmington, WBBN	South Carolina: Charleston, WBBY, WNAQ, WQAH Clemson College, WSAC	Wyoming: Casper, KFEV Laramie, KFEU		
California: Bakersfield, KDZB Berkeley, KRE Burlingame, KPNZ El Monte, KUY Fresno, KMMJ Hollywood, KFAR Long Beach, KFMV, KFN, KSS Los Angeles, KFI, KPPG, KPSG, KHJ, KJS, KLV, KNX, KUS Oakland, KGO, KLS, KLB, KZM Pasadena, KPNL Richmond, KFCM, KFOU Sacramento, KFRK San Diego, KDPT, KDYM, KFBC San Francisco, KPO, KUO San Jose, KQW Santa Ana, KFBE Santa Barbara, KFJH Santa Rosa, KFNV Stanford Univ., KFGH Stockton, KJQ, KWG Whittier, KFOC	Iowa: Ames, WOI Atlantic, KFLZ Boone, KFGQ Burlington, WIAS Cedar Falls, KFJX Cedar Rapids, KFPL, WJAM, WKAA Davenport, WOC Dexter, KFJY Port Dodge, KFER, KFJY Lowell, WHAA Lamoni, KFFV Le Mars, KFVY, WIAU Marion, KFOL Marshalltown, KFJB Ottumwa, KFJL Shenandoah, KFNF Sioux City, KFMR, KFOV, WEAU Waterloo, WRAN	Mississippi: Coldwater, KFNG Oxford, WCBH Pascagoula, WCBG	North Dakota: Fargo, KFJY, WDAY, WPAK Grand Forks, KFJL, KFJQ Wahpeton, WMAW	Texas: Abilene, WQAO Amarillo, WDAQ, WQAC Austin, WCM, WNAS College Station, WTAW Corpus Christi, KFNC Dallas, WDAO, WFAA, KFOP, KFFZ, WBR El Paso, WDAH, WPAT Fort Worth, KFJX, WBP Galveston, KFLX, KPOQ, WJAB, WJAC Greenland, KFPM Houston, KFCE, WCAK, WEAY, WVEY, WRAZ Orange, KFGX Plainview, WSAF Port Arthur, WFAH San Antonio, WSA, WCAK, WQAH San Benito, KFLU San Marcos, KFMC Tyler, WQAF Waco, WJAD, WJAC Wichita Falls, WKAJ	Hawaii: Honolulu, KGU Lihue, KFES	Porto Rico: San Juan, WKAQ	
Colorado: Boulder, KFAJ Colorado Springs, KFFQ, KFKZ Denver, AA3, KDZQ, KFAF, KFEL, KFKH, KFLE, KLZ Greeley, KFKA Gunnison, KFHA Trinidad, KFBS	Kansas: Anthony, WBL Beloit, WPAR Hutchinson, KFHX Joplin, KFID Louisburg, KFIL Manhattan, WTG Mifflord, KFKR Peabody, KFVX Topeka, WIAQ, WPAM Towanda, KFJW Wichita, KFOT, WEAH	Missouri: Butler, WNAK Cameron, WFAQ Cape Girardeau, WSAB Columbia, WAAN Independence, KFJX Jefferson City, WOS Joplin, WEAH Kansas City, WDAF, WDB, WMAJ, WOQ Marshall, WJAT Moberly, KFFP, KFOJ St. Joseph, KFHD St. Louis, KFJZ, KSD, WKX, WEB, WEW, WMAJ, WROA Springfield, KFNE, WIAI Warrensburg, KFJH	Ohio: Canton, AQ6 Cincinnati, WAAD, WHAG, WLW, WSAI Cleveland, KDPN, WHK, WJAX, WTAM Columbus, WBAV, WCAH, WEAQ, WMAN, WPAJ Dayton, AW5, WARD Dover, WABP Granville, WJD Hamilton, WRK Lima, WQAC Newark, WBA Pomeroy, WSAZ Sandusky, WABH, WQAF Springfield, WNAF Toledo, WABR, WTAL Wooster, WABW Yellow Springs, WRAV Youngstown, WDBF	Virginia: Arlington, NAA Blacksburg, WEA Fortress Monroe, WNAW Norfolk, WBBW, WTAR Richmond, WBBE	British Isles: Aberdeen, 2BD Birmingham, 5BT Bournemouth, 6BM Cardiff, 5WA Glasgow, 5SC London, 2LO Manchester, 2ZY Newcastle, 5NO	Canada: Bellevue, CFCO Calgary, CFAC, CFCA, CHBC, CHCM, CKCK Edmonton, CFCK, CJCA Halifax, CHAC Hamilton, CHCS Iroquois Falls, CFCH Kingston, CFRC London, CFVW, CJGC Mont-Joli, CJCM Montreal, CFCF, CFUC, CHYQ, CKAC Nanaimo, CFDC New Westminster, CFXC Ottawa, OA, CKCH, CKCO Quebec, CFQJ, CHCQ Regina, CKK St. John, CJCI Saskatoon, CFQC Sudbury, CFCR Toronto, CFCO, CHCR, CJCD, CJCN, CJSC, CKFI Vancouver, CFQC, CFYC, CHUC, CJCE, CKCD Victoria, CFCF, CHCE Winnipeg, CKY	
Connecticut: Hartford, WDAK New Haven, WPAJ Storrs, WABL	Kentucky: Louisville, WHAS, WLAP	Nebraska: David City, KFOR Fremont, WQAE Hastings, KFXX Lincoln, WFAV, WMAH Norfolk, WJAG Oak, KFEQ Omaha, KFCZ, KFFX, KFOX, WAAW, WIAK, WNAL, WQAW Tecumseh, WTAU University Place, WCAJ York, KFDR	Oklahoma: Bristow, KFJK Chickasha, KFGD Oklahoma City, KFJF, WKY Norman, WNAJ Okmulgee, WPAK Tulsa, WGAF, WLAL	Utah: Ogden, KFCE Salt Lake City, KDYL, KFLH, KFOO, KZN	France: Lyons, LY Paris, ESP, FL	Mexico: Mexico City, CTB, CYL, CYX	
Delaware: Wilmington, WHAU, WQAT	Louisiana: Baton Rouge, KFFY Alexandria, KFFY Baton Rouge, KFCC Franklin, KFLL Jennings, WCBJ New Orleans, WAAB, WAAC, WABZ, WBBS, WCAQ, WCBE, WGV, WIAF, WIAF, WVL Shreveport, KFDD, KFHF, WGAQ	Nebraska: Sparks, KFFR	Oklahoma: Astonia, KFJI Arlington, KFGL Baker, KFDA Corvallis, KFJH Hillsboro, KFJO Hood River, KFHB, KQP Marshfield, KFOP Medford, KPAY Pendleton, KFEE Portland, KDYO, KFEC, KFIF, KFOH, KGG, KGN, KGW	Vermont: Bellows Falls, WLAJ Springfield, WQAE	Germany: Berlin, 500 Frankfurt, 500 Hamburg, 500 Munich, 500 Nuremberg, 500 Stuttgart, 500	Italy: Rome, 500 Milan, 500 Naples, 500 Turin, 500	Japan: Tokyo, 500 Osaka, 500 Kyoto, 500 Yokohama, 500
Florida: Jacksonville, WABG Miami, WQAM Pensacola, WGAN, WLAJ St. Petersburg, WCBK, WSAG Tampa, WDAE West Palm Beach, WBBJ	Georgia: Atlanta, WBBF, WSB Gainesville, WKAY Macon, WMAZ	New Hampshire: Laconia, WKAV	Pennsylvania: Allentown, WGBA, WSAJ Altoona, WCAW Butler, WBR Easton, WMAP East Pittsburgh, KDKA Erie, WQAV Grove City, WSAJ Harrisburg, WABE, WBAK Haverford, WBAQ Johnstown, WBBV, WTAC Lancaster, WDBC, WGAL McKeesport, WK Parkersburg, WQAA	Washington: Aberdeen, KNT Bellingham, KDZR Everett, KFBL Lacey, KGY Nash Bay, KFHH Pullman, KFAE Seattle, KFJR, KFJC, KFOA, KFJL, KHQ, KJR, KTW Spokane, KFIO Tacoma, BEI, KFBG, KGB, KMO Walla Walla, KFCF Wenatchee, KDZI, KZY Yakima, KFIO	Spain: Barcelona, 500 Madrid, 500 Valencia, 500	Switzerland: Geneva, HB1	
Idaho: Boise, KFAU, KFDD, KFFB Kellogg, KFEY Moscow, KPAN Wallace, KFOD	Illinois: Belvidere, WOAG Cambridge, WTAP Carthage, WCAZ Chicago, KYV, WAAF, WDAF, WLS, WGN, WMAQ, WSAX Decatur, WBAO, WBAF Elgin, WTAS Galesburg, WRAM Joliet, WVAE Lake Forest, WABA	New Jersey: Atlantic City, WHAR Camden, WABU, WWAJ Gloucester City, WRAX Lambertville, WTJZ Newark, WAAAL, WABS, WBS, WOR, WRAZ N. Plainfield, WEAM Paterson, WBAJ Trenton, WMAJ, WQAX, WWAB	Virginia: Arlington, NAA Blacksburg, WEA Fortress Monroe, WNAW Norfolk, WBBW, WTAR Richmond, WBBE	Washington: Aberdeen, KNT Bellingham, KDZR Everett, KFBL Lacey, KGY Nash Bay, KFHH Pullman, KFAE Seattle, KFJR, KFJC, KFOA, KFJL, KHQ, KJR, KTW Spokane, KFIO Tacoma, BEI, KFBG, KGB, KMO Walla Walla, KFCF Wenatchee, KDZI, KZY Yakima, KFIO	Switzerland: Geneva, HB1	Switzerland: Geneva, HB1	

PART IV—STATION DATA

(The following schedules complete the alphabetical station data list, Part III of which was given last week.)

WRM, Urbana, Ill. 360 meters. 500 watts. Univ. of Ill. Tues, 7-8 pm, music. Tues, Thurs, 8:30-9:30 pm, Univ. news, talks, music. Irregular schedule of University events. Central.

WRR, Dallas, Texas. 360 meters. 20 watts. City of Dallas. Daily ex Sun, 11:30-12:30 pm, weather; 2:45-3:30, sports, markets, news; music. Sun, 11 am, 7:30 pm, church services. Central.

WRW, Tarrytown, N. Y. 273 meters. 150 watts. Tarrytown Radio Research Laboratory. Slogan, "Everything in Radio." Daily, 9 pm, police reports. Mon, Wed, Fri, 7:30-11:30 pm, music, lectures, entertainment. Sun 8-9 pm, church services. Eastern.

WSAB, Cape Girardeau, Mo. 360 meters. 100 watts. Southeast Mo. State Teachers College. Mon, Wed, 3:30 pm, lecture, 9, concerts. Central.

WSAC, Clemson College, S. C. 360 meters. 500 watts. Clemson Agri. College. Mon, Wed, Fri, 7 pm. Eastern.

WSAD, Providence, R. I. 261 meters. 150 watts. Fosters-Jewellers. Daily, 2:30-4 pm. Tues, Thurs, Fri, Sat, 6-7 pm. Thurs, 8:15 pm, music, entertainment. Sat, 6-8 pm. Sun, 2-4 pm, music, church features. Eastern.

WSAG, St. Petersburg, Fla. 244 meters. 10 watts. L. Yanderbeck, Davis. Tues, Thurs, Sat, 7:30 pm, bedtime stories; 8-10, music.

WSAH, Chicago, Ill. 243 meters. 500 watts. A. G. Leonard, Jr. Daily ex Sun, 5:30-6:30 pm. Fri, 8:45-10. Central.

WSAI, Cincinnati, O. 309 meters. 500 watts. United States Planning Card Co. Tues, 7-10 pm. Thurs, 8-10 pm. Sat, 10-11:30 pm; 12-1:45 am. Central.

WSAJ, Grove City, Pa. 360 meters. 250 watts. Grove City College. College activities. Wed, 7:30-9 pm, music. Fri, basket ball. Eastern.

WSAL, Indianapolis, Ind. 246 meters. 50 watts. Franklin Elec. Co.

WSAN, Allentown, Pa. 229 meters. 10 watts. Allentown Radio Club.

WSAP, New York, N. Y. 263 meters. 250 watts. City Temple. Sat, 10:45-11 pm. Sun, 7:30-9:30 pm. Eastern.

WSAR, Fall River, Mass. 254 meters. 10 watts. Doughty & Welch Elect. Co. Daily ex Sun, 12-1 pm. Tues, Thurs, Sat, 7:15-8:15 pm. Eastern.

WSAT, Plainview, Tex. 268 meters. 20 watts. Donohoo-Ware Hardware Co.

WSAW, Canandaigua, N. Y. 275 meters. 5 watts. John J. Long, Jr. Irregular Fri programs.

WSAY, Port Chester, N. Y. 233 meters. 100 watts. Irving Austin, Chamber of Commerce.

WSAX, Chicago, Ill. 268 meters. 20 watts. Chicago Radio Lab.

WSAZ, Pomeroy, Ohio. 258 meters. 50 watts. Chase Elec. Shop. Daily ex Sun, 5:30 pm, weather. Tues, Thurs, Sat, 5 pm, music. Central.

WSB, Atlanta, Ga. 429 meters. 500 watts. Atlanta Journal. Slogan, "The Voice of the South." Daily ex Sun, 12-1 pm, music, weather; 2:30, reports; 4-4:30, music; 5-6, news, sports; 8-9, concert (ex Wed); 10:45-12, news. Sun, 10:45-12:15 pm, 5-6, 7:30-9:15, church services. Central.

WSL, Utica, N. Y. 273 meters. 100 watts. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 5-6 pm, music, news. Mon, Wed, Sat, 8-9 pm. Sun, 10:30-12 m, 7:30-9 pm. Church services. Eastern.

WSY, Birmingham, Ala. 360 meters. 500 watts. Alabama Power Co. Sun, 11 am, 8 pm, church services. Central.

WTAB, Fall River, Mass. 248 meters. 100 watts. Fall River Daily Herald. Tues, Thurs, Sat, 8-10 pm. Sun, 2:30-4:30 pm. Eastern.

WTAC, Johnstown, Pa. 360 meters. 150 watts. Penn Traffic Co. Daily ex Sun, 4 pm. Sun, Thurs, 7:30-9:15. Eastern.

WTAF, New Orleans, La. 268 meters. 20 watts. Louis. J. Gallo. Daily, 6:45-7 pm, police reports. Tues, Sat, 8-9:30 pm, music. Central.

WTAG, Providence, R. I. 258 meters. 10 watts. Kern Music Co.

WTAJ, Portland, Me. 236 meters. 20 watts. The Radio Shop. Wed, Sun, 7:45 pm. Eastern.

WTAL, Toledo, Ohio. 252 meters. 10 watts. Toledo Radio & Elec. Co. Tues, Thurs, 8:45 pm. Sat, 8 pm. Eastern.

WTAM, Cleveland, Ohio. 390 meters. 1,000 watts. Willard Storage Battery Co. Slogan, "The Voice from the Storage Battery." Daily ex Sun, 6 pm. Wed, 7-9 pm, concert. Sat, 8-10 pm, dance music. Eastern.

WTAP, Cambridge, Ill. 242 meters. 100 watts. Cambridge Radio & Elec. Co. Tues, Sat, 12:15-1:15 pm, 9:30-10:15. Central.

WTAQ, Oscego, Wis. 254 meters. 100 watts. S. H. Van Gorden & Son.

WTAR, Norfolk, Va. 280 meters. 100 watts. Reliance Electric Co. Tues, Sat, 8 pm. Fri, 3:30 pm. Sun, 4 pm. Eastern.

WTAS, Elgin, Ill. 286 meters. 500 watts. Chas. E. Erbstein. Slogan, "Willie, Tommie, Annie and Sammie." Daily, 8:15-12 mid., music. Fri, 12:30-1:30 pm, organ. Sun, 2:30-5 pm, music. Central.

WTAT, Boston, Mass. 244 meters. 100 watts. Edison Elec. Illuminating Co. (Portable Station).

WTAU, Tecumseh, Neb. 360 meters. 10 watts. Ruegg Battery & Elec. Co. Tues, 8:30 pm. Central.

WTAW, College Station, Tex. 280 meters. 50 watts.

Agricultural and Mechanical College of Tex. Wed, Fri, 8-8:30 pm, music, talks. Sun, 11 am, church services. Central.

WTAX, Strettor, Ill. 231 meters. 50 watts. Williams Hardware Co. Mon, Thurs, 9-10 pm. Tues, 12 m-2 Pm. Central.

WTAY, Oak Park, Ill. 283 meters. 500 watts. Oak Leaves. Daily ex Sun, Mon, 6:15-8:15 pm. Central.

WTAZ, Lambertville, N. J. 283 meters. 15 watts. Thomas J. McGuire. Mon, 8-10 pm, music. Eastern.

WTG, Manhattan, Kan. 360 meters. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.

WWAB, Trenton, N. J. 226 meters. 10 watts. Hoenig, Swern & Co. Wed, 7:30-10:30 pm. Eastern.

WWAC, Waco, Tex. 360 meters. 100 watts. Sanger Elec. Co. Temporarily discontinued.

WWAD, Philadelphia, Pa. 360 meters. 100 watts. Wright & Wright, Inc. Thurs, 8:30 pm. Eastern.

WWAE, Joliet, Ill. 227 meters. 500 watts. Alamo Dance Hall. L. J. Crowley. Wed, Sat, Sun, 8:30-12 midnight, orchestra. Central.

WWAF, Camden, N. J. 236 meters. 1,000 watts. Galvin Radio Supply Co.

WWI, Dearborn, Mich. 273 meters. 50 watts. Ford Motor Co. Wed, 8-10 pm, music, lectures. Eastern.

WWAD, Houghton, Mich. 244 meters. 250 watts. Michigan College of Mines. Daily ex Sun, 12 m, news, markets. Mon, Wed, Fri, 7:30-8:30 pm, talks, music. College sports. Central.

WWJ, Detroit, Mich. 517 meters. 500 watts. The Detroit News. Daily ex Sun, 9:30-9:45 am, household hints; 9:45-10:25, health talks; 10:25-10:30, weather; 11:55-12, time; 12:05-12:45 pm, music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports, April 22, and every other we-k, 8:30-10 pm, concert. Sat, 7-8:30 pm, concert. Thurs, 10-12 pm, "midnight special". Fri, 11 in weeks, 7-8:30 pm, concert; Sun, 11 am, 7:30 pm, church services; 2-3 pm, or 5-6, concert. Eastern.

WWL, New Orleans, La. 280 meters. 100 watts. Loyola Univ.

2AB, Havana, Cuba. 240 meters. Alberto S. de Bustamante.

2BD, Aberdeen, Scot. 295 meters. 1,500 watts. British Broadcasting Co. Daily ex Sun, 3:30-4 pm, concert; 5-5:30, women's hour; 5:30-6, children's period; 7-10:30, concert. Sun, 3-5 pm, 5:5-8:30, 8:30-10:20, Greenwich Mean.

2BY, Havana, Cuba. 250 meters. Frederick W. Borton.

2CX, Havana, Cuba. 320 meters. Frederick W. Borton.

2DW, Havana, Cuba. 300 meters. Pedro Zayas.

2EV, Havana, Cuba. 220 meters. Westinghouse Elec. Co.

2FC, Willouby, Australia. 1,000 meters. 5,000 watts. Farmer & Co., Ltd.

2HS, Havana, Cuba. 180 meters. Julio Poeser.

2JQ, Havana, Cuba. 150 meters. Paul Perez Falcon.

2KD, Havana, Cuba. 350 meters. E. Sanchez de Fuentes.

2KP, Havana, Cuba. 200 meters. Alvaro Daza.

2LC, Havana, Cuba. 250 meters. Luis Casas.

2LO, London, Eng. 365 meters. 1,200 watts. British Broadcasting Co.

2MG, Havana, Cuba. 280 meters. 20 watts. Manuel G. Salas. Daily ex Sun, 3-4 pm, music. Evening program.

2MN, Havana, Cuba. 270 meters. Fausto Simon.

2OK, Havana, Cuba. 360 meters. Mario Gardo Velez.

2OL, Havana, Cuba. 290 meters. Oscar Collado.

2TW, Havana, Cuba. 230 meters. Roberto E. Ramirez.

2WW, Havana, Cuba. 210 meters. Amadeo Saena.

2XD, Havana, Cuba. 345 meters. 50 watts. Dr. Eduardo Sanchez.

2ZY, Manchester, Eng. 385 meters. British Broadcasting Co.

5EV, Colon, Cuba. 360 meters. 100 watts. Leopold V. Figueroa. Sun, 9-11 pm, Eastern.

5IT, Birmingham, Eng. 420 meters. British Broadcasting Co.

5NO, Newcastle, Eng. 400 meters. British Broadcasting Co.

5SC, Glasgow, Scot. 415 meters. British Broadcasting Co.

5WA, Cardiff, Wales. 353 meters. British Broadcasting Co.

6AZ, Cienfuegos, Cuba. 200 meters. Valentin Ullivarri.

6BM, Bournemouth, Eng. 385 meters. British Broadcasting Co.

6BY, Cienfuegos, Cuba. 300 meters. Jose Ganduxa.

6CX, Cienfuegos, Cuba. 170 meters. Antonio T. Figueroa.

6DW, Cienfuegos, Cuba. 225 meters. Eduardo Lerry.

6EV, Caibarien, Cuba. 290 meters. Maria Josefa Alvarez. Daily, 10:30 pm.

6KW, Tuinucu, Cuba. 332 meters. 100 watts. Frank H. Jones. Slogan, "If You Hear the Koo of the Cuckoo You Are in Tune With Tuinucu." Mon, Tues, Fri, Sun, 9 pm, music. Wed, Thurs, Sat, 6:30 pm, music. Central.

6XJ, Tuinucu, Cuba. 275 meters. 100 watts. Frank H. Jones.

8AZ, Santiago, Cuba. 240 meters. Alfredo Brooks.

8BY, Santiago, Cuba. 220 meters. Alberto Ravel.

8DW, Santiago, Cuba. 275 meters. 15 watts. Pedro C. Andujar. Daily, 4:30-8:30 pm, 10-12.

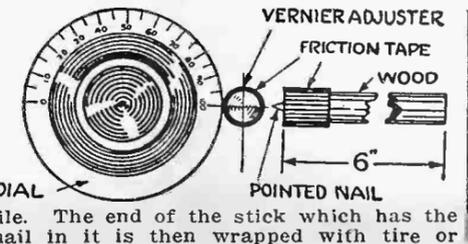
8EV, Santiago, Cuba. 180 meters. Eduardo Mateos.

8FU, Santiago, Cuba. 220 meters. Andres Vlnnet.

(This completes the alphabetical station data list. Part I, the first installment of the four-part list, will appear next week.)

Pencil Vernier

Vernier adjustment is one of the requirements connected with the operation of a receiving set. A vernier adjuster can be made as follows: Procure a piece of round wood, 1/4 inch in diameter and 6 or more inches in length—a wooden penholder will do—and drive a very small nail in the center of one end. Cut the nail off, leaving about 1/8 or 1/4 inch sticking out, which should be pointed with a



friction tape, as shown. This is to make a friction contact when the stick is turned against the dial. Another good thing about the adjuster of this kind is that you do not have to touch the dial with your hand, thereby eliminating considerable body capacity.—J. M. Keebler, Philadelphia, Pa.

Never allow radio batteries to stand in the sunlight. Heat shortens the life of the battery.

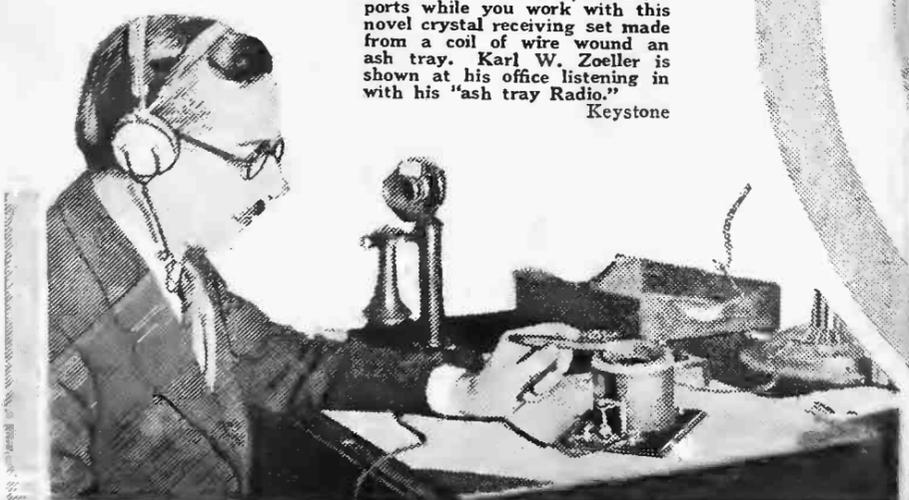
Grounding Transformer Cores

If adjusting the filaments of an amplifier does not stop it from howling, try attaching a wire from the negative terminal of the battery used for lighting the filaments of the tubes to the ground post of the set. Should the howling continue, try grounding the iron cores of the amplifying transformers by attaching a wire to the cores and bringing it to the ground terminal.



A penny for your thoughts, via Radio. Here is D. Marie Bowker of Chicago, listening in during a recent experiment by three university professors in an attempt to send "thought waves" through the air from WGN, Chicago. If you had known Miss Bowker was on the air, what what you have thought about?

Music, baseball scores, stock reports while you work with this novel crystal receiving set made from a coil of wire wound an ash tray. Karl W. Zoeller is shown at his office listening in with his "ash tray Radio."
Keystone



"The Voice from the Storage Battery" in reality. Pretty Miss Mitchell, one of the staff of WTAM, Cleveland, listening to "The Voice from the Storage Battery."