

Harkness Neutroflex Compact Set—H. J. Marx; 8 Days' Advance Programs; "The Neutrodyne Circuit"—P. J. Clute; Edelman's A-B-C's for Beginners

Radio Digest

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

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

Vol. IX Copyright 1924 By Radio Digest Publishing Co. SATURDAY, APRIL 19, 1924 No. 2

PROPOSE TAX ON SETS

CARROLL'S VANITIES SHOW RADIO VALUE

ON AIR AT KYW APRIL 22 TO PROVE GOOD AGAIN

Success of Gigantic Musical Comedy, Opening in Chicago, Due Much to Broadcasts

CHICAGO. Does broadcasting of theatrical productions decrease box office receipts? Earl Carroll, owner and producer of Earl Carroll's Vanities, which comes to the Colonial Theater here for an indefinite run, Easter Monday, says "no" in a most emphatic manner and produced a letter from a mass of thousands in which the writer declared that he would have to stop listening in, because reception of Vanities cost him fifty-five dollars when his wife insisted that he take the entire family to see the show.

Earl Carroll is the pioneer in broadcasting musical comedy productions. He is the only producer in America who has successfully broken down the obstacles placed in his way by the various managers' associations and theater owners who, up to the time Mr. Carroll came along, had the fixed idea that broadcasting hurt business.

Broadcasting Swells Box Office

Since the Earl Carroll Vanities left the Earl Carroll Theater in New York City for a limited tour of the eastern states on the way to Chicago, the first act of this wonderful play has been broadcast from the theater in Pittsburgh, Washington, Baltimore, Boston, Cleveland, Detroit, Colum-

(Continued on page 3)



Mitzie, the famous international musical comedy actress and star of "The Magic Ring" was heard over the air recently, when the entire show was broadcast from WIP, Philadelphia.

LISTENER TO PAY COST IF BILL PASSES

Senate Committee Adds Ten Per Cent Excise on Parts and Sets

Would Repeal Candy Tax

Listening In Suddenly Becomes Luxury—Radio Administration Won't Get New Revenue

(By L. M. Lamm, Staff Correspondent)

WASHINGTON.—The radical proposal that a ten per cent tax be levied on all Radio receiving sets, parts and accessories, including tubes, has been made by the Senate finance committee, considering the revenue bill now before it. The tax, the committee has voted, would be paid at the source of manufacture, but Radiophans generally know that the tax, multiplied by costs of distribution, will be passed on to them.

Is a Radio Set a Luxury?

Why radio sets and parts should be taxed, is the foremost question in the minds of listeners in. Why, they ask, should such a tax be levied when musical

(Continued on page 2)



Angelo Devoto recently treated WLW fans to a very pleasing program of song and violin numbers. Miss Devoto, although only nineteen years of age, is a talented singer, musician and dancer, and is well on her way to stardom. Young & Carl

Margaret Clark, leading lady of the KGO Radio Dramatic Players, was heard recently as Sylvia Fair, when the drama "The Famous Mrs. Fair" was broadcast from this station.

PROPOSE TAX ON SETS

(Continued from page 1)

instruments are tax free—and musical instruments are not even educational. On the other hand Radio sets, and consequently the parts that go to make up sets, have proven to be the greatest source of education since the advent of printing presses—which are also tax free.

What President Coolidge Says

Discussing the proposed Radio tax, President Coolidge stated that he is not in favor of any new kinds of taxes being imposed. He said that the business of the country should be so conducted that no new taxes are necessary.

It is understood that he modified his statement somewhat by stating that the Senate finance committee might find it necessary to change from one kind of tax to another, and that if that is the case with the Radio tax, he would not oppose it.

Critics of the proposed tax, fearsome of additional bureaucracy, attack the Senate committee on the basis that the Radio "manufacturer's" tax is but another form of direct taxation of the people.

Would Class Radio Reception as Luxury At the same time that the Senate committee voted to levy the ten per cent Radio tax, the body approved a reduction in automobile taxes and repeal of the candy tax, voted by the House. The committee also proposed a ten per cent tax on Mah Jongg sets.

It is evident that the game of Mah Jongg is merely a luxury, designed to pass leisure time, but it remains to be explained how the Senate Finance committee can consider the broadcasting and reception of educational lectures and talks, music memory contests, stock and market quotations weather reports and news bulletins as anything other than first-class necessities.

Tax Proposal Made Without Figures

The proposal accepted and voted favorable by the Senate finance committee, that Radio sets and parts be taxed, was originated by Senator McLean of Connecticut. It is said that the committee had no figures available upon which to base the probable collection of the tax, and that the committee added it with several other new taxes in a blind effort to avoid the deficit which is threatened under the Mellon tax reduction bill as it now stands.

If, as statistics would indicate, sales in the Radio industry amount to \$350,000,000 for the fiscal year, the manufacturers' sales figures will be close to \$150,000,000. The proposed tax of ten per cent then, levied at the source of manufacture, would yield the government \$15,000,000, less the cost of collection.

Would Money Go to Radio Administration?

The revenue so made available would amount to probably \$13,500,000. The money evidently would not go toward helping pay for the administration of Radio affairs, according to the much sliced and deficient appropriation finally allowed the Radio section of the Department of Commerce for the ensuing year.

The case of the poorly-funded Radio section is pitiable, considering the vast fund which would be made available by the proposed Radio tax. Here is what happened:

Radio experts of the department of Commerce asked the director of the budget for an appropriation of \$215,000 for the forthcoming fiscal year. This sum was considered extremely small in the light of the many needs of the Radio section. The budget director suggested that this low figure be cut to \$180,278—but when the committee reported the appropriation bill to the House, the budget allowance even for the Radio section was cut again—this time to \$158,778, an increase of but \$2,000 over the past year's appropriation.

Even last year's appropriation was considered entirely inadequate to carry on the work of the Radio section, much of which was necessarily slighted to the point almost of inefficiency.

Those Responsible for Radio Set Tax

For Radiophans and other interested parties desiring to communicate with the Senate finance committee relative to the proposed tax, the following list of Senators who are members of the committee is given:

- Simmons, N. C. Elkins, W. Va.
McLean, Conn. Curtis, Kans.
Watson, Ind. Gerry, R. I.
Reed, Penna. Reed, Mo.
McCormick, Ill. Walsh, Mass.
Ernst, Ky. Harrison, Miss.
Jones, N. M. King, Utah
Smoot, Utah Stanfield, Ore.
La Follette, Wis.

The amusement tax, providing the revenue bill is passed, will allow admissions under fifty cents to go free. Automobiles will be taxed but three per cent, and automobile accessories will bear an excise of only two and one-half per cent.

Coolidge on Air April 22

NEW YORK.—President Coolidge and Frank Noyes, president of the Associated Press, will address a luncheon of the Associated Press at the Waldorf Astoria, April 22, from 1:30 to 4 p. m., Eastern time. WEAf will broadcast the speeches.

Senate Passes Howell Bill

WASHINGTON.—Senator Howell's bill, declaring the air to be the inalienable possession of the people, passed the Senate last week, with practically no debate.

250,000 TELEGRAMS SUPPORT DILL BILL

FANS EXPRESS DESIRE TO HAVE TAX FREE MUSIC

Wires, Letters and Postcards Flood Senatorial Mail When Listeners Join Song Fight

NEW YORK.—According to advices received from Paul B. Klugh, executive chairman of the National Association of Broadcasters, hundreds of stations throughout the country recently advised their listeners "to put a million letters and telegrams into Washington," urging the support of the bill introduced by Senator Dill of Washington modifying the copyright law, particularly as it effects Radio.

From all reports, this had succeeded greatly beyond all expectations, as over 250,000 telegrams, exclusive of letters and postcards have reached Senators and Congressmen since the public were first asked to telegraph or write.

Station KFI Alone Raises 50,000 Wires.

When Station KFI went on the air asking all Radiophans interested in the passage of this bill, to wire their Congressman, one telegraph company sent more than 50,000 telegrams to Washington from Southern California alone.

One telegraph company, anticipating an avalanche of telegrams to Washington, had forms printed. All the listeners in had to do was pay seventy cents and sign the printed form. The telegraph company did the rest. The form telegram was called the Dill bill wire.

Dill Bill Almost Sure to Pass.

So much excitement has been raised that studios throughout the country were literally flooded with telephone messages. The response to the request for telegrams to go to Washington, certainly indicated

Wanamaker Broadcasts Through Station WJZ

Radio Carnival Heard in London with Ease

NEW YORK.—During the recent Radio carnival held here by the Wanamaker store, broadcasting through the courtesy of station WJZ, a number of surprises were given to the staid old Gothamites. Owners of one tube and crystal sets were astonished to hear "The Voice of the South," and "The Call of the North" as plainly as the local stations. This was the climax of a week of superb entertainment given by the store.

The announcers from WSB and WLAG were imported for this occasion, thereby explaining the marvelous phenomena of hearing these voices.

Unbroken and undistorted, the program was heard in its entirety in London. Radiograms and cables from London, and ships at sea were received, reporting concert clear and excellent.

Vandals Wreck Station and Studio in Newark

NEWARK, N. J.—Radio vandals working with a thorough knowledge of the subject of their wrath practically wrecked the nearly completed studio and station of WBS here recently.

an active interest in the future of Radio. At the time of writing, the disposition of the Dill bill had not been settled, but owing to the flood of letters and telegrams pouring into Washington, the copyright law will no doubt be amended by Congress to allow the broadcasting of music tax free.

The copyright law was passed years before broadcasting was even dreamed of. The men who framed the law naturally did not have the slightest conception of this great public service.

CONTENTS

Radio Digest, Illustrated, Volume IX, Number 2, published Chicago, Illinois, April 19, 1924. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign Postage One Dollar additional; single copies Ten Cents. Entered as second-class matter at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

All the Live News of Radio... 1 to 9
Before They Thought of "Mikes"... 5
Operating and Trouble Shooting for the Owner of a Melco Supreme Receiver... 11
What's Wrong with Your Receiving Set, Chapter VIII—The Neutrodyne Circuit... 13
An Evening at Home with the Listener In, a Chart to Show When to Listen In for Your Favorite Stations... 14
Advance Programs for the Current Week at the Larger Stations... 15 to 18
Thirty-Minute A-B-C Lessons for Radio Beginners, Chapter V—What Condensers are Good For... 19
Editorials; Indi-Gest; Condensed by Dielectric... 20
New Simple and Compact Radio Receiving Set, Part II—Main Panel Layout for Harkness Neutrodyne, by H. J. Marx... 21
Selection of Sets Having Desirable Hook-ups, Part II—Combinations that Control Regeneration, by Thomas W. Benson... 23
Variations on King Miloplex Circuit, Three Wires Placed in Cellar Used for Aerial... 27
Questions and Answers... 30
Radiophone Broadcasting Stations, Part III... 31
Radio Illustrated, a Page of Pictures... 32

Looking Ahead

More Neutrodyne Information will be given next week by Peter J. M. Clute in his series, "What's Wrong with Your Receiving Set"? Mr. Clute begins his neutrodyne article this issue.

Miloplex Celebrated and Long-Heralded Interview—in which much of the life of the Mystery Man is divulged—comes next issue. Aha, the plot thickens!

Resistance and Its Use in Radio is the next subject of Paul Edelman. In his easily understood style, Mr. Edelman will tell what the purpose of resistance is in a Radio part, be it rheostat, grid leak or potentiometer.

Inductance Alone, No Capacities, are used to tune the efficient set H. M. Taylor will describe next week. Promised this week, but you may be sure of reading about it next issue.

"Fallacy of Trick Circuits," by Thomas W. Benson, will have a third part. Read it next week and save your money from costly failures.

An Eight-Tube Super-Heterodyne will be described in detail beginning soon. The "super-het" is being tested and photographed, and it acts as well as it looks.

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

Form for subscription: Name, Address, City, State. Includes instructions to send check for five dollars for one year's subscription.

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

Crosley advertisement for a New Two Tube Set at \$18.50. Includes image of the radio set and text: 'CROSLLEY for the Radio World... THE most astounding value ever offered in radio—a new two-tube receiver, Crosley Model 51...'.

THE most astounding value ever offered in radio—a new two-tube receiver, Crosley Model 51, consisting of Armstrong regenerative detector and one stage of audio frequency Amplification. Licensed under Armstrong U. S. Patent No. 1,113,149.

This wonderful set gives loud speaker volume on local stations at all times and on distant stations under fair receiving conditions. Otherwise head phones should be used for distant reception. Be sure to see this receiver.

For Sale by Good Dealers Everywhere. Free Catalog Sent on Request

The Crosley Radio Corporation

Powel Crosley, Jr., President

Formerly The Precision Equipment Company and Crosley Manufacturing Company

4493 Alfred Street, CINCINNATI, O.

CARROLL'S VANITIES SHOW RADIO VALUE

ON AIR AT KYW APRIL 22 TO PROVE GOOD AGAIN

Success of Gigantic Musical Comedy, Opening in Chicago, Due Much to Broadcasts

(Continued from page 1)

bus, Cincinnati, Indianapolis, St. Louis, and now arrangements have been made with Station KYW here to have the entire first act broadcast on the Tuesday night following Easter, the night after the opening.

Whatever objections managers and managers' associations had to broadcasting shows from the stage prior to the advent of Mr. Carroll's wonder play were swept aside by the tremendous response from the public. The box office receipts literally skyrocketed, and the management of both the production and the theater deluged with mail and telegrams as well as telephone messages voicing the approval of the show and asking for more.

Earl Carroll, Philanthropist

Mr. Carroll has been congratulated by fans all over the globe for the wonderful fight he has put up in defense of broadcasting, but he modestly declares that the letters he has received from bedridden invalids, cripples and those living in remote places without a chance of ever coming to a theater, have more than repaid him for any trouble or inconvenience he has been put to in the matter.

The bewitching Peggy Joyce, who heads the long list of feminine loveliness, can almost be visualized as she makes her grand entrance to the stirring strains of "Pretty Peggy." The uproarious fun occasioned by Joe Cook, master comedian of the American stage, causes giggles, chuckles and finally long, loud laughs to echo around the earth as those in the remotest districts listen to his mirth-provoking clowning.

Long List of Stars and Beauties

In addition to the two stars mentioned above there is Don Barclay, L. Barton Evans, Frank Leslie, Irene Ricardo, Marguerite Davies, Dorothy Knapp, Mlle. Renova, Harry Burns, Charles Senna, Charles Callahan, Carlana Diamond, Ami Revere, John Byam, Claire Elgin, Lota Cheeke, Cardinal Pears, Ruth Oswald, Al Clair, Thelma DeLorez, Betty Fitch, Vera King, Elsie Lombard, Renoff, Vaughn Hyde, Flo Gillingham, Portland Hoffa, Frank Biyler, Elsie Neal, Lucille Moore, Brooks Hall, Pat Patterson, and a veritable regiment of the most dazzling beauties ever seen on any stage.

Theater owners and managers all over the world have their eyes focused on the fight which Mr. Carroll has been waging against traditions and the old fogy ideas entertained by the various managers' associations.

They see the box office receipts climb in every city where Vanities has played and broadcast, yet many of them hesitate.

Carroll to Broadcast Other Productions

Not alone is Mr. Carroll sold on broadcasting his production of Vanities, but he is also going to take the air route to millions in every part of the world with his great dramatic production, "White Cargo," now having a phenomenal run at the Daly Theater, New York, and on the occasion of opening his London company of "White Cargo" he will broadcast from the heart of the British Empire the performance by the English company so that the thousands upon thousands who have enjoyed the performance in New York by an American company will have the chance to compare the two organizations.

Chicago is the first city Mr. Carroll has invaded with his huge production (there are 128 people in the cast) which has offered no objection to his broadcasting the first act of Vanities. If anything, this proves that the news of the huge success attending the former experiments have preceded the special train which brings the greatest of all musical revues to the metropolis of the west.

PROGRAMS 'IMMORAL,' PASTOR ASKS CENSOR

PHILADELPHIA—At a recent convention here of Methodist ministers, Rev. G. D. C. Hanna urged that a censor be appointed for broadcasting stations. He said that some action should also be taken to compel stations to broadcast religious devotion each day for half an hour. He charges immoral and trifling entertainment fills the ether lanes. "Blatant outbursts of jazz," he said "are the chief things I hear when donning a headset." No action was taken on the suggestion, however.

WBAV ALARM CLOCK WAKES UP HIS WIFE

COLUMBUS, O.—A small alarm clock at WBAV here, recently awakened more response from Radio listeners than any other device that has been tried, judging from the number of letters and cards received. The clock was placed near the microphone for a few moments. Shortly afterward the alarm was sounded. Next day missives flooded in. One man declared that his wife, taking a nap while he listened in on the loud speaker, rolled off the davenport with a 5:30 a. m. expression on her face.

CKAC BROADCASTS IN TWO LANGUAGES

UNIQUE SERVICE CATERS TO VARIED TONGUES

Intricate Translating System Detracts Little from Speed of Sending News Flashes

MONTREAL, QUE.—Of the scores of thousands who have followed the Canadian Hockey Championship series played in Ottawa and Montreal, through Station CKAC, La Presse, Montreal, very few are aware of the added work involved in such a service, not from the mere broadcasting of up-to-the-minute results, but from the necessary bilingual point of view.

From isolated spots in Northern Canada, from large cities in the far West, from crowded towns in the East and South, messages have come to Station CKAC reporting a faultless reception of the entire series, and all bearing expression of wonder at the rapidity of "the two-languages" transmission.

Caters to Two Languages

The service of Station CKAC is unique inasmuch as it caters to two different races, by necessity. Though in this old province of Quebec, Scotch and French mingle together most friendly, speaking either language in the street, the household conversation is carried out in its respective native tongue, and the growing or older generation, in most cases, understand its mother tongue with more facility. Therefore CKAC hurls everything in the air in the official languages of this American continent "Switzerland."

In order to do this, remote broadcasting is difficult because of the impossibility of broadcasting from a ringside fight or games as they go along. To compensate, CKAC, with the co-operation of the Canadian National railways, who by the way, are ardent Radio entertainers, saving no expense or labor to fill the Radiophans' wants, provide operator-reporters at the ringside.

Translators at "Mike"

These men use direct, private wires to the studio, where an expert operator receives the flashes of the proceedings as fast as telegraphy will express. Alongside the receiving operator, are two translators deciphering English into French or vice versa. It is then passed on to the announcer who does the rest of the work.

The hockey games from Ottawa were broadcast but two or three minutes behind actual playing time, and scoring was announced within thirty seconds of the point itself. By this dual procedure of giving the Canadian National game series results, Radiophans from among five millions of French Canadians within Canada, New England and western states were pleased as well as any other from among the English speaking community.

WOR Tries Its Fans on Mental Telepathy

Newark Makes Tryout After WJAZ Tests Its Listeners

NEWARK, N. J.—Much discussion transpires among psychologists and others over the question whether thought transference or mental telepathy occurs; and most scientists who have given the question serious thought are inclined to believe that it does occur.

The results of the recent telepathic test tried at WJAZ, now WGN, Tribune-Zenith station, Chicago, have led Station WOR of this city to try the experiment on eastern listeners. In conjunction with J. Malcolm Bird, noted psychologist, WOR recently gave its listeners an opportunity to participate.

Letters and telegrams are still coming in and figures are not as yet available on the success of the stunt. The tests given were, in many ways, similar to those used at WGN.

LISTENING IN ON THE MAKE-UP



The fairer sex has been said to have kept nearly everything imaginable in the large, suitcase-like vanity cases. Here we have a new proof of the assertion. Miss Orabelle Roggeveen, Chicago, powders her nose while she listens in (to beauty hints?) on her homemade, vanity case crystal set, entered recently in a freak set contest. © U. & U.

Hawaii Hears Program from Station WOS Every Night

JEFFERSON CITY, MO.—A. F. Costa, of Wailuku, Hawaii, has written Station WOS, the Missouri State Marketing Bureau here, that he has been able to hear WOS regularly and clearly. On March 12 and 14 Mr. Costa listened to prearranged programs and heard them both loud.

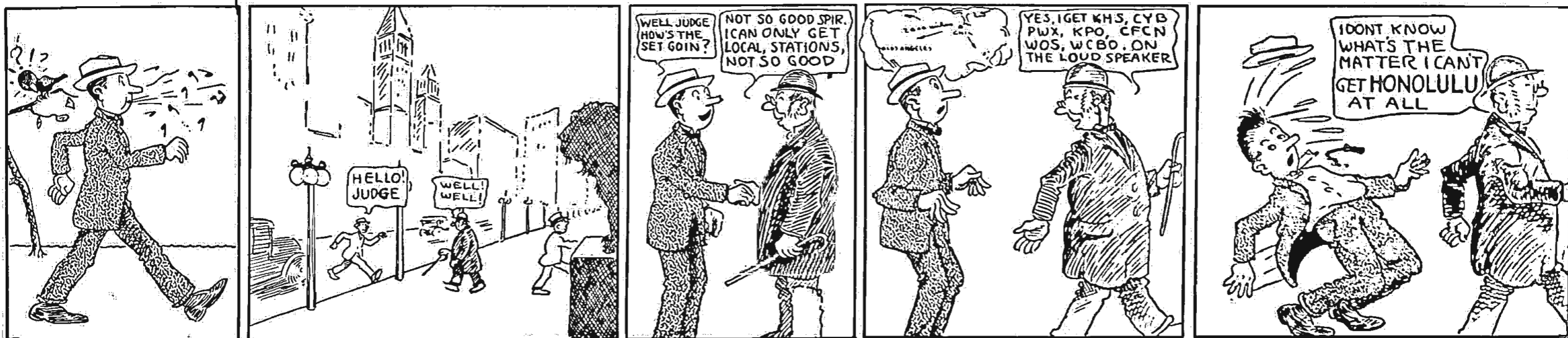
\$331,849 Value of Radio Exports During January

WASHINGTON, D. C.—There were 184,965 pounds of Radio apparatus exported during January valued at \$331,849 according to figures just made public by the Department of Commerce. Of this amount by far the largest went to Canada with a value of \$160,282.

THE ANTENNA BROTHERS

Spir L. and Lew P.

A Good "Judge" of Sets



MORE THAN BILLION PEOPLE WGN REACH

WORLD'S POPULATION, MINUS 2%, MIGHT HEAR

Capt. W. Evans, U.S.N., Gives Idea of Significance of Chicago Station's New World Record

By Capt. W. Evans, U. S. N., Commandant U. S. Naval Training Station, Great Lakes, Ill.

WOULD you believe that it is possible for 1,713,000,000 people, 98 per cent of the population of the world, to listen in to the message of a single broadcasting station without help of relay? The statement seems exaggerated, but let us see.



CAPT. W. EVANS, U.S.N.

On Sunday morning, March 31, between the hours of three and five, Central time, WGN, the Chicago Tribune-Zenith station, succeeded in transmitting the voice as far as Hobart, Tasmania. A new world record for broadcasting was established. The distance from Chicago, measured on the Great Circle (airline) route to Hobart, Tasmania, is 8,409 nautical miles (9,670 land or statute miles). I

am indebted to Lieutenant Melvin C. Kent, U. S. N., officer in charge of the naval branch hydrographic office in Chicago, for the measurement of this distance.

A nautical mile is a geographic mile, that is, it is a minute of arc on the earth's surface. There are 360 degrees in a complete circumference of the earth's surface, and each degree represents 60 minutes, or 60 geographic miles. Seagoing people call these nautical miles. (A statute, or land, mile, the mile commonly known to everyone, is shorter than a nautical mile. The latter is equal roughly to 1.15 statute miles.)

A Voice Almost Encompasses Earth

Now, as there are 360 degrees in one complete circumference of the earth, and

WGN REACHES OUT TO TASMANIA—A NEW RECORD



Gene McDonald, above, owner of WGN, formerly WJAZ, and John T. McCutcheon, right, famous cartoonist for the Chicago Tribune, greet Radiophans on the eve of making a new world record. The gala program marked the Tribune's affiliation with WGN.

A few of those present at the dedication of WGN, who, it develops, had a possible audience of 98 per cent of the world's total population. Left to right: Gene McDonald, John T. McCutcheon, Rev. Gardner A. MacWhorter, William M. Dewey, Mayor of Chicago Dever and Edith Mason, opera star. P. & A. Photos

60 minutes or nautical miles for every degree, the circumference of the earth's surface is equal to 21,600 nautical miles, or half the circumference, known as the semi-circumference, is equal to 10,800 nautical miles.

Subtracting the distance from Chicago to Hobart, Tasmania, from the semi-circumference, we obtain a difference of 2,391, or roughly 2,400 nautical miles. In other words, the voice transmitted over the WGN microphone at the time of the test reached within 2,400 nautical miles of half the distance around the world.

But as the voice theoretically was carried by Radio an equal distance in all directions, it means that the message covered the larger portion of the earth's sur-

face, and had it carried 2,400 miles further, would have encompassed the earth, with all its population.

But Two Per Cent World's Population Untouched

The present population of the earth is approximately 1,748,000,000 people of all races. The population of the small area uncovered by the broadcast is only about two per cent of the total population of the earth, and the small area in square miles is but about eleven per cent of the total area of the earth's surface.

It is very simple to demonstrate the foregoing and very interesting to see the results.

To make the demonstration, procure an ordinary globe of the earth, such as are

common in schools and many homes, a string, a pin and a pencil.

For all practical purposes the earth is a sphere (it is only slightly flattened at the poles). Chicago can be considered one of the poles, and a point directly opposite Chicago on the other side of the earth can be considered the other pole.

How to Demonstrate Area Covered

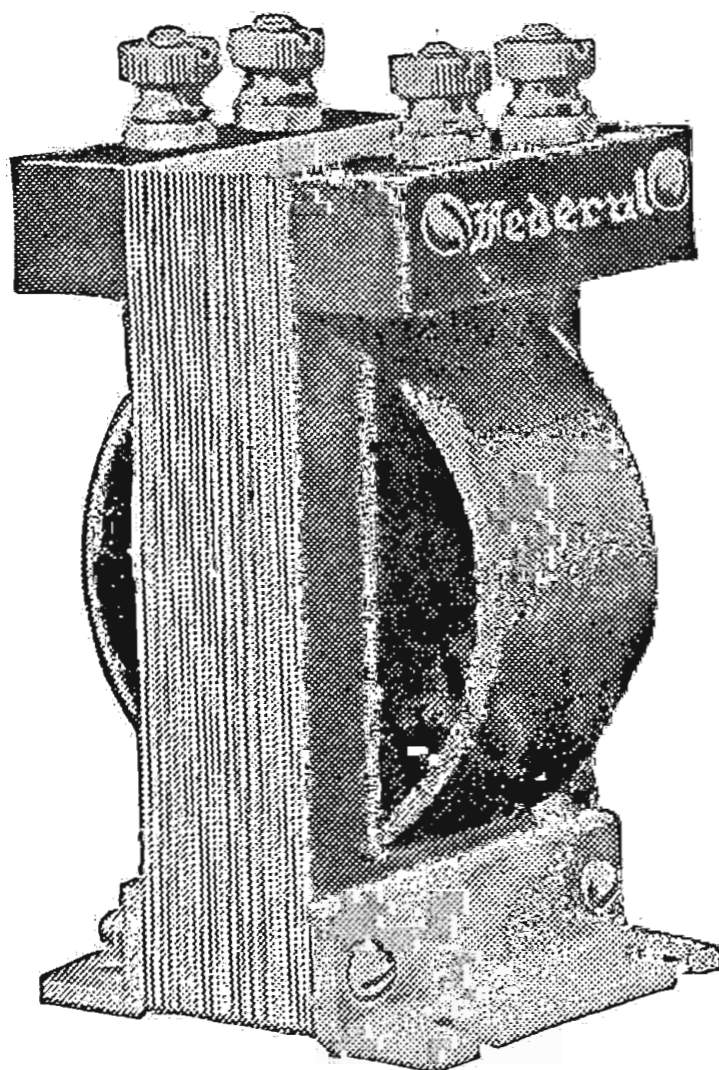
The latitude of Chicago is approximately 42° north; and longitude, approximately 88° west. Let us call this position the north pole. The opposite pole is 42° south latitude and 92° east longitude. We will call this latter position the south pole.

With one end of the string secured to a pin which is sticking in the globe in the position of our north pole (Chicago), stretch the string directly along the surface of the globe from Chicago to Hobart, Tasmania, and at that point on the string, secure the point of a lead pencil. This distance, remember, is 8,400 nautical miles.

Now, with the string centered at Chicago, swing the pencil around the globe, being careful always to keep the string straight between the pin and the point of the pencil. In this way, a circle will be drawn around the globe with Chicago as the center. Every point within this area so drawn will be at a distance not greater

(Continued on page 8)

130 Guaranteed Federal Parts and only One Quality—the Best!



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

\$7.00

EACH and every Federal unit has been given the same careful study of design—each is manufactured with the same unswerving mechanical precision. So it is that any radio set will be improved by the introduction of Federal Standard Radio Parts. The more Federal Parts—the more satisfactory the set!

This loyalty to the best interests of Federal customers has so expanded Federal production that today Federal are the largest designers and manufacturers of radio equipment in the country.

And Federal's iron-clad guarantee on every Standard Radio Part you buy assures you in a real business-like way of the complete satisfaction that you have every right to expect.

Federal Telephone and Telegraph Company

Factory: BUFFALO, N. Y.

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

The sign of Reliable Radio Dealers



BEFORE THEY THOUGHT OF "MIKES"

The gentleman in the circle at ten months considered life a very serious matter. With added years, his features still resemble the baby picture very much and he is still serious minded. From his station come evening talks and readings he often writes. Who? Wait till next week.



Last week's babe with the skirts on is at the left divulged as S. W. Barnett of WOC. Read more about him below.



Above is the first prize baby at Columbus, O., twenty-nine years ago. Name coming next week.



M. Joseph Sartory, WCAE, above, is the curly-locked lad with the pop gun shown last week. Note he still retains the curly hair. Read more about him below. The nine-months-old babe in the bear skin at the left has a name that rhymes with rainy.

Stanley W. Barnett, WOC

STANLEY W. Barnett managed to slip into this world just two years before the Twentieth century began its notorious career. WOC is the Palmer School of Chiropractic, as you all know, and as it happens, "Stan" is a licensed "back-puncher" as well as a brass-pounder and announcer. The native sons of California would probably put him in jail for being a chiropractor, so that eliminates his ever being announcer for KPO, KFI, KGO, KHJ, KLX, etc. However, he has been forced to put aside his knowledge of back-thumping and devote his time to key-thumping and microphone-massaging for the present.

During the war Mr. Barnett was a first-

class Radio operator in the U. S. Navy and became so attached to navy life that one year ago he enlisted for a life cruise on the good ship Matrimony. Husband-hunters need read no further. The married life seems to agree with Stan, for since the above photograph of him in his shirt sleeves was taken he has added about twenty-five pounds weight.

If you happen to notice that his voice is gradually becoming weaker and weaker, it is because he has to stand further and further away from the mike as a result of his increasing girth. B. J. Palmer, father of the Palmer school, is planning to take care of Stan's adding avoirdupois by putting in a couple of extra speech amplifier tubes in the announcer's microphone line.

We forgot to ask Announcer BWS where he was born, but he did say that his parents lived in Kittanning, Pa. And while we mention this another thought enters our mind. Few sons are able to keep so closely in touch with their parents as are the sons who by good fortune are announcers. BWS says that in three years' time he has only been home once, but "that doesn't mean much for me to be away from home, as my folks back in Kittanning hear my voice every night before retiring."

M. Joseph Sartory, WCAE

M. JOSEPH, now the voice of Kaufman & Baer, Pittsburgh, was born on the reverse side of the pond August 2, 1885. He soon developed a distaste for foreign languages and therefore moved to Pittsburgh, where he decided to stay for life, even if he did have to change his collar every day. He admits that he always was fond of outdoor sports of all kinds and stayed away from school whenever possible, although he did have a very distinct "what makes it go?" complex and ruined many good alarm clocks.

Beginning at the tender age of 14, he became a Postal Telegraph messenger and soon thereafter was promoted to Morse "speed maniac." In the latter capacity of brass pounding Mr. Sartory was known as "The Kid" as a result of his extreme

youth. Morris Stephens taught "The Kid" vocal lessons as a result of his interest in choral singing. He has sung for many of the larger Pittsburgh churches.

Mr. Sartory was trying to answer "what makes it go?" by snooping around WCAE one day, when Chief Operator Thomas McLean "discovered" him. M. Joseph says he never will forget the first awe inspired in him by the thoughts that went chasing through his mind the first time he substituted for the regular announcer.

He emphasizes that he is impressed by the simplicity of really great men, such as he has met in the studio, and their unquestioning compliance with the instructions or directions given them on their first appearance before a microphone. According to his creed, he believes that the announcer is just a necessary evil to the BCL, and that his duty to them consists first, in placing the artists to the best possible advantage before the microphone, balancing out volumes of sound so that they blend evenly; second, making all announcements clearly and concisely, not too fast, so that there is no question as to what station is being heard; third, making himself as inconspicuous as possible, and permitting the credit for a performance to fall where it is justly due, to the artist who is performing.

FREE AIR ISSUE HAS HOOVER'S APPROVAL

DEPT. OF COMMERCE NOT AGAINST BILL

Senator Howell's Plan, However, Secretary Says, Does Not Go Far Enough

WASHINGTON, D. C.—The Department of Commerce is not opposed to the free ether bill favorably reported to the Senate as introduced by Senator Howell, according to Secretary of Commerce Hoover.

Secretary Hoover states that while the department is not opposed to the bill, he does not feel that it goes far enough. Mr. Hoover pointed out that the two-year license period allowed by the Howell bill would not interfere in any way with the department inasmuch as at the present time the department is only issuing licenses for a comparatively short time.

Representative Rayburn, of Texas, has introduced a free ether bill in the House of Representatives. The bill is identical with the bill introduced and reported out by Senator Howell in the Upper House.

Senate Against Special Privilege

The Senate committee on interstate commerce in favorably reporting out the Howell bill, points out that "the ether and its use within the jurisdiction of the United States may be well considered one of the great and almost untouched natural resources of the nation."

"No one can prophesy," continues the report "the future of its use. Its possibilities undoubtedly transcend any dreams of today not merely in the matter of the transmission of signals, speech, and pictures (including the printed pages), but also of the transmission of energy for the development of power."

"Under the circumstances, therefore, it would be unthinkable for Congress, through any laches on its part, to encourage any person or interest to assume the possibility of securing a right to any use of the ether whatever, other than a mere privilege for a limited period of time."

Lays Batavia Woes to Short Circuits

North Carolina Man Offers Solution to Troubles; \$50 Reward Offered

CHICAGO.—As an answer to the Batavia, N. Y., Radiophans who are offering \$50 to the person or persons who discover and eliminate the mysterious electrical disturbance in Batavia, comes a letter from J. A. Turner, Winnsboro, S. C., who says the trouble may undoubtedly be traced to short-circuited transformers in electric power lines. He says:

"You will no doubt find that a high voltage wire is rubbing against the shell of one of the transformers, thereby causing a high frequency current to flow from the transformer over the entire system of the city, or that there is a short-circuit within the transformer which would produce the same effect."

"To locate the trouble, I suggest that a one stage Radio frequency receiver with a loop aerial be hooked up and placed in an automobile. The lines should be followed until the disturbance noise reaches its maximum. At this point a faulty transformer or short-circuit will very likely be found."

LISTENING SETS FOR VETERANS' HOSPITALS

Wiring for Every Sanitarium Being Prepared

WASHINGTON.—The Veterans' Bureau here plans to equip all government hospitals with Radio as soon as possible. As a preliminary step the wiring for Radio of hospitals under construction has been authorized.

All 48 hospitals at present occupied, not yet supplied with Radio, will also be wired and equipped as soon as means to meet the expenses can be found. Money will be needed for the centrally located receiving sets, and headsets and loud speakers. It is hoped charitable institutions or Radio manufacturers will aid the government in its plan.

Your Choice FREE Limited Supply

Your prompt action gives you one bound volume with each annual subscription. New or renewal.

Greatest Collection of Radio Information

A. B. C. Lessons for Radio Beginners. Two, Three, and Four Tube Reflex Circuits. The Famous Hileplex with Various Hook-ups. Reinartz Long Distance Circuits—Ultra Reinartz. Flewelling Popular "Fliver" Circuit. Single Tube Reflex Circuits—Super-Heterodyne. Five Tube Neutrodyne, Special R. D. Hook-ups.

In addition to these features, the current issues give you all the live news in Radio. The popular Q. and A. Department. How to Operate Your Set. Advance Broadcasting Station Programs, and a correct list of all Broadcasting Stations.



65 Copies

Serving as a Radio Reference Library

You receive 52 issues with your Subscription and 13 issues in each bound volume

Bound Volumes 3, 4, 5 and 7 now ready.

This offer good only in U. S. and Possessions, and Canada.

This offer not good through dealers or subscription agencies, but must be sent us direct with the full subscription price. Remittance must be by check, money order or draft.

RADIO DIGEST, 123 W. Madison St., Chicago
Check Offer Desired

One year's subscription, and choice of one volume. Send Vol. Enclose..... \$5.00

One year's subscription, and choice of two volumes. Send Vols. Enclose..... 7.00
Additional Bound Volumes at \$2.00 each.

Name

Address

City State.....

4-19-24

OLD TIME MELODIES OUST JAZZ AT KFNF

SHENANDOAH, IA., HAS A 9 O'CLOCK STATION

Fiddlers' Trio, Farmers' Cornet Band, Virginia Reels and Pig Mascot Featured

SHENANDOAH, IA.—Laughing saxophones, weirdly whining reeds and woodwinds, grotesque tympany—epitome of Jazz.

The whirr of a generator, a brief announcement and a clash of cymbals—opening of any program.

Twist of the detector dial, a subdued siren and a blare of modern melody—on any DX set.

But tarry, should the operator catch the wave length of Station KFNF, the broadcasting organ of the Henry Field Seed company at Shenandoah, Ia., he could easily imagine that he had been transported back through time and space to the "good old days."

Specializing in Old-Fashioned Music

Like as not, the "Fiddlers' Trio" of Shenandoah would be stamping their boots in rhythm with the square dance or Virginia reel they were playing. Or mayhap the Page County Farmers' Silver Cornet band, 35 pieces, would be tuning up to play. KFNF is specializing in old-fashioned music.

But the operator must tune in before 9 p. m., Central time. There is no broadcasting after that hour in Shenandoah.

"We are all hard-working folk hereabout," announces Henry Fields, who operates the seed house and the station, "and we are very busy about ten hours a day. The Radio work must be done in off time."

What KFNF Won't Broadcast

Barred from the Shenandoah programs are:

- Jazz
- Elocution
- Heavy classical music
- Child prodigies
- Heavy speeches
- Overuse of dedications

Mr. Field personally reserves the right

KFNF'S OWNER AND A POSSIBLE SQUEAL



Henry Fields, Shenandoah, Ia., seed merchant, with the mascot of his station, KFNF, "Penelope" (the pig) may put some new squeals on the air.

to "pull the plug" on any speaker who talks too long or gets mean or tiresome.

Winnipeg Rebroadcasts Kansas City's Program

Canadian Crystal Set Users Benefit by Experiment

WINNIPEG, MAN.—For the second time, the Manitoba Telephone system's station here has rebroadcast an American station. During a recent program CKY picked up WDAF, Kansas City Star, and put it on the air for the benefit of local crystal set users. WDAF played a piano selection, followed by the announcement of some basketball results. CKY immediately "came back" with a piano solo by Digby Tomlinson, the Blind Pianist, followed by the results of a local hockey game.

Tube set users reported that there appeared to be no quality lost in the reproduction. Enthusiastic letters have since been pouring in from crystal set fans. CKY is now able to rebroadcast whenever local receiving conditions are good.

His broadcasting schedule is:

General concerts: Wednesdays and Saturdays, 7:30 to 9 p. m.; Sacred song service: Sundays at 6:30 to 7:30 p. m.; Ladies' hour: 3 to 3:40 p. m. daily.

Penelope, a pig, is the mascot of KFNF. Mr. Field is striving to educate Penelope so that she will be able to give a flourishing sign-off call. The Shenandoah shoat was adopted as a rival to the WLAG rooster of Minneapolis. The rooster sometimes crows at the conclusion of programs.

CHATHAM PICKS UP SFR, EIFFEL TOWER

EASTERN FAN FIRST IN U. S. TO HEAR PARIS PHONE

Listens to 1780 Meter Station for One Hour with Four-Tube Receiver

CHATHAM, MASS.—The first Radio concert to be heard in America and transmitted from the Eiffel Tower, Paris, France, was intercepted recently by Bert Moulton, this city. Mr. Moulton is employed as a Radio operator here, besides operating his own experimental station.

The powerful station on the Eiffel Tower, with the call letters SFR, operated by the Compagnie Francaise De Radio-phonie, used a wavelength of 1780 meters, and broadcast a special program intended for American listeners between 5:00 p. m. and 7:00 p. m., Eastern time.

A carefully calibrated receiver employing four tubes was used, and Moulton listened to the French broadcast program for over an hour. He heard instrumental and vocal selections at 6:10 p. m., and held them until 7:15.

It was the first time regular concert from France was received in America. Station SFR used 2000 watts, twice as much power as the larger American broadcasters use.

Earn \$500 to \$2000 a Day in RADIO

You can! Hundreds of ambitious men are already earning thousands of dollars in this wonderful new industry—many working only in their spare time. Mail coupon below for Free Book which describes fully the amazing money making opportunities in Radio and tells how YOU can earn from \$500 to over \$10,000 a year!

The astounding growth of Radio has created thousands of big money opportunities. Millions of dollars were spent during the past year on Radio—and thousands of young men are needed right now to meet the ever increasing demand of work. Never before has there existed so many and such remarkable opportunities for making money in this wonderful new field.

Men are needed to build, sell and install radio sets—as radio engineers and executives—as operators at land stations and on ships traveling the world over—as operators at the hundreds of broadcasting stations. And these are just a few of the wonderful opportunities!

Easy to Learn Radio At Home In Spare Time

No matter if you know nothing about Radio now, you can quickly become a radio expert, by our marvelous new method of practical instruction—instruction which includes all the material for building the latest up-to-date radio apparatus.

Scores of young men who have taken our course are already earning from \$75 to over \$200 a week. Merle Wetzel of Chicago Heights, Ill., advanced from

lineman to Radio Engineer, increasing his salary 100% even while taking our course! Emmett Welch, right after finishing his training, started earning \$300 a month and expenses. Another graduate is now an operator of a broadcasting station, PWX of Havana, Cuba, and earns \$250 a month.

Still another graduate, only 16 years old, is averaging \$70 a week in a radio store.



Send for FREE BOOK

Learn more about this tremendous new field and its remarkable opportunities. Learn how you can quickly become a radio expert and make big money in Radio. Find out what remarkable successes our graduates have had—even a few weeks after their training finished.

We have just prepared a new 32-page booklet which gives a thorough outline of the field of Radio—and describes our amazing practical training in detail. This Free Book, "Rich Rewards in Radio" will be sent to you without the slightest obligation. Mail coupon for it now!

National Radio Institute

Dept. 55DA
Washington, D. C.

National Radio Institute, Dept. 55DA, Washington, D. C. Please send me without the slightest obligation your Free Book, "Rich Rewards in Radio" and full details of your special Free Employment Service. Please Write Plainly.

Name Age

Address

City State

Radio Firms—Secure practical Radio Experts—our graduates. Write us today.

BLUE PRINTS

MAKE YOUR OWN SET



NEUTRODYNE

Five Tube Receiver
Full Assembly Details
Blueprints
Tuning Instructions

REINARTZ

Three Tube Receiver
Detector and Two Stage Audio
Frequency Amplifier
Assembly Details
Tuning Instructions
Blueprints

MILOPLEX

Three Tube Receiver
Detector and Two Stage Audio
Frequency Amplifier
Assembly Details
Tuning Instructions
Blueprints

REFLEX DE LUXE

Three Tube Receiver
Full Details for Assembly
Blueprints
Tuning Instructions
How to Make a Loop Aerial De Luxe

FLEWELLING

Three Tube Receiver
Detector and Two Stage Audio
Frequency Amplifier
Assembly Details
Tuning Instructions
Blueprints

ONLY 50 CENTS EACH

All five blueprints for \$2.00
Send Only Money Orders. No Checks or Stamps. Coins at Your Own Risk.

RADIO DIGEST PUBLICATIONS

123 West Madison Street, Chicago, Ill.

Please send me the Special Offer of 5 Books. I am enclosing M. O. for \$2.00.

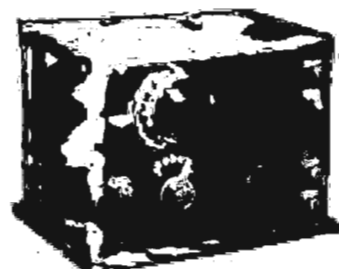
Name

Address

City State

4-19-24

1000 Mile Radio Set FREE



Fresco Reg. License Armstrong U. S. Patent No. 1113149

In order to complete your practical instruction at home, learning by actual experience, this splendid regenerative receiving set is now included without the slightest additional cost.

Wonderful Opportunities

Hardly a week goes by without our receiving urgent calls for our graduates.

"We need the services of a competent Radio Engineer"—"We want men with executive ability in addition to radio knowledge to become our local managers"—

"We require the services of several resident demonstrators"—these are just a few small indications of the great variety of opportunities open to our graduates.

Take advantage of our practical training and the unusual conditions in Radio to step into a big paying position in this wonderful new field. Radio offers you more money than you probably ever dreamed possible—fascinating easy work—a chance to travel and see the world if you care to or to take any one of the many radio positions all around you at home. And Radio offers you a glorious future!

CONCERT PICKED UP ON NITROGEN TUBE

PROFESSORS MAKE DIODE OSCILLATE AND RECTIFY

University of Pennsylvania Technicians Use Neither Aerial Nor Ground in Unusual Experiment

PHILADELPHIA.—One of the most novel receptions of a concert ever staged in the history of Radio was successfully accomplished recently by two professors at the University of Pennsylvania, recently while conducting experiments to determine the construction of nitrogen molecules.

The experiment was made by Dr. E. Witmer under the direction of Dr. Charles B. Bazzoni. They were using a specially designed two-element nitrogen-filled tube to study the spectrum of the blue light emitted by the tube, made incandescent by passing through it a current of electricity.

No Aerial or Ground Used

The most remarkable thing about the reception with the nitrogen tube is that no special apparatus of any kind was used to tune in a station, the nitrogen tube and its circuits acting as a rectifier. No aerial or ground was employed. The long leads, inclosed in a conduit and coming underground from a storage battery in the adjoining building, served as a loop antenna, and also supplied the necessary inductance.

Although the tube contains only two elements, it was made to oscillate. The headphones were connected to the secondary of a transformer and the pulsating direct current set up in the secondary acted on the diaphragms of the phones and produced sounds.

Bureau of Standards Keeps Wavemeters Over Wide Band

WASHINGTON.—Two specially constructed wavemeters, covering the frequencies in more general use, (16,650 to 65 meters), are kept at the bureau of standards here. The standard wavemeters are used in calibrating wavemeters belonging to the Radio inspection service, manufacturers, colleges or others in need of standard wavelength, in Radio measurements and in adjusting the bureau transmitting set, WWV, which is used to transmit standard wave signals.

A VOICE FROM ROOSTER HEAVEN



Joe Maland is shown before the microphone of Station WLAG, Minneapolis-St. Paul, with his pet (stuffed) rooster, Billy Lag, signing off at the close of the Northwest Farmstead program.

IT IS rumored rather widely that Station WLAG, Twin City Radio Central, Minneapolis, has a pet rooster, a real one by the name of "Billy Lag," who signs off every evening at 8:15 p. m., Central time, closing the Northwest Farmstead program for WLAG. It is rumored—but we doubt it. For the crow of Billy Lag, despite the above photograph, has a very peculiar resemblance to the war whoop of one Joe Maland, said to be the trainer of Billy. But if Billy was trained, it was Joe's voice that received the training.

And thereby the whole plot is exposed. A terrible plot it was, too, embracing the whole country in its talons. Why, WLAG even had the above photograph of Mr. Maland at the microphone taken, and then pasted in a photo of Billy Lag. After the pasting operation, the photographer's art was again employed to take a picture of the "doctored" photograph. Then the photograph was sent to every friend of WLAG, quite an order of photos, together with the beautiful explanation of how Joe

Maland tickles the reported Billy to get a sign-off crow.

But the editor wasn't sold on the idea. Billy is nothing more than a dead, stuffed bird, whose museum specimen number still remains on his left leg. His glass eyes also give him away. So Billy Lag's crow will continue to be a ghostly cackle from rooster heaven . . . until WLAG sends us Billy himself or motion pictures of Billy in action.

PLAN TO BROADCAST G. O. P. CONVENTION

WJAX, CLEVELAND, LIKELY TO BE PLANT USED

Part of Proceedings at Republican Parley to Be Barred from Ether

WASHINGTON, D. C.—Elaborate preparations are being made for the broadcasting of the Republican National convention proceedings at Cleveland. Details, however, are not yet available. It is understood that a meeting of the committee in charge will be held the latter part of April in Cleveland at which time definite details will be available.

It is understood that it has been tentatively decided to install loud speakers all over the hall at Cleveland and in addition on the outside of the convention hall so that thousands of people who will not be able to gain admittance to the convention proper will be able to hear details from the streets adjoining the hall.

Certain parts of the proceedings will be broadcast and it is probable that Station WJAX, the Union Trust company, will be used. At the present time it is believed that only a certain part of the proceedings will be broadcast. It is not thought feasible to broadcast the entire convention.

WBZ Man Gets Loud Speaker

SPRINGFIELD, MASS.—Arthur A. Eise-mann, program director of Station WBZ here, was recently secretly married to Lois E. Gedelman of Youngstown, O. A combination brass and funeral band greeted him on his return, news of the wedding having arrived first.



"The Loveliest Thing I've Ever Heard Over the Radio"—Mary Garden

Only the most flawless reproduction, free from distortion and parasitic noises, could earn a tribute so unreserved from America's queen of song.

The exquisite tone quality and purity of Duo-Reflex reception that appealed so irresistibly to Miss Garden is finding equally enthusiastic appreciation in the homes of super-critical radio lovers everywhere.

Not only in sheer tonal perfection, but in range and volume, have Erla Duo-Reflex receivers demonstrated decisive superiority. Tube for tube, they are the most powerful receivers known.

Complete Erla parts, including celebrated synchronizing radio and audio transformers that enable vacuum tubes to do triple duty, guarantee success to the amateur who "rolls his own." Easily understood blueprints guide every step of construction and assembly.

Ask your dealer for free Erla Bulletin No. 20, giving latest Erla one, two and three-tube diagrams; or write direct, mentioning your dealer's name.



Increased range and volume, as well as elimination of distortion, follow installation of Erla transformers. Reflex and Cascade types, \$5



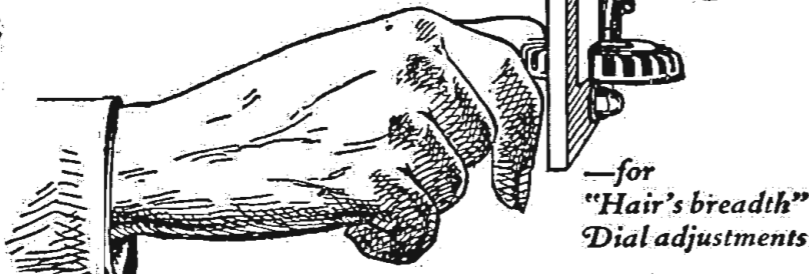
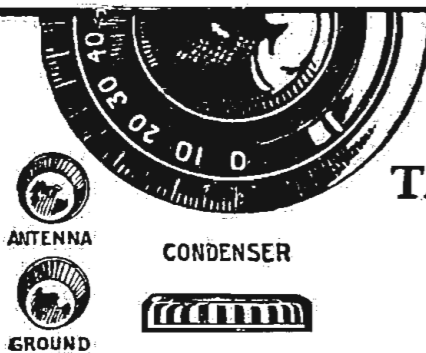
Exclusive ability of Erla audio transformers to amplify three stages without distortion assures improvement in any receiving set. List, \$5

Dealers and Jobbers—Erla products turn over rapidly, reducing capital invested and increasing profit. Send for liberal scale of discounts

Electrical Research Laboratories
Dept. A 2515 Michigan Ave., Chicago

ERLA

The GREBE TANGENT WHEEL VERNIER



—for "Hair's breadth" Dial adjustments

A Device found only on GREBE Receivers

THE man who has once operated a Grebe Receiver reaches instinctively for the Tangent Wheel Verniers on every other receiver he thereafter tunes.

This and other details of Grebe craftsmanship are fully covered by patents granted and pending. Inspect these details at your dealer's today.

Grebe Regenerative Receivers are licensed under Armstrong U.S. Pat. No. 1,113,149



"The accomplishment of great things consists in doing small things well." —Confucius

Perfection of detail is a big factor in the success of the Grebe Receivers.

Doctor Hyslop

A. H. GREBE & Co., Inc.

Richmond Hill, N.Y.

MORE THAN BILLION PEOPLE WGN REACH

WORLD'S POPULATION, MINUS 2%, MIGHT HEAR

Capt. W. Evans, USN, Gives Idea of Significance of Chicago Stations New World-Record

(Continued from page 4)
than 8,400 miles from Chicago, or from our so-called north pole.

By this we will divide the earth into two unequal parts, the larger part representing the area that is within 8,400 miles from Chicago (the distance reached by the voice on this test).

Finding Unreached Area of Earth

Another and simple way to get this circle is to take a string or a pair of ordinary dividers, and, with our south pole (latitude 42° south, longitude 92° east), and a length of string, or dividers equal to 2,400 miles—or 40° in the earth's arc—draw on the surface of the globe a circle with our south pole as the center. If carefully done, this circle will exactly coincide with the circle as drawn above, with Chicago as the center.

This smaller area will be the area within which all points are at a greater distance than 8,400 miles from Chicago, and it represents the area within which the voice on this test did not reach.

Area Covered Will Surprise

Now, by an examination of the two areas, it will be found that, in the large area, i. e., the area in which no point is over 8,400 miles from Chicago, there are included the entire continents of Europe, Asia, Africa, North America, South America, all of the Pacific Islands, also the north and south poles of the earth. Whereas in the smaller area, there are included only the western portion of Australia and Tasmania, the southern portion of the Sumatra group, and a few islands in the Indian Ocean. These latter islands have but a very small population.

This demonstration will probably be a surprise to most readers, as it was to me.

Why 98 Per Cent of World Couldn't Hear

It means that when the voice over a microphone at Chicago will carry 8,400 nautical miles, that it is reaching nearly the entire population of the earth (98 per cent).

Owing to the fact, however, that the Radio does not carry in daylight as it does in darkness, the voice at one time could not reach the whole inhabited part of the earth, but by speaking in the morning about daylight, as was done in this recent test, it would reach one-half of the earth to the westward; and then, by speaking just at dark in the evening, it would reach the other half of the earth to the eastward; nearly the whole area of the earth, however, being reached from one position.

Receiving and sending instruments are continually being improved and it is, of course, a matter of only a very short time when the additional 2,400 miles noted above will be reached. When that is accomplished it will be possible for the voice to carry over the whole of the sphere. But, as stated before, with the 8,400 miles that has been reached, we reach almost the entire part of the earth that is inhabited.

Aerial Regulatory Law in Use in Washington

Prohibits Towers on Public Ground; Fixes Heights

WASHINGTON, D. C.—The first Radio regulatory law has just been made effective by the commissioners of the District of Columbia. The regulations prohibit the erection of aerials on any public property and they also prescribe certain heights.

It is said that at a recent fire when the firemen went on the roof of an apartment house they were confronted with twenty-four aerials which had to be cut before they could work on the fire. The new regulations are to prevent such instances.

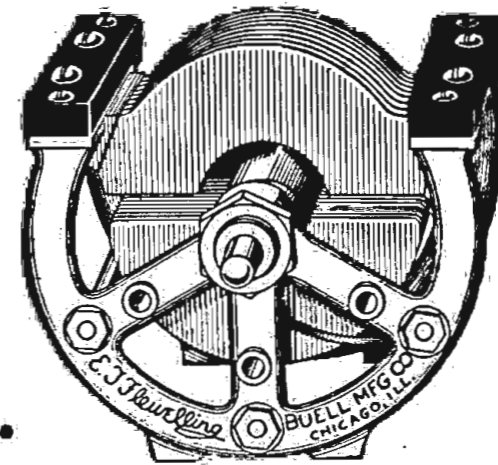
WHEELING, W. VA.—The city council has passed unanimously the city's first ordinance regulating erection of Radio aerials. The ordinance requires a city permit before a resident may install a set.

The new regulations say antenna shall not cross over or under electric light or power wires carrying 500 or more volts and all possibility of contact must be avoided. The ordinance is purely for the insurance of proper installations and contains very rigid specifications of how installations shall be made. Fines up to \$100 or a year in jail may be placed against persons violating the ordinance.

RADIO TALKS

The use of a low resistance condenser or a low resistance tuner will so sharpen your tuning and increase your selectivity and distance ability as to make their selection a matter of vital importance.

Genuine BUELL—E. J. Flewelling Radio Apparatus De Luxe

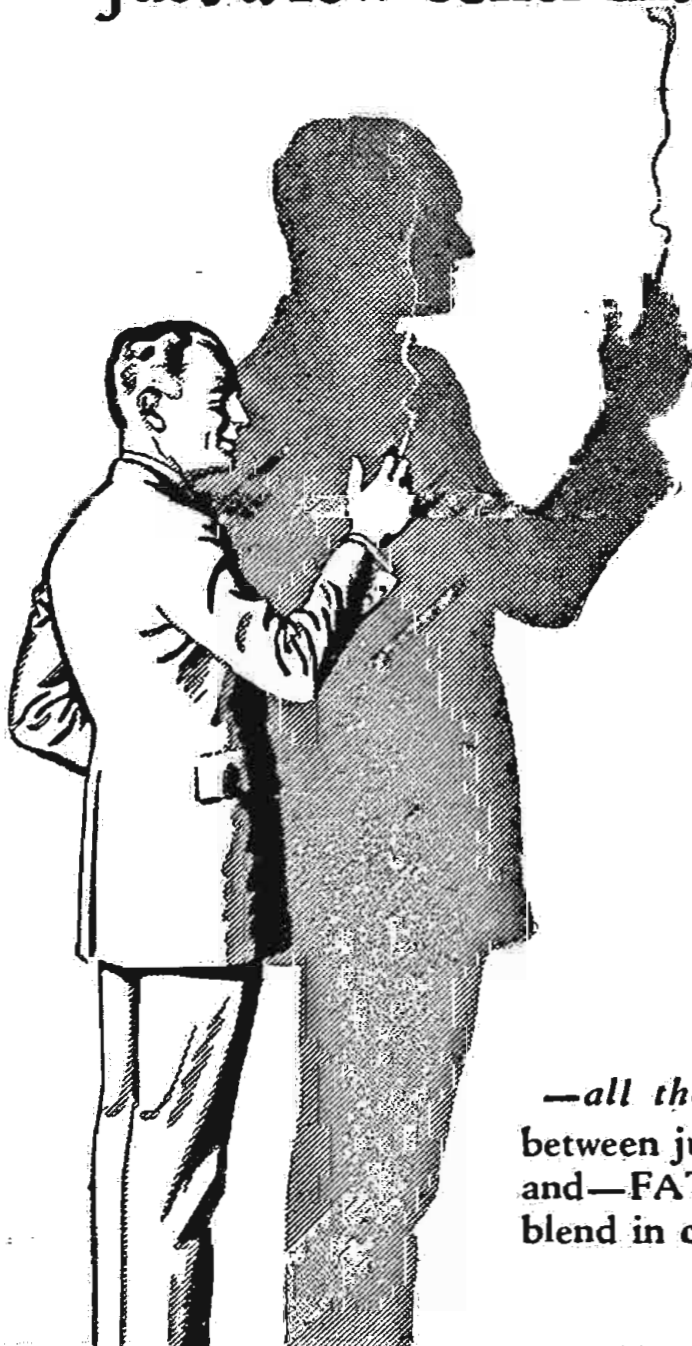


We offer a condenser so good that it has met with the unanimous approval of every user. Its construction is extra rugged; its performance is above that of any other condenser of similar capacity.

BUELL MANUFACTURING COMPANY
2977 Cottage Grove Ave.
CHICAGO

Condensers • Tuners • Sockets

“What a whale of a difference just a few cents make!”



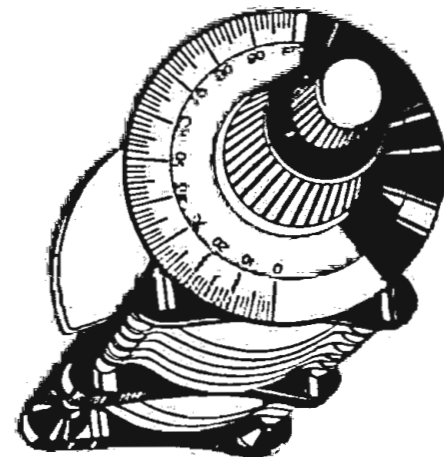
—all the difference between just an ordinary cigarette and—FATIMA, the most skillful blend in cigarette history.

COMSCO CONDENSERS

for maximum results



COMSCO



COMSCO

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
THE ORIGINAL AUTOMATIC
BULL DOG GRIP TELEPHONE PLUG

For One Pair Phones
\$1.00



For Two Pair Phones
\$1.50

ASK FOR COMSCO AT YOUR DEALER

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

GENERAL INSTRUMENT CORP.

423 Broome Street
NEW YORK CITY



NO TUBE RESTRAINT ACCORDING TO R.C.A.

OFFICIAL OF LARGE CORPORATION EXPLAINS

E. E. Bucher Says Incorrect Guesses at Demand Is Root of Trouble —Okeh Now

NEW YORK.—When asked whether there was any foundation to the rumors that the company which he represents had withheld the sale of vacuum tubes and thus restrained the sale of competitive apparatus, E. E. Bucher, manager of sales, Radio Corporation of America, said:

"Rumors to the effect that we have been holding back on our tube sales are absolutely unfounded, and I wish to deny that this is the case.

"Only ten to fifteen per cent of our total monthly tube production is required for our merchandise, the remainder going to purchasers using sets and parts manufactured by others.

"There are general facts in the vacuum tube situation which we are glad to give and which, no doubt, will tend to curb any feeling that the Radio Corporation of America is not giving this subject the close attention that it deserves.

Presents Facts of Case

"We maintained a day-by-day inventory of from 450,000 to 600,000 tubes of five different types, up to January 1st of this year, and steps were taken many weeks past with the endeavor to build this inventory to still larger figures.

"768,816 Radiotrons were delivered to the trade in January, this year; 825,936 in February, and March deliveries will exceed 900,000.

"70 per cent of our monthly production schedule is composed of Radiotrons UV-200 and 201-A.

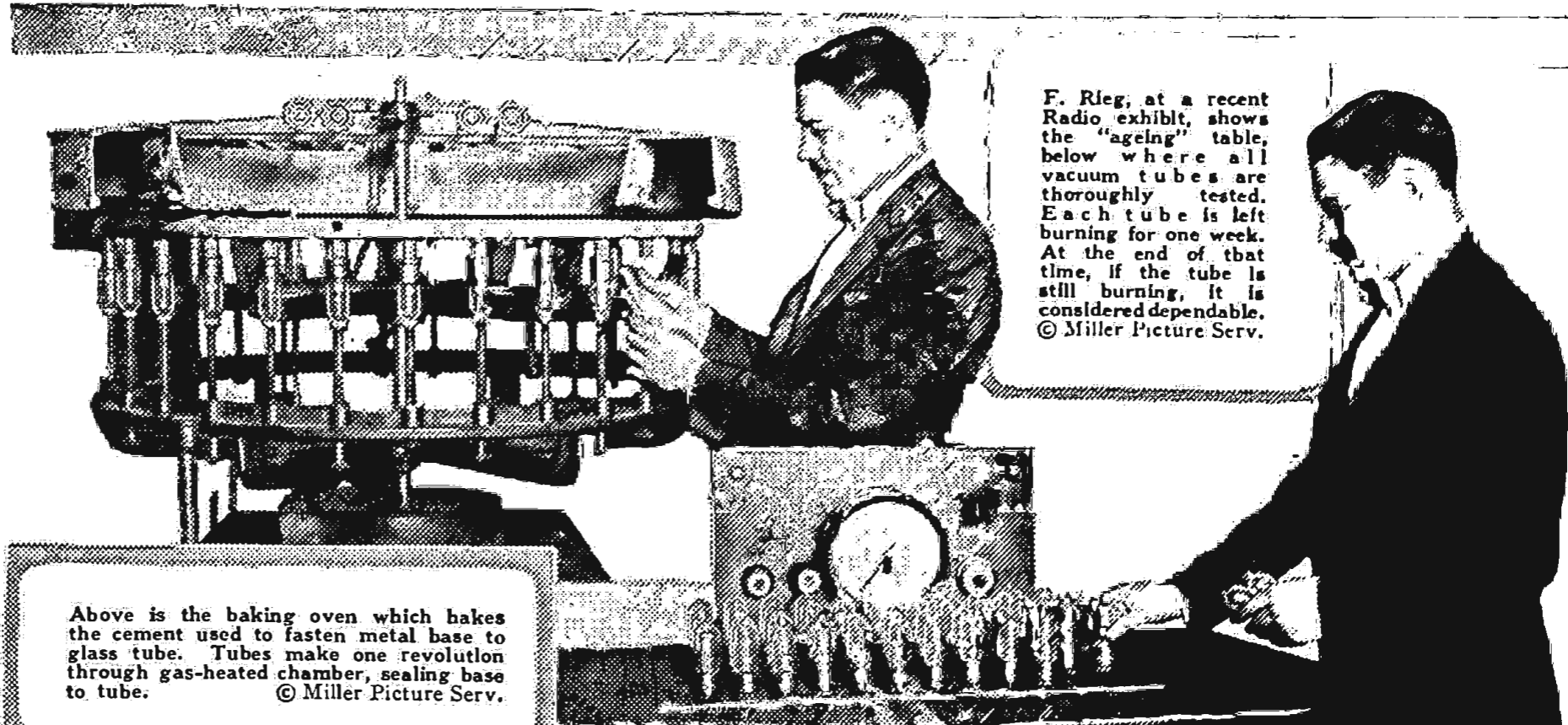
"Stocks of dry battery tubes have been in excess of the trade demands from May, 1923, to date and current production is keeping pace of the demand.

Believes Excess Will Come Soon

"Current production on the storage battery types of tubes is actually in excess of new orders booked for these particular types, but present production schedules should produce an excess soon.

"Briefly, the industry is too young to enable either the dealer or the distributor to place orders with the manufacturer sufficiently in advance to meet the fluctuating

"HOWDJA" LIKE TO OWN A VACUUM TUBE MACHINE?



F. Rieg, at a recent Radio exhibit, shows the "aging" table, below where all vacuum tubes are thoroughly tested. Each tube is left burning for one week. At the end of that time, if the tube is still burning, it is considered dependable. © Miller Picture Serv.

Above is the baking oven which bakes the cement used to fasten metal base to glass tube. Tubes make one revolution through gas-heated chamber, sealing base to tube. © Miller Picture Serv.

demands for the specific types of tubes. As the factories, on the other hand, must prepare their production and procure new material from ninety to 120 days in advance of actual deliveries, it becomes necessary for us to endeavor to predict at least four months in advance what the trade requirements may possibly be. To this end the Radio Corporation maintains a staff of expert statisticians whose time and energies are devoted solely to a study of this situation, frequent conferences are held with the manufacturers and production schedules are revamped to meet the fluctuating demands of the market.

May Be Locality Shortages

"A temporary tube shortage may develop in any particular locality not by reason of insufficient factory production, but because of the difficulties of obtaining uniform distribution. The Radio Corporation sells its tubes to distributors; from that point on it has no control over distribution to the dealers. We are aware, however, that distributors are making

every effort to serve dealers in all localities, but the actual quantities distributed in any particular territory are also governed by the amount of dealers' orders, dealers' credits, inability of some dealers to sense the public demand sufficiently in advance to enable them to serve customers promptly, and numerous other factors, all of which have bearing on the situation.

"As further evidence of our desire to meet all possible trade demands, it is important to point out that only ten to fifteen per cent of our total tube production is required for our own merchandise and all that we need is more concise advance notification of what the trade wants, thus enabling us to prevent shortages."

Islands of the southern Pacific Ocean have been brought within regular range of American broadcasting. KGO, the new 1000-watt station of the General Electric Company at Oakland, Calif., was heard two evenings out of five at Apia, British Samoa, a distance of 4,750 miles from Oakland.

Weather Service Day and Night for South

Station WEAY In Houston Does Something New

HOUSTON, TEX.—For the first time in history, the South has a weather service that always stays open. Bulletins are available both day and night for farmers, plantations, lumber camps, ships on the gulf, summer resorts and towns alike.

Arrangements have just been completed by the weather bureau through Lawrence H. Daingerfield, forecaster at Houston, to broadcast weather every night from WEAY (360 meters) between 10:05 and 10:10 p. m. Central time.

The plant of WEAY is at the Iris theater in Houston, where WFO, a commercial Radio station is also maintained.



De Forest DV3 Dry Cell Tube \$6.50



De Forest DV2 Storage Battery Tube \$6.50

The More You Know About Radio The More You Rely on De Forest

Without Lee De Forest's discovery of the vacuum tube there would be no radio today. All radio broadcasting, all radio receiving by means of tube sets, rests on De Forest patents.

De Forest has been a pioneer in radio since 1900 and De Forest is a pioneer today. That is the reason for the great success of the De Forest Reflex Radiophone. That is the reason for the success of the new De Forest tubes—DV-2 Storage Battery Tube, DV-3 Dry Cell Tube.

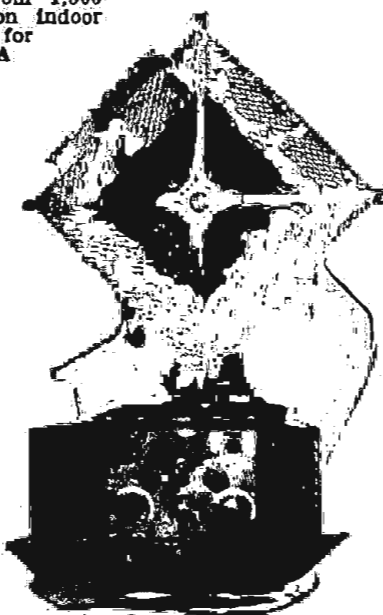
If you want a radio receiving set with a range on indoor loop of from 1,500 to 3,000 miles, depending on atmospheric conditions; if you want simplicity of control, clear reception without distortion and without extraneous noise; if you want operation on either wet or dry cells—see the De Forest Reflex Radiophones at the De Forest agents today.

The D-7A Reflex Radiophone is a three-tube set at \$125.00; the D-10 Reflex Radiophone has a drawer in its cabinet for dry batteries and is a four-tube set at \$150.00. No matter what you pay, you can't get greater radio satisfaction.

Whether you buy your set complete, or build your own from the laboratory-tested De Forest parts, you can rely on De Forest, the greatest name in Radio.

De Forest Radio Tel. & Tel. Co. Dept. R. D. 8 Jersey City, N. J.

De Forest Portable Reflex Radiophone type D-10, which operates on wet or dry cells, has a reception range of from 1,500 to 3,000 miles on indoor loop; has drawer for all necessary A and B dry cells. Price \$150.00, plus approximately 6% for transportation in territories west of Rocky Mountains.



Radio Catalogs Free Send a postcard for De Forest's Free Radio Catalog with full details and prices on sets, tubes, and parts.

De Forest products are sold only through exclusive agents direct to the public for your protection. The De Forest Company will be glad to hear from representative dealers in various communities who wish to become exclusive De Forest agents.

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-radiating 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.

Choice of Aerial or Loop

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.

BRISTOL

TRADE MARK
AUDIOPHONE
REG. U. S. PAT. OFFICE

Loud Speaker



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:

- Audiophone Senior Price, \$30.00
- Audiophone Junior Price, 22.50
- Baby Audiophone Price, 12.50

THE BRISTOL COMPANY, Waterbury, Conn.

OVERWHELMED!

ORDERS! Orders!! Orders!!! Thousands since last week's Radio Digest advertisement snowed us under. If you have already sent your order for this amazing bargain, your DeLuxe Neutrodyne is now on its way to you. This week, with enlarged facilities, the second rush will find us ready for every order on this sensational set which only America's Greatest Store can offer.

THIS is the set that fans say they build within three hours on our Special Blueprint—that they say is far above comparison with their friends' factory built sets, and fogs stations all over the country. More than a hundred fans write in their letters that they cannot understand how we can sell such high quality licensed Neutrodyne parts at such a low price.

The DeLuxe Neutrodyne

ANOTHER RADIO SHACK SENSATION

5 TUBE NEUTRODYNE Knock-Down Set COMPLETE



The Deluxe Neutrodyne
ALL Parts LICENSED
ALL Parts MATCHED
Fine Workmanship

GENUINE HAZELTINE



\$34.49

SEND NO MONEY

Written Money-Back Guarantee Sent With Each Purchase

Read This List of PARTS
 Just Picture This—

Read What USERS Say—

- 1 DRILLED Radion Mahoganite Panel, engraved in gold.
- 3 Four-inch Radion Mahoganite Dials, gold engraved.
- 2 Gold Plated Jacks.
- 3 Genuine Hazeltine Neutroformers Mounted on the famous Comsco Bakelite End Condensers. Positively the only Neutrodyne Kit including these famous Comsco Condensers.
- 2 Hazeltine Neutrodons.
- 5 Bakelite Sockets.
- 1 6-ohm Rheostat with Gold Plated Knob to Match Panel.
- 1 30-ohm Rheostat with Gold Plated Knob to Match Panel.
- 2 Genuine Killark Shielded Audio Transformers.
- 1 Baseboard.
- 20 Feet Tinned Bus-bar.
- 1 .00025 Freshman Grid Condenser.
- 1 Tuhular Glass Grid Leak.
- 1 Set Engraved Binding Posts.
- 1 .002 Micon Condenser.
- 1 .006 Micon Condenser.
- Exact size special panel and base blueprint.
- All packed in attractive box.

"I consider yours the best buy I have ever made in Radio."
 B. A. Steele, Hartford, Conn.

"I am very glad to be dealing with men of such business integrity. I shall recommend your house on all possible occasions, and be glad of the privilege. I have been building sets for two years, and am fairly well up in the game."
 Alfred L. Hunt, McCall St., Bennington, Vt.

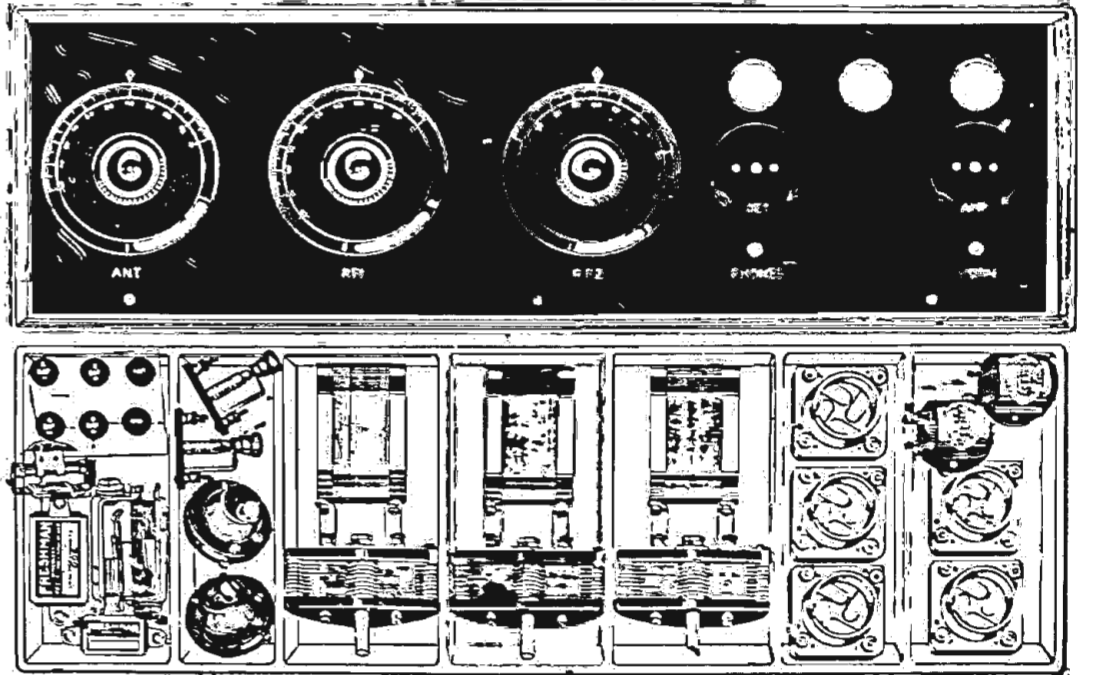
"Goods arrived this a. m. Your house is no doubt offering the public better service than any other in the country, and if you are not constantly receiving commendations, it is due to the fact that your customers have just neglected to express their appreciation. Please send me prices on cabinets."
 V. C. McDonald, 440 State St., Watertown, N. Y.

"A number of people here have purchased from you, and are satisfied with the goods they received. I built up one of your five-tube Neutrodynes last week and it works as good as a \$250.00 machine."
 Geo. H. A. Parker, Box 123, Abbotsford, Wis.

"I congratulate you on giving the radio fans these wonderful bargains."
 A. J. Toll, 742 Nelson St., London, Ont., Can.

"Please send me another complete set of the Neutrodyne parts the same as you sent me two weeks ago. I am very well satisfied with the set. I have it wired and it works perfect."
 Charles F. Stein, 611 No. Center St., Joliet, Ill.

A 5-Tube Assembly Kit Which Includes Everything Necessary to Build a Genuine Hazeltine 5-Tube Set The De Luxe Neutrodyne For Beauty and Efficiency



You Can Build The Most Beautiful Receiver Ever Designed

USE THIS COUPON

Send No Money

Pay Postman

We Ship C. O. D.

Date

THE RADIO SHACK
 55 Vesey St., Dept. RD-419
 New York City



Ship me C. O. D. The DeLuxe Neutrodyne at \$34.49, the complete assembly kit to build a genuine Hazeltine 5-tube set.

Put a cross (X) in this square if you ALSO WANT us to ship you C. O. D. the Outfit of All Additional Accessories at \$46.40. Send a separate order if you want only part of this outfit.

Name

Address

Complete Outfit of Additional Accessories

- 5 Tested Matched Tubes (201A Type) for Neutrodyne... \$19.25
- 2 45-volt "B" Batteries 6.00
- 1 "A" 60-ampere Storage Battery... 10.95
- Phones (3000 Ohms) 3.75
- Complete Antenna Equipment 1.50
- Cabinet, Piano Finish 4.95

\$46.40

Also Sold Separately

The **RADIO-SHACK**

EXECUTIVE OFFICE:

55 Vesey Street, Dept. RD-419
 NEW YORK CITY

Goods shipped C.O.D.
 Just pay the postman

EVERY ARTICLE SOLD ON WRITTEN MONEY-BACK GUARANTEE

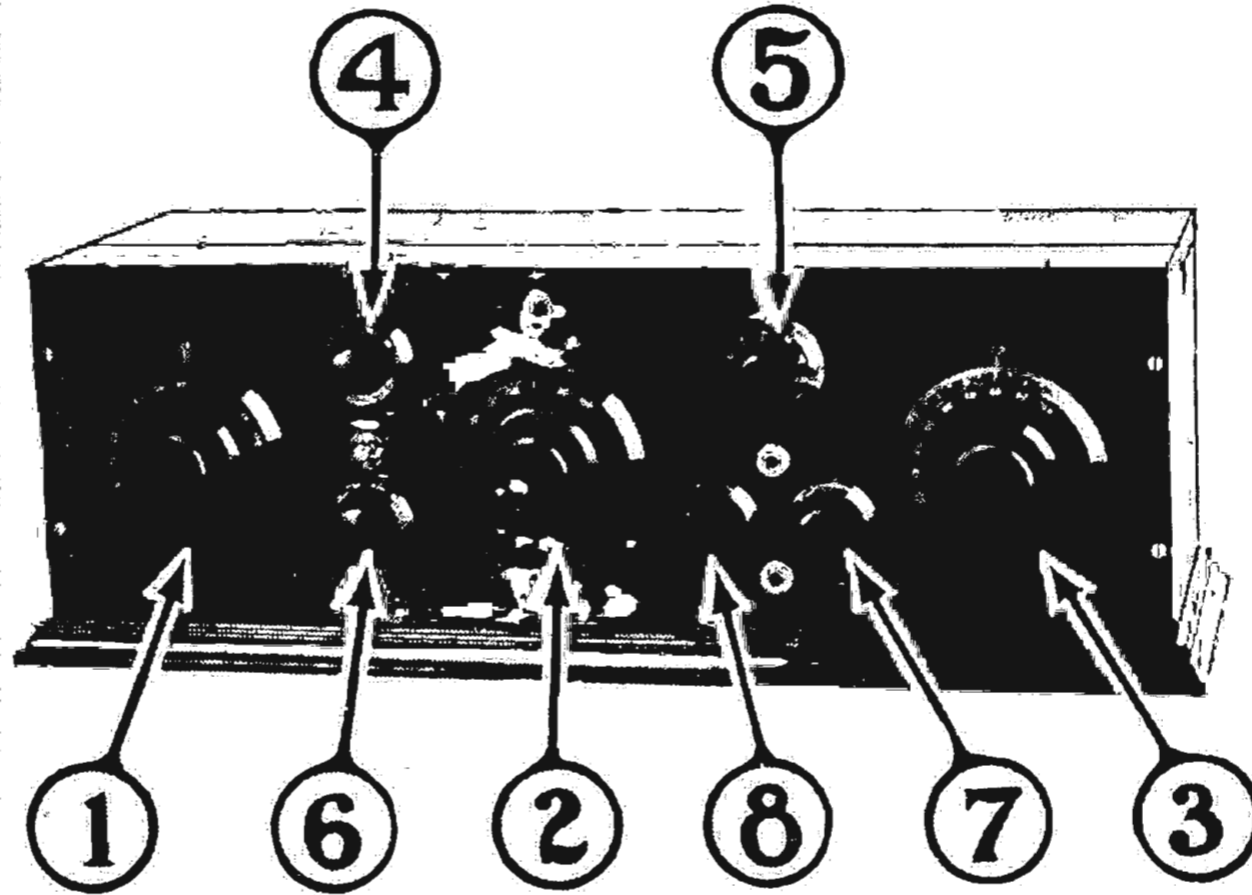
OPERATING AND TROUBLE SHOOTING

For the Owner of a MELCO Supreme 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 17 and 29 this week, the Melco Supreme Receiver is described. Radiophans with other sets will also find these articles worth reading; particularly the notes on trouble finding.

THE Melco Supreme Receiver utilizes the principle of tuned Radio frequency to secure its long distance receiving radius. Details accompanying this method of increasing sensitivity, insure pleasing clearness of tone, absence of howling, distortion and instability of adjustments.

Two terms frequently used in Radio must here be defined—Radio frequency amplification and audio frequency amplification. Radio frequency amplification intensifies the Radio energy as picked up on the antenna and has the effect of moving the receiving set nearer to the broadcasting station. This amplification is effected before the received energy reaches the detector tube. Audio frequency, on the other hand, intensifies the music or speech after they have been



detected, and has the effect of moving the telephones closer to the ears. Audio frequency amplification is the intensifying of the sound frequency currents formed by the detector.

Two Stages of Radio Frequency

The receiver has two stages of tuned Radio frequency amplification, a detector and one stage of audio frequency. There are thus three tuned circuits, the first of which is tuned by a novel form of variometer, while the other two circuits are tuned by Radio frequency transformers, known as vario-transformers. These are wound in the form of the letter D and are known as "closed circuit" inductance coils. This cuts out stray magnetic fields which feed energy back from one tuned circuit to another of ordinary tuned Radio frequency amplifiers.

Dial 1 tunes the variometer, while 2 and 3 tune the two vario-transformers. All three of these must be in perfect

"synchronism" with the wave being radiated from the broadcasting station before it may be received. This means triple security from interference by another broadcast station whose wave length is as little as three or four meters different from that of the desired station. In other words, the listener may select just what station he desires to hear and hear that particular one without hearing any other station. This does not mean, however, that he may sit down and decide to listen to 2LO of London whenever he wishes to. Such extreme distance work is dependent upon atmospheric conditions to such a degree that no circuit under the sun can honestly be guaranteed to receive such distant stations upon demand.

Types of Antenna

The circuit is moreover of such sensitivity that it is adaptable for reception with any one of the four ordinary types of antenna: Outdoor antenna, in-

door antenna, loop and the lighting plug. Which of these is most successful depends mainly upon the location and conditions varying with the location. The outdoor antenna will give the loudest signals from weak distant stations unless interference is experienced. In that case the loop should be employed. Note: Detach jumper between binding posts marked "gnd" and "loop." In many localities a good lighting plug inserted in a convenient electric light socket operates very satisfactory on both local and distance reception. For an outdoor antenna we recommend a single straight length of stranded copper or phosphor bronze wire about 1/16-inch in diameter and 60 or 70 feet long. This must be well insulated at each end by good porcelain insulator and should be as high as possible above nearby chimneys, wires of any kind, and roofs. It may be suspended from the window to any desirable point of support. If the point of support is more than 75 feet away, another length of wire may be used to bridge the gap, and should be separated from the antenna itself by an insulator.

Ground Wire

The ground wire from the set should be of the same material as the antenna and should run from the ground binding post of the set to the nearest water pipe or radiator. There it should be fastened by a good ground clamp, the latter tightened about a bright, cleanly sandpapered point on the pipe. An approved type of lightning arrester should be bridged between antenna and ground where the lead-in enters the house, and a porcelain tube about 6 or 8 inches in length is used to introduce the lead-in through the window frame. The tubing may be inserted through a hole in a narrow board upon which the window sash may be closed.

For an indoor antenna, we suggest a length of wire about 12 to 20 feet long, fastened to the antenna post and strung to any convenient support.

B Batteries

B batteries of 45 to 90 volts may be used, the higher voltage giving the louder signal. While good dry cells will function as the A battery, quieter and more economical operation is furnished by a storage battery. Connections to the

(Continued on page 29)

BUILD YOUR OWN 5 TUBE NEUTRODYNE SET

WITH LICENSED Hazeltine Parts

\$39.95 COMPLETE



EACH KIT INCLUDES

- Drilled and Engraved 7x26 Panel \$ 8.00
 - 3 Genuine FADA Neuroformers and Condensers..... 22.50
 - 2 Genuine FADA Neurodons... 2.50
 - 3 4-inch Dials 3.60
 - 20 Feet Tin Copper Bus Bar Wire25
 - 1 Detector Rheostat 1.25
 - 1 Amplifier Rheostat 1.50
 - 2 Genuine Dietzen Audio Frequency Transformers..... 12.00
 - 5 Vacuum Tube Sockets 5.00
 - 2 Frost Neurodyne Jacks..... 1.80
 - 1 Freshman Grid Leak and Mica Condenser65
 - 1 Dubilier Micadon .001..... .40
 - 1 Mica Condenser .006..... .75
 - 1 Frost Battery Switch..... .30
 - 1 Stained Baseboard 1.00
 - 8 Engraved Binding Posts..... 1.00
 - 2 Lengths Black Varnished Tubing30
 - Complete FADA Instruction Book and Blue Prints..... .50
- Regular Price \$62.25
Our Price \$39.95

NEUTRODYNE has taken the country by storm. It is the remarkable distance getting, powerful, non-oscillating and non-whistling receiver.

WORKING MODEL ON DEMONSTRATION
"America's Greatest Radio Retailers"

SHOP BY MAIL

Modell's

VIA PARCEL POST ADD 50c

*191 FULTON Cor. Church
*14 CHURCH ST. At Cortlandt
(*Open Sat. Ev'gs)

*71 CORTLANDT Near Washington
15 Whitehall St. Cor. Stone St.
**241 W. 42d St. Bet. 7th & 8th Avs.

BROOKLYN **81 Flatbush Av.
Post Radio Elec. Corp.
(**Open Ev. Evg.)

MAIL ORDER DEPT., 71 CORTLANDT ST., NEW YORK

Standard Merchandise Only **S. HAMMER RADIO CO.** 303 Atkins Ave. Brooklyn, N. Y. Anything and Everything in Radio

NEW COCKADAY DISTORTIONLESS AMPLIFIER

Complete Parts Exactly as Specified by Mr. Cockaday

List Price	Our Price	List Price	Our Price
\$4.00	\$2.60	\$12.50	\$10.00
2.00	1.50	7.00	5.60
3.50	2.00	3.90	3.30
2.00	1.50	2.00	1.80
2.85	1.70	2.25	1.95

List Price \$40. **OUR PRICE for above complete parts..... \$32.00**

The Above Parts May Be Bought Separately

\$120 FADA NEUTRODYNE Set No. 160-1 Wired in Fada's Own Factory None shipped C.O.D. **\$9450**

\$65.60 FADA KNOCKDOWN Parts No. 167-A Sealed in Fada's Factory Complete parts..... None Shipped C.O.D. **\$4995**

8 TUBE Super-Heterodyne Type SH 8-1 Receptad Kit Consisting of 3 R.F. Trans., 5,000 to 25,000 meters, Type R.F. 1716 1 Audio Trans. for 1st stage, Type ATX 1 Audio Trans. for 2nd stage, Type AT3 2 1/2 Mfd. By-pass Condensers, Type C 1000 1 Tuned Filter Coupler, Type SW 21 1 Super-Heterodyne Manual

COMPLETE PARTS FOR Neurodyne 5-Tube Set

- 1 7x26 Panel, Orilled
- 1 Single Sockets
- 1 Triple Socket
- 2 Neurodons
- 3 Neuroformers
- 2 Jefferson Transformers
- 1 Battery Switch
- 3 4" Dials, Fada Type
- 1 Power Rheostat
- 1 Vernier Rheostat
- 2 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 **\$ 3150**

5-Tube Neurodyne Set, wired complete in a mahogany cabinet—Genuine FADA Parts. **\$79.75**

COCKADAY 4 CIRCUIT TUNER Complete parts for the Improved Cockaday 4 Circuit Tuner, exactly as specified by Mr. Cockaday..... **\$55.00**

4000 Ohms N&K Imported Phones MODEL D List \$8.50 **\$5.85**

ADDITIONAL PARTS

- 1 Terminal Panel 1x8x11/2
- 1 .001 Mfd. Cardwell Unvernier Condenser
- 1 .0005 Mfd. 2 1/2 plate Cardwell Vernier
- 8 Sockets, Federal or General Radio
- 3 Rheostats, 10 ohm, Gen'l Radio
- 2 Rheostats, 6 ohm, Gen'l Radio
- 1 Potentiometer, over 400 ohms, General Radio
- 3 Grid Condensers and Leaks
- 2 .0025 Fixed Dubilier Cond.
- 1 .002 Fixed Dubilier Condenser
- 1 .006 Fixed Dubilier Condenser
- 1 2 Circuit Federal Jack
- 1 Single Federal Jack
- 1 Switch, Cutler-Hammer

List Price \$125.00. **Our Price \$92.50**

Parts for **\$80** *Freed-Eisemann* **\$150**
5 TUBE NEUTRODYNE **\$64.50** NEUTRODYNE **\$124.00**
Set K.D. 50 Model N.R.-5
None Shipped C. O. D. None Shipped C. O. D.

PHONES	TRANSFORMERS	DIALS AND SOCKETS
\$ 5.00 Turners, 3000 ohms..... 2.75	7.00 Federal No. 65..... 5.35	3" Amco Bakelite45
12.00 Western Electric 8.75	5.00 Acme 3.85	4" Amco Bakelite80
6.00 Brandes Superior..... 4.70	5.00 All-American 3.85	Bell Socket65
12.00 Baldwin Type C..... 7.95	7.00 Amertran 5.00	Melco Socket80
7.00 Federal 4.85	4.50 Thordarson 3.75	Rakette Socket45
5.50 Stromberg Carlson..... 4.50	12.50 Como Duplex P. P..... 10.00	Chelton Socket65
12.00 Dr. Selbt 6000 ohms... 5.75	12.50 Modern Push-Pull..... 10.00	MISCELLANEOUS
LOU SPEAKERS	5.00 Erla 4.25	Pathé Pluist rners 7.95
\$30.00 Music Master \$24.00	12.00 All-American P. P..... 10.00	Ambassador Co..... 5.25
35.00 Magnavox 29.00	4.00 Duratran R. F..... 3.35	Cockaday Coils, Precist-n..... 4.50
36.00 Radiola F. H. 30.00	5.00 General Radio 4.35	Cockaday Chils, Faste..... 3.35
10.00 Brandes Table Talker. 6.50	POTENTIOMETERS	AMPLEX GRID BENSER .. 1.10
Baldwin Unit 4.65	1.25 Pacent 1.10	Lavite Resis. (res. 48, 90
Amer. Radiophone Unit..... 3.95	1.50 Amro 1.25	ohms, Genuine 1.10
Gerao Music Master Unit... 9.00	1.50 Cutler Hammer 1.15	\$2.00 Reinartz C..... 1.40
	1.50 Klesner 1.25	Erla Crystals90

ALL MAIL ORDERS SHIPPED PROMPTLY. Orders over \$5.00 will be shipped prepaid. Money orders or C.O.D. Not insured unless insurance charges included. Write for Price List.

SUPER-VALUES

Super-Heterodyne NEW AND IMPROVED TYPE

Resistance Coupled—No Transformers MODEL "D"

Complete Blue Prints—Consisting of Instrument Layout and Wiring Diagram

Our Number —501—502 "D"

Post Paid **\$200**

Cockaday Four Circuit Receiver

Cost of Parts at List Price . . \$73.30

Cost of Parts at Our Price . . \$59.00

Receiving Range:—Over 3,400 Miles

Mr. Cockaday needs no introduction to the radio fans of America. He is known among the amateurs as a source for complete and authoritative information for those who build their own, and we are quite sure that you will make no mistake in building this Master Receiver. You will be compensated for your efforts by many hours of happiness in receiving long distance broadcast reception with this new Receiver, which employs power amplification, automatic tuning, unusual selectivity and a wave length range from 150 to 675 meters.

For the best results it is absolutely necessary that you follow his instructions and wiring diagrams to the letter, and we are prepared to supply you with the complete blue-prints, showing the instrument layout, the panel layout and the wiring diagram, as specified in "Popular Radio," for the price of \$1.20.

Here Are the Items You Will Need:

SYMBOL	QUANTITY	DESCRIPTION	LIST PRICE
A-B-C-D	1	Four Circuit Coil Set, known as Cockaday Coil	\$ 4.75
E and F	2	AMSCO Vernier Variable Condensers, 26 plates .00046 (.0005) MFD. at \$4.50 each	9.00
G and H	2	AMPLEX Grid-densers (small Variable Condensers) at \$1.25 each	2.50
I	1	BRADLEY-LEAK, Variable 1/4 to 10 megs.	1.85
J1, J2, J3, J4, J5	5	MELCO or BAKELITE Tube Sockets, at \$1.00 each	5.00
K	1	AMSCO Filament Rheostat, 6 ohms	1.00
L1, L2, L3	3	AMSCO Filament Rheostats, 20 ohms, at \$1.00 each	3.00
M1, M2	2	PACENT Double Circuit Jacks, at 85c each	1.70
M3	1	PACENT Single Circuit Jack	.70
N1 and N2	2	AMERTRAN or FEDERAL 65 Audio-Frequency Amplifying Transformers, at \$7.00 each	14.00
O	1	COMO Input "Push and Pull" Transformer	12.50
P	1	COMO Output "Push and Pull" Transformer	12.50
Q and R	2	Switch Levers and Knobs, at 50c each	1.00
S	11	Switch Points, 2 Switch Stops, at 5c each	.55
T	1	Dubilier Mica Fixed Condenser, .0005 Mfd., with lugs for transformer mounting	.45
U	1	Dubilier Mica Fixed Condenser .00025 Mfd., with Clips for Grid Leak	.45
V	1	DURHAM Variable Grid Leak	.75
W1, W2, W3	3	LAVITE Resistances, 48,000 ohms	3.00
X	1	AMSCO Potentiometer, 400 ohms	2.00
Y1, Y2, Y3	3	Composition Panels: 7" x 24" x 1/8" 3.00 3" x 2 1/4"25 1" x 12"45	
Z	12	Binding Posts	2.40
		30 Ft. Varnished Tubing	3.00
			\$73.30

If drilled and engraved panel is desired, there is a charge of \$3.50 extra. One 7x24 Cabinet, Mahogany, \$7.50.

In the event you place your order with us, we are prepared to make shipment immediately, as we carry a stock of all of the required parts in large quantities.

Hazeltines-Neutrodyne

Complete parts for building this Master Receiver as below **\$4965**

- | | |
|---|-------------------------------------|
| 1 Bakelite Panel 26x7x 7/8 Drilled and Engraved | 1 Vernier Rheostat |
| 1 Baseboard | 7 Binding Posts |
| 5 Standard Panel Mounting Sockets | 1 Closed Circuit Jack |
| 3 Neutroformers | 1 3 Spring Automatic Jack |
| 2 Neutrodons | 27 Ft. Spaghetti Tubing |
| 2 High Ratio Transformers | 27 Ft. Bus Bar |
| 1 A Battery Switch | 2 Condensers—.006 |
| 3 4" Pathe Dials | 1 Grid Leak—2 Megohm |
| 1 Plain Rheostat | 1 Grid Leak and Condenser—.00025 |
| | 1 Pkg. Screws, Nut, Terminals, Etc. |
| | 1 Fada Instruction Book |

Non-Inductive Resistances

THE ORIGINAL P.L.

For Radio Amplification For Audio Amplification
Used in the Distortionless Power Amplifier

STOCKED IN FOLLOWING SIZES

1,000 OHMS	25,000 OHMS	80,000 OHMS	List \$ 1.00 Price 1 EACH
5,000 OHMS	30,000 OHMS	100,000 OHMS	
12,000 OHMS	48,000 OHMS		
20,000 OHMS	50,000 OHMS		

FOR USE IN THE REINARTZ, COCKADAY, SUPER PILODYNE CIRCUITS

Amplion

The World's Standard Loud Speaker

JUNIOR DE LUXE AR-5	\$26.00
DRAGON AR-19	\$40.00
BEAUTY AR-15	\$46.00

You Will Never Tire of the AMPLION

Cardwell Condensers

Type	Capacity	Price	In Stock at All Times
123B	.0005	\$5.00	
137B	.001	\$6.00	
141B	.00025	\$4.25	

SUPPLIES

We have one of the LARGEST and MOST COMPLETE stocks of High Grade STANDARD APPARATUS in the United States and can make Prompt Shipments.
WRITE FOR OUR NEW CATALOGUE, DEPT. Z.
All Mail Orders Shipped Promptly THE RADIO MAIL ORDER HOUSE—KNOWN FOR LOW PRICES Send Money Order, Including Postage



1476-1480 Broadway, Corner 42nd Street
LONGACRE BUILDING, NEW YORK CITY

What's Wrong with Your Receiving Set?

Chapter VIII—"The Neutrodyne Circuit"

By Peter J. M. Clute

THE preceding discussion has pointed out the inherent advantages of tuned Radio frequency amplification, with its very interesting method of tuning by graphical selectivity. This basic system of tuned Radio has led directly to a consideration of the neutrodyne principle, which employs tuned Radio frequency amplification with complete neutralization of the inherent capacity coupling of the vacuum tubes and associated circuits.

Efficient amplification with the elimination of distorting regeneration, oscillation and re-radiation interference are combined in the neutrodyne receiver, which operates directly at peak value without any scratching, howling, or distortion. The properly constructed neutrodyne provides an exact, but not excessive amount of neutralizing energy for all requirements of the circuit. This insures that each stage of Radio frequency amplification will be at its maximum value for each wave length setting. With its high degree of amplification, its basic principle of non-reaction, its ability to give maximum selectivity, its broad operating range with maximum sensitivity on every wave length, and its extreme simplicity of tuning, the neutrodyne receiver has

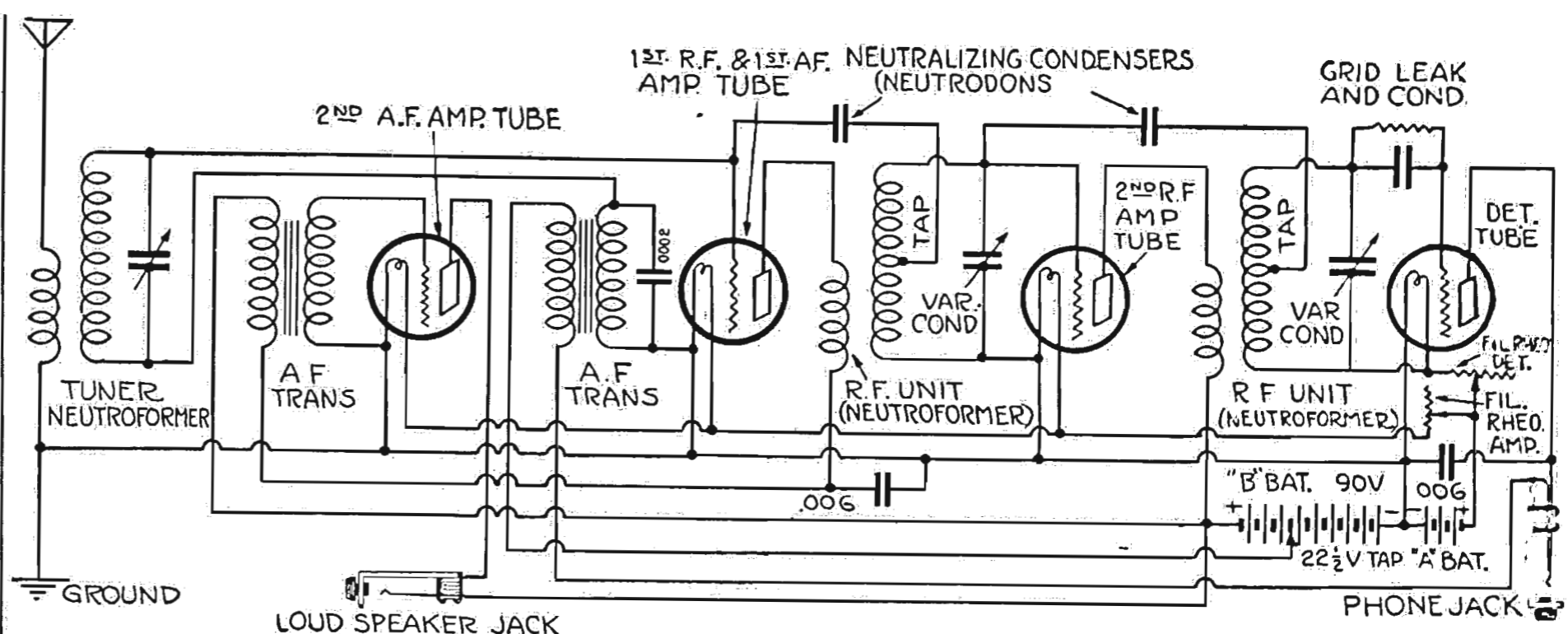


Figure 2

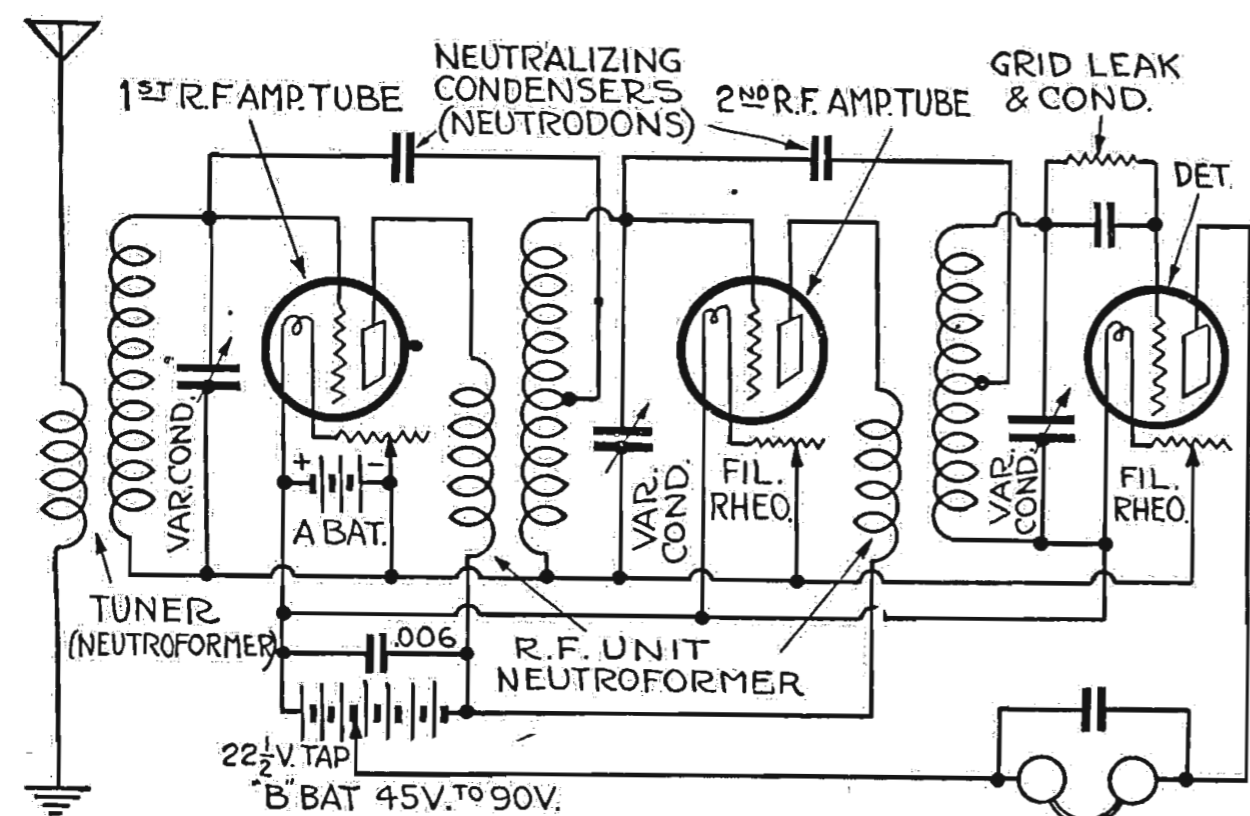


Figure 1

demonstrated its superiority for both local and DX broadcast reception. Efficient Radio Frequency Amplification In the neutrodyne circuit, the inventor

has accomplished something that has long been the goal of Radio engineers, namely, efficient Radio frequency amplification. The obvious disadvantage of attempting to combine pure Radio frequency amplification with the task of eliminating bothersome regeneration and oscillation has been the source of much worry to the experimenter. This regenerative effect will prevent clear reproduction, unless correctly designed transformers are employed. The neutrodyne principle has eventually succeeded in eliminating this disadvantage by reverting to the well known theorem that two equal and opposite forces balance or neutralize each other. While the internal capacity existing between the grid and plate in the vacuum tube is quite small, under certain conditions of operation the resulting regeneration in the amplifier tubes is a distinct hindrance to perfect reception. In the neutrodyne the capacity just referred to is neutralized by inserting

another capacity of equal value in the circuit so as to act against or buck the capacity effect within the tube. This neutralizing condenser or neutrodon is a very special variable condenser with an extremely low capacity, capable of fine variations of from one to ten micro-microfarads. The critical adjustment of the neutrodyne circuit is dependent upon the neutrodon condenser, which consequently should be designed to have practically no losses at Radio frequency.

Average Values of Capacities

In this connection, it may be of interest to note the following average values in micro-microfarads of capacities between the vacuum tube elements:

	UV-199	UV-200	UV-201A
Between filament and grid	3.5	6.0	6.0
Between filament and plate	3.5	6.0	6.0

(Continued on page 25)

Thrills from Radio

No. 17 of a Series Featuring Experiences of "ALL-AMERICAN" Users

"All American" Proved to be Over 100% Better

By C. C. Gielow, Sandusky, Ohio

"Due to your continued advertising, I recently purchased several All-American Audio Frequency Transformers.

"Can safely state that I have neither seen, nor heard, their equal either in appearance or performance.

"Previously I had used transformers manufactured by an old firm, noted for the quality of its other products, but the 'All-Americans' won after a fair trial.

"They proved to be over 100% more efficient than the other transformers."

Why spend money and waste time experimenting? Nearly three-quarters of a million radio enthusiasts, like Mr. Gielow, have already proved that "All-Americans" are best.

Special Offer

All-American Power Amplification diagram-circular and Book of 22 Tested Hook-ups sent for 4c in stamps to cover mailing.



All-American Audio Frequency Transformers come in three ratios: 3-1, \$4.50; 5-1, 10-1, \$4.75. The best—no need to pay more.

All the better dealers sell the "ALL-AMERICAN"

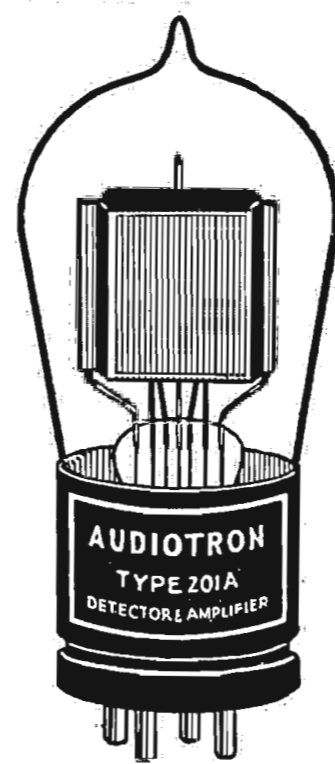
RAULAND MFG. CO., 2650 Coyne St., CHICAGO
PIONEERS IN THE INDUSTRY

Audio and Radio Frequency Power Amplifying (input and output)

More than 700,000 in use Standard on the better sets

ALL-AMERICAN AMPLIFYING TRANSFORMERS

Largest Selling Transformers in the World



APEX AUDIOTRONS "Sound Perfection"

Apex Audiotrons have been on the market for a considerable length of time. They have been sold throughout the country and results have been highly gratifying. Apex Audiotrons are now being advertised nationally for the reason that the factory output has become large enough to take care of a great demand.

This is the first time that a manufacturer has sold a tube with a full guarantee. Apex Audiotrons may be relied upon at all times.

List \$4.00

APEX AUDIOTRON GUARANTEE

All Apex Audiotron tubes are guaranteed, and Dealers, as well as the manufacturers, will make replacement or refund the money on all tubes that prove unsatisfactory in any way. The only requirement is that the tube must not have been burned out.

All Tubes Are Guaranteed to Work in Radio Frequency. Especially Adapted for Neutrodyne, Reflex and Super-Heterodyne Sets.

The following tubes are now on sale:

- Type 201A—5 volts, .25 amperes \$4.00
Amplifier and Detector
- Type 199—3-4 volts, .06 amperes \$4.00
Amplifier and Detector
- Type 199A—3-4 volts, .06 amperes \$4.00
With Standard Base—Amplifier and Detector
- Type 12—1 1/2 volts, .25 amperes \$4.00
Platinum Filament—Amplifier and Detector
- Type 200—5 volts, 1 ampere \$4.00
Detector Tube

If your local dealer cannot supply you, order direct

RADIO TUBE CORPORATION
70 HALSEY STREET NEWARK, N. J

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

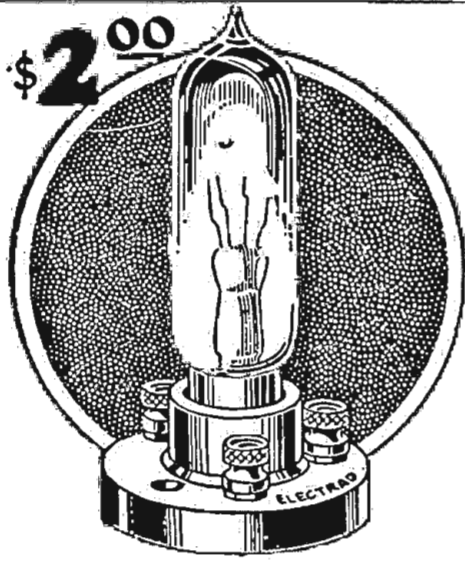
Table with columns: Station and City, Met., Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday. Lists various radio stations and their broadcast times.

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.

It is a waste of time and money for an amateur to try to make head receivers, audio frequency transformers and home-made battery chargers.

Never leave the high-tension battery leads near the filament leads when they are disconnected, as contact will result in the burning out of the tube.

Harkness Reflex New Electrad Diode Tube



Endorsed by Kenneth Harkness

IF YOU are building any Reflex Circuit, be sure to use a Diode Tube as a rectifier.

Diode Tubes are better for all detector purposes. Give greater volume than a crystal. Never get out of adjustment. Stabilize the circuit—overcome distortions, howling, etc. Require no B Batteries. With ordinary care they will burn 600 to 1000 hours.

Sold by most good radio stores. If your dealer cannot supply you, send us \$2.50 and we will see that you are supplied.

FREE—If you are building any Reflex Circuit, ask your local dealer for our complete and detailed diagrams of the Harkness, and instructions for the use of a Diode Tube in place of a crystal.

ELECTRAD Inc.

NEW YORK

CHICAGO

5 Tube Neutrodyne

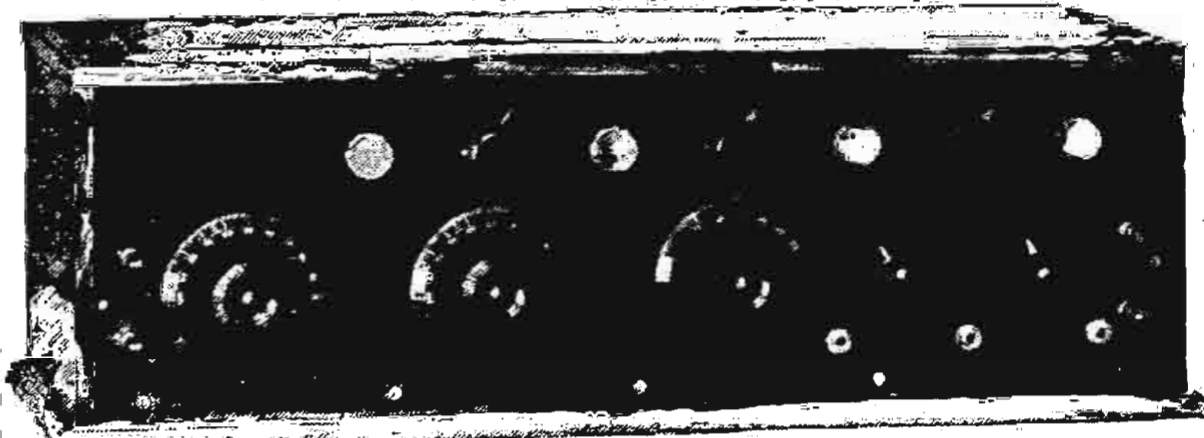
PAY NO MONEY

Just Pay The Postman

\$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

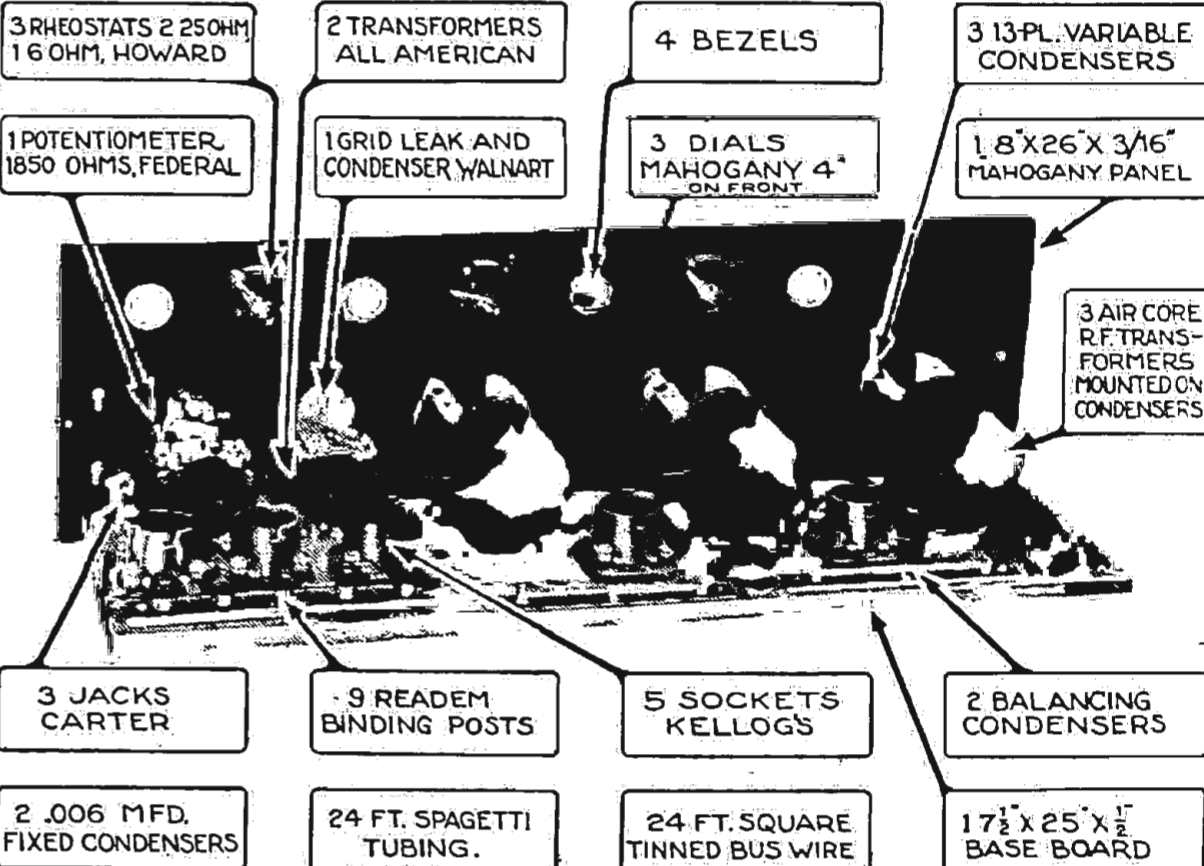
BLUE PRINT FREE EASY TO WIRE

\$48.50

SEE BELOW

For Ten Days, Cabinet..... 12.50 \$54.69 \$67.19

Mounted on Panel and Baseboard



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
1 110 Ampere Storage Battery..... 18.00
1 DeLuxe Homecharger..... 18.00
1 Headset..... 12.00
1 Complete Aerial Equipment..... 1.50
1 45 Volt B Battery..... 5.50
2 22 1/2 Volt B Batteries..... \$ 6.00
Loud Speaker..... 12.50
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..... \$2.98 list, \$6.00. Big buy at.....

We are responsible folks, money cheerfully refunded within ten days if you are not satisfied. All Orders Mailed Promptly. Send Check or Money Order. No Stamps Accepted.

Everything in Radio. Write Us

Quality Merchandise at Low Prices Economical Radio House 4600 LINCOLN AVENUE, CHICAGO

We Personally Guarantee All Goods

WHAT TO HEAR, WHEN AND WHERE

Tuesday, April 15

CKAC, Montreal, Canada (Eastern, 425), 4:00 p. m., Music; 7:00, Kiddle's stories in French and English; 7:30, Rex Battle and his Mt. Royal Hotel Concert Orchestra; Benjamin Scherzer, violinist; 8:30, French concert, direction of Raoul Veniat; 10:30, John C. Smith and his Mount Royal Hotel Dance Orchestra. Featuring Teddy Brown.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 12:20 p. m., Lenten services, Trinity church, Rev. Alexander Mann; 5:30, "Jesus Christ, His Only Son," Rev. Hugh Thomson Kerr; 6:15, Dinner concert, Grand Symphony Orchestra; 7:15, "The Importance of Personal Problems in the Field of Public Utilities," A. W. Tobertson; 7:30, Wendall Hall; 8:00, "Humanity," from the Autobiography of Benjamin Franklin, Dr. John Ray Evers; 8:15, "The Contemporary Novel: What a Novel Is and Why Read It," Frederik E. Meyer; 8:30, Concert, Mendelssohn Quartet, Marian L. Bonhard, soprano; Ellen Willcox, contralto; Alfred C. Hagem, tenor; W. D. Stewart, bass; J. K. Milligan, accompanist.

KFAF, Denver, Colo. (Mountain, 360), 8:30 p. m., Speaker, George Holmes, Pres. Kiwanis Club.

KFKB, Milford, Kansas (Central, 286), 8:05 p. m., "Business Methods in Dairying," Prof. H. W. Cave; 8:30, "Marketing the Egg Crop," Prof. L. F. Payne; Vocal solos, Mrs. William T. Miller; Jessie Bogue, Charles Stratton, pianists.

KGO, Oakland, Calif. (Pacific, 312), 8:00 p. m., Arion Trio; Lucy Vance, soprano; Irving Krick, pianist; Glenn Chamberlain, tenor; Blanche A. Hawkins, whistler; Mildred Jensen, accompanist; "My Friend, the Dog," Otto Blehl; William Snow, French horn

Headliners of the Week

NO DOUBT, many Radiophans living out in the country far from civilization are following with interest the courses given them through the courtesy of KFKB and the Kansas State Agricultural College. Two lectures are given Tuesday for the dairy farmer.

This week is Easter week and all stations are respectfully offering their microphones for the purpose of carrying Easter thoughts to the listener in. WTAM is planning such a program Wednesday evening. Rev. DuMoulin will talk, L. W. Zimmerman will give a reading, Richard Finnegan, the boy soprano, will sing.

WGY is offering every Thursday a series of book reviews. The books talked about are always non-fiction, so that here is your chance to become a high brow.

Friday, the cantata "Seven Last Words of Jesus," will be broadcast from

the Christ Church Cathedral by KSD. This music is very lovely and let us hope the ether carries it to all of you. Friday afternoon WMAQ begins a series of dressmaking lessons, so stand by, ladies.

The Saturday program given by CKAC will be given by the Frontenac Breweries Band and Artists direct from the Frontenac Breweries. Enough said.

Wake up early Sunday morning and tune in for WCAL. They are offering an Easter Morning service at 6:00 a. m.

Monday, KGW is giving the joint harp recital of Ruth Lorraine Close and Helen Martin and those who have not heard them must be sure to tune in.

Fishermen who have planned to catch trout during their vacation in the Denver mountains should certainly get the hints offered through KFAF Tuesday by R. G. Parvin, State Fish and Game Commissioner.

Pilgrims: Master Norman Pilgrim, tenor; F. N. Pilgrim, pianist; Garth Pilgrim, conductor; Masked Reenactors.

WMAQ, Chicago, Ill. (Central, 447.5), 4:20 p. m., Interest to women; 4:30, Puppis Glen D. Iard Gunn School of Music; 5:00, Weekly Child Talk for children; 7:00, Travel talk, Clara E. Laughlin; Program, Loyola University; 8:00, Talk, Larry Har—; 8:20, Americanization lessons; 8:50, La Salle Orchestra; 9:10, Lecture, University of Chicago; 9:30, L— & Healy program.

WMC, Memphis, Tenn. (Central, 500), 8:00 p. m., "L'Espresso Sam in Europe," Dr. Albert Bushnell Hart, 11:—, Pipe organ, Prof. H. O. Nichols.

WQAW, Omaha (Central, 526), 6:00 p. m., Lions Club program; 9:00, Vocal students of J. Edward Carnal.

WDC, Ovensport, Iowa (Central, 484), 12:00 p. m., "Chimes concert," 3:30, "Rheumatism," A. G. Hennrichs; 5:45, Chimes concert.

WDO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:02 p. m., Wanamaker Crystal Tea Room Orchestra, Robert E. Golden, director; 4:45, Organ recital, Mary E. Vogt.

WQQ, Kansas City, Mo., Western Radio Co. (Central, 360), 7:00-7:45 p. m., Edison Recreation program; 8:00-10:00, Special program arranged and presented by Hal Kiefer and O. J. Ochs.

WSB, Atlanta, Ga. (Central, 429), 12:00 m., Entertainment; 3:30-4:00 p. m., Howard Theater overture and prologue; 5:00, Music; 5:30, Bonnie Barnhardt's songs and bedtime story; 8:00-9:00, Yarrab Temple Million Dollar Shrine Band; 10:45-11:45, DeMolay "On to Washington" concert.

WWJ, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises, R. J. Morton; 9:45, Fred Shaw pianist; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra; Thaddeus Wronski, vocalist.



L. R. Tucker, a Big Brother, who reads stories from the Book of Knowledge from 5:30 to 6:30 p. m. on Mondays, Tuesdays, Wednesdays and Thursdays. This is broadcast from KPO, Hale Bros., San Francisco.

The Arion Trio who have delighted the many fans of KGO, Oakland, will be heard again on Tuesday evening, April 15. The members of the trio from left to right are: Margaret Avery, cello; Josephine Holuh, violin, and Joyce Barthelsson, piano.

Leonore Pilgrim Schwab will be in charge of the program presented by the Pilgrim family from WLW, Cincinnati, on Tuesday evening, April 15. In addition to being in charge of the program, Miss Schwab, who has a very pleasing soprano voice, will sing several selections.

Wednesday, April 16

player; Bruce A. Wilson, saxophonist; "That Something," Guy B. Kibbee.

KGW, Portland, Ore. (Pacific, 492), 12:30 p. m., Concert, Civic Music Club; 3:30, Talk, Jeannette P. Crsmer; 7:45, Talk for farmers, Oregon Agricultural College extension service.

KPD, San Francisco, Calif. (Pacific, 423), 1:00-2:00 p. m., Rudy Selger, Fairmount Hotel Orchestra; 2:30-3:30, Organ recital, Theodora J. Irwin; 4:30-5:30, Rudy Selger's Fairmount Hotel Orchestra; 5:30-6:30, Children's hour stories, "Big Brother" of KPO, Book of Knowledge; Jack Costa, pianist; 10 years; 6:30-7:00, "Cleveland Six" Orchestra, Wilt Gunzendorfer, director; 7:00-7:30, Rudy Selger's Fairmount Hotel Orchestra; 8:00-10:00, Program, management, Mme. Stella Vought; 10:00-11:00, E. Max Bradford's Versatile Band.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., Studio program, Ica Pfisterer, soprano; Marietta Schumacher, contralto; Beatrice Knetser, pianist.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 2:35 p. m., Studio program; 4:00, "Bringing the World to America," "Our World"; 6:18, "Astronomy," Rev. D. J. McHugh; 6:45, Bedtime story, "Uncle Bob," Walter Wilson; 7:00, Dinner music, Congress Hotel, Joska DeBabary's Orchestra, Clyde Doerr's Orchestra; 8:20, American Farm Bureau Federation speakers, "The Farmer's Taxes," H. W. Moorhouse; "The Home You Loved to Live In," K. J. T. Ekblaw; 8:48, Musical program, Chicago Musical College, D. Paul Brietwiser.

WAAM, Newark, N. J. (Eastern, 255), 7:00-7:30 p. m., "Star Spangled Banner," Bluecrest Dance Orchestra; 7:30-8:00, Jimmy Clark and His Broadway Melody Entertainers; 8:00-8:15, Alice Carter and Jimmy Johnson; 8:15-8:30, Armand Cotter, of Wall Street Journal, talking on Samuel Vaulclair, president of the Baldwin Locomotive Works; 8:30-8:45, Mercedes Gilbert, monologist; 8:45-9:00, Irving Bachelor and Leo St. Cloud, duets; 9:00-9:30, Continuation program by Bluecrest Dance Orchestra; 9:30-9:45, "Paintings and Their Place in the Home," talk by Iola Dalton Kire; 9:45-10:00, Robertson Kiddies, Edna and May; 10:00-10:30, American Warblers; 10:30-11:00, George Williams, John Hill and the Trionan Melody Ensemble; 11:00-11:15, Chas. Le Roy, pianist; 11:15-11:30, Bob Schafer and Dave Ringle, songbirds.

WAOW, Omaha, Neb. (Central, 360), 8:00 p. m., Lenten services, conducted by Rev. E. T. Otte, pastor of St. Paul's Lutheran Church, of Omaha.

WBAH, Minneapolis, Minn. (Central, 417), 12:30-1:30 p. m., Musical programs, Jean Estinger, pianist; Russell Murphy, baritone; 7:00-7:30, Musical, Minneapolis Bor scouts.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, E. Clyde Whitlock, violinist and pupils; 9:30-10:45, Concert, auspices Mrs. Louis Morris, vocalist.

WBAV, Columbus, Ohio (Eastern, 390), 12:00 m., Piano music, Ila Lorbach Owens.

WBZ, Springfield, Mass. (Eastern, 337), 7:00 p. m., "The Fruit Garden," William H. Wolff; 7:30, Bedtime story for the Kiddies; 7:40, Concert, Benjamin Buxton, pianist; 8:30, Concert, Boston University Musical Clubs.

WCAE, Pittsburgh, Pa. (Eastern, 462), 4:30 p. m., Sunshine Girl; 6:30, Dinner concert, William Penn Hotel; 7:30, Uncle Kaybee; 7:45, Theatrical review; 8:30, Musical program, students, Prof. Joseph H. Moore.

WCAL, Northfield, Minn. (Central, 360), 9:00 p. m., Esther Ringsiad, soprano; Marcella Rogness, pianist; Arnold Hamre, tenor; Evelyn Nestes, Judith Halderson, accompanists.

WCX, Detroit, Mich. (Eastern, 517), 6:00 p. m., Dinner concert, Hotel Tuller; 8:15, Lenten speaker, Rev. John A. McClary, S. J.; 10:00, Red Apple Club.

WDAF, Kansas City, Mo., Star (Central, 411), 3:30-4:30 p. m., Musical matinee, Joseph Black's Sexton Cafe Concert Orchestra; 6:00-7:00, School of the Air; Piano tuning in number, Duo-Art; Address, speaker, National Live Stock and Meat Board; The Tell-Me-a-Story Lady; Music, Fritz Hanlein's Trioan Ensemble; 11:45 p. m.-1 a. m., Nighthawk Frolic, "The Merry Old Chief" and Coon-Sanders Orchestra.

WDAP, Chicago, Ill. (Central, 370), 7:00-8:00 p. m., Drake Concert Ensemble and Blackstone Quintet; 8:00-8:30, Ralph Emerson, organist; 10:00, Rosemary Hughes, Voice Worthy, Fred Agard, Jack Chapman's Orchestra.

WDAK, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Organ recital, Stanley Theater; Dinner music, Arcadia Concert Orchestra; 2:00, Piano recital, Edna Finestone; Arcadia Cafe Concert Orchestra; 4:30, Recital, Max Eisenberg, tenor; 7:30, Dream Daddy's bedtime stories; 7:50, Play review, Arnold Abbott.

WEAF, New York, N. Y. (Eastern, 492), 11:30 a. m., Motion picture talk; 11:45, Board of Education; 12:00 noon, Lenten church services; 4:00 p. m., Blue Horse Instrumental Quartette; 5:00, Children's hour stories; 7:30, Thornton Fisher; 7:40, Christina Thompson, pianist; 8:00, Corn Products Refining Orchestra; 8:30, Republican State Convention; 9:45, Claire Lammman, contralto; 10:00, Everready program.

WFAC, Dallas, Texas (Central, 476), 12:30-1:00 p. m., Address, DeWitt McMurray; 8:30-9:30, Nash Symphony Orchestra; 11:00-12:00, Piano recital, Katherine B. Peeples and assisting musicians.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concert Orchestra; 9:00, Philadelphia Musical Club; Women's Symphony Orchestra of Phila.; Mabel Swint Ewer, president; J. W. G. Lehman, conductor; Florence Hasle, soloist; 6:00, Sunny Jim, the Kiddies' Pal; 6:30, Meyer Davis Bellevue Stratford Concert Orchestra; 8:00, Lenten Cantata by Charles H. Maskell; choir Mt. Hermon Reformed Church; 8:30, Wilson A. Chest, tenor; Henry L. Booth, baritone; 10:30, Charlie Kerr and his Symphonic Dance Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selection on Ampico in Chickering; Chat with Ladies, Marjorie Drew; Selections on Brunswick; 7:00 p. m., Meeting of the Amrad Big Brother Club; 7:30, "Africa from Cape Town to the Congo," as seen by a Commercial Traveler, A. S. Filnt; Musicals.

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., "The Decorations of the White House," Mrs. Capitola Ashworth; 6:30, Dinner concert, Instrumental Trio of Hotel Ten Week; 7:45, "The Present Day Undergraduate," Dean Edward Ellery; 8:00, Scotch program, Pipers, Campbell MacRae, William I. Riddell; Jean H. Gray, contralto; Robert MacNeish, tenor; Mrs. Harry Bertram, soprano; Robert Stewart, baritone.

WHAA, Iowa City, Iowa (Central, 484), 8:00 p. m., Interpretative reading of "Romeo and Juliet," Helene Blattner, Vance Morton.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; Walnut Theater Orchestra; Alamo Theater Organ; 7:30-9:00, Louisville Flute Club; Reading, An Interesting Historical Episode.

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

Radio Orchestra; 3:00 p. m., Weather and market information; 7:00-8:00, Musical numbers, Sweeney Radio Orchestra; Talk on "Gardens," Mrs. Paul Briggs; 8:00-10:00, Sweeney Radio Orchestra and program by assisting artists.

WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Organ recital, Karl Bonawitz; 3:00, Six Saxophone Serenaders, Philadelphia Dental Trio, William Rothner, Samuel Slopkin and Irving W. Capelman, assisted by Matilda Broadman; 6:05, Dinner music, Dick Regan and his WIP Symphony Orchestra; 7:00, Uncle Wip's bedtime stories; Piano duet, Franklin Faddes and E. Kottcamp; 8:15, Philadelphia Police Band, direction Lieutenant Joseph Kiefer; 9:15, Mme. Lyd Rogister, cellist; Caroline Neebe, pianist; Chas. J. Smithwell, basso; 10:15, Ted Weems and his Cafe L'Aiglon Orchestra.

WJAX, Cleveland, Ohio (Eastern, 390), 7:30 p. m., Concert program arranged by the Cleveland News-Leader; Bedtime story, E. G. Johnson; Radio Talk Cartoon, Don Palmer; 8:00 p. m., Robinson's Circus, broadcast from the ringside in Public Auditorium.

WJY, New York, N. Y. (Eastern, 405), 7:30 p. m., "Selma Lagerlof," 8:00, "Broadcasting Broadway," Bertha Brainard; 8:15, Evelyn Schiff, soprano; 8:35, New York University concert; Albert Sossel, violinist; Mme. Kathryn Bacon, pianist; 10:00, Humorous readings, T. Constance McClure; 10:15, Paul Morenos, tenor; Athens Buckley, soprano.

WJZ, New York, N. Y. (Eastern, 455), 12:00 m., Lenten services, Trinity church, Rev. Charles Fiske; 1:00 p. m., Henry Van Der Zander's Hotel Ambassador Trio; 2:00, New York Board of Education; 3:00, Special afternoon concert, Wanamaker Auditorium; 4:00, Eleanor Gunn's fashion talk; 4:15, "Right Habits of Reading," Prof. Howard R. Driggs; 4:45, "Home Beautiful," Dorothy Ethel Walsh; 5:00, "Chateau music program; Harry Rocco, baritone; Miss Phillips, soprano; Anthony Gale, pianist; Louis Levine violinist; 7:00, J. K. Hamilton, tenor; 7:15, Supper music, Paul Specht's Alamac Hotel Orchestra; 8:15, "How to Analyze Yourself," Norman T. Raymond; 8:30, Natinska, pianist; 9:00, "How Tea and Coffee Put Punch in the Menu," Anne Lewis Pierce; 9:15, U. S. Army Night; 10:30, Dance music, Hotel Astor Grill Orchestra, A. Eps, leader.

WLAG, Minneapolis-St. Paul, Minn. (Central, 417), 10:45-11:15 a. m., Household hints; 11:35 a. m.-12:00 m., Surprise hour; 2:00-2:30 p. m., "Federal Aid," Mrs. Frank E. Loch; 2:40-4:00, Daylight concert; 4:00-4:30, WLAG Players presenting "Sutcliffe"; 5:30-6:00 p. m., Children's stories, Maclester College Girls; 6:00-6:15, "Arclery," H. H. McChesney; 6:15-7:00, Dinner hour concert St. Paul Hotel Orchestra, Sam Helman, director; 7:30-8:15, Farm lectures, "U. S. Veteran's Bureau," Chas. A. Reese; "Marketing of Hay," H. L. Elliott.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Topics of interest to women; 10:00, Entertainment, Band of the Hamilton County Kulgths of the Ku Klux Klan; Leonore Pilgrim Schwab presents the

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

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 12:30 p. m., Lenten services, Trinity Church, Rev. Alexander Mann; 5:30, "The Communion of Saints," Rev. Hugh Thomson Kerr; 6:15, Dinner concert, Pittsburgh Athletic Association Orchestra; 7:15, "The City Rights," Dr. Carl Wallace Petty; 7:30, World's Fair; Program, arranged by the United Synagogue of America; 8:30, Concert, of Spanish music, KDKA L. S. Symphony Orchestra, Trio, Helen Clough, soprano; Ashley Brockett, baritone; Ada Virasoro de Narul, reader; Gunnar Narud, pianist.

KFAE, Pullman, Wash. (Pacific, 330), 7:30 p. m., "Soils," Prof. George Severance; "Casualties During the War," Prof. A. B. Pence; "Repatriations and War," Dr. F. F. Potter; Reading, Leone Webster; "Home Gardening Potlents," M. D. Armstrong; "Potatoes for Seed," George L. Zundel; Music.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Detective stories by Detective Nick Harris, Concert; 8:00-9:00, Evening Herald concert; 9:00-10:00, Examiner concert; 10:00-11:00, Concert presented through courtesy by Hollywoodland Community Orchestra; 11:00-12:00, Ambassador-Max Fischer Cocoanut Grove Orchestra.

KFKB, Milford, Kansas (Central, 286), 8:05 p. m., "Orderly Marketing of Kansas Wheat," Prof. R. M. Green; 8:30, Timely topics; Boyd Ringo, pianist. Faculty Trio; Vocal solos, Edna Ellis.

KFDA, Seattle, Wash. (Pacific, 455), 8:30 p. m., Sherman, Clay & Co. presents Seattle's most popular orchestras.

KGW, Portland, Ore. (Pacific, 492), 12:30 p. m., Concert, Darby's Orchestra; 3:30, Children's program, 8:00, Orchestra concert; 9:00, Alexander Hamilton Institute, business talk, James Albert; 10:00, Dance music, George Olsen's Metropolitan Orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Program presenting Arthur Raymond Hill, tenor, and Bill Hatch, pianist; Garden talk by Fred C. McNabb of the Argyle & Musser Seed Co.; 2:30-3:30, Program presented by courtesy of Barker Brothers; 6:45-7:30, Children's program, presenting Catherine Craig, reader 15 years, Selma Anthony, pianist 13 years, pupil of Keineth E. Campbell; Duck Winslow, juvenile reporter; 8:00-10:00, Program through courtesy of Estelle B. Mills, Sudebaker Ra to Orchestra, of Long Beach; Dr. Mars E. Baumgardner.

KLX, Oakland, Calif. (Pacific, 509), 8:00-10:00 p. m., Studio program, Wiley B. Allen Co., Soprano duets, Charlotte Hatch, Bernice Hackett, Mildred Ha ket, pianist; Otto Linquist, tenor; Dean Donaldson, violinist; Stanley Painter, baritone; Myrth Luff, soprano; Maybell Sherburne West, pianist; Reading, Anne Briganan; Aurelia Frazer, pianist.

KPD, San Francisco, Calif. (Pacific, 423), 1:00-2:00 p. m., Rudy Selger's Fairmount Hotel Orchestra; 2:30-3:30, California Collegians; Victor Townly tenor; Theodoro J. Irwin, accompanist; Barron Bartusch, pianist; 4:30-5:30, Rudy Selger's Fairmount Hotel Orchestra; 5:30-6:30, Children's hour, "Big Brother" of KPO; Eleanor Berland, pianist; 7:00-7:30, Rudy Selger's Fairmount Hotel Orchestra; 8:00-11:00, E. Max Bradford's Versatile Band.

KSD, St. Louis, Mo. (Central, 546), 6:30 p. m., Program, Albergh's concert ensemble; 9:00, Studio program, Tyrolan music, Jolui Buscher, Albert Knettel, tenors; Rudolph Schneider, Carl Spalinger, bassos; Olga Ruernann, reader; Zithers, Martha Kiefer, Mrs. Gries, Hugo Elster; Fred Kiefer, violinist, Karl Haber, pianist; 11:00, Hotel Statler dance music, Rodenbach's Orchestra.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 6:00 p. m., Sweeney school, Prof. A. A. Brasch; 6:45, Children's hour story, "Uncle Bob" 7:00, Dinner concert, C

(Continued on page 16)

EARL CARROLL'S "VANITIES" ON

First Act of "Vanities"

MUSICAL comedy enthusiasts and the world in general will have an opportunity to hear Earl Carroll's "Vanities" next Tuesday night, April 22, at 8:15 Central time, when Station KYW, Chicago, broadcasts the entire first act direct from the Colonial theater, where the "Vanities" will have opened the night previous. KYW uses a wave length of 536 meters. The program of the first act is given so that listeners can follow the action more closely.

The program will begin at 8:15 with a short talk by Mr. Carroll, probably the only producer and manager who admits that broadcasting is a great business getter for a show. The great success of the "Vanities" over many other well-known musical comedies, should be a point in Mr. Carroll's favor. His praise of Radio and the story of the fight he has had in the support of his belief, are given elsewhere in this paper. The program should be over by 10 p. m., Central time.

Scene 1—The Birth of a New Revue
The Composer.....L. Barton Evans
The New Born.....Mlle. Renova
The Cohan Revue.....Polly Lux
The Winter Garden.....DeLorez
White's Scandals.....Vera King
Greenwich Village Follies.....

Scene 2
Musical Number, "Girls Were Made for Dancing," sung by Frank Blyler with Margaret Davies, assisted by Amy Frank, Lucille Moore and girls, followed by Al Thomas and Olga Borowska.

Scene 3
Baritone Solo.....J. Frank Leslie

Scene 4
A Singing Lesson.....Irene Ricardo
Harry Burns and Chas. Senna.

Scene 5—"The Soul of a Harp"
My string of pearls upon a harp belong
A golden harp of melody and song;
And as I play the string of pearls,
A vision comes of lovely girls,
I see a girl, but who knows if what I behold
Is not the soul that dwells within my harp of gold?

The Singer.....Ruth Oswald
The Harpist.....Carlena Diamond
The Child.....Elsie Neal
The Vision.....Amy Frank
Olga Borowska, Lucille Moore,
Amy Rivere
(Staged by Senia Gluck)

Scene 6—The New Scene—Comedy Sketch

The Hero.....Don Barclay
The Heroine.....Margaret Davies
The Director.....Harry Burns
The Villain.....Charles Callahan

Scene 7—The Silver Garden
"The Band Plays Home, Sweet Home".....L. Barton Evans and Dorothy Knapp
"Pretty Peggy".....Peggy Joyce
Assisted by her Collegians

Scene 8
Travesty.....Don Barclay
Harry Burns, Charles Senna, Al Thomas, Charles Callahan, Al Clair

Scene 9
Vocal Selection.....J. Frank Leslie

Scene 10
"Cretonne Girl".....John Byam
Assisted by Margaret Davies and Cretonne Girls

Scene 11—Joe Cook, The Humorist
(Presenting a portion of his "One Man Vaudeville Show")

Scene 12—The Slave Mart
(Conceived and Arranged by Renoff)
Premiere Danseuse.....Renova
Violet Bristow, Olga Borowska, Jean Watson, Elsie Neal and Corps de Ballet

The Slave Dealer.....Renoff

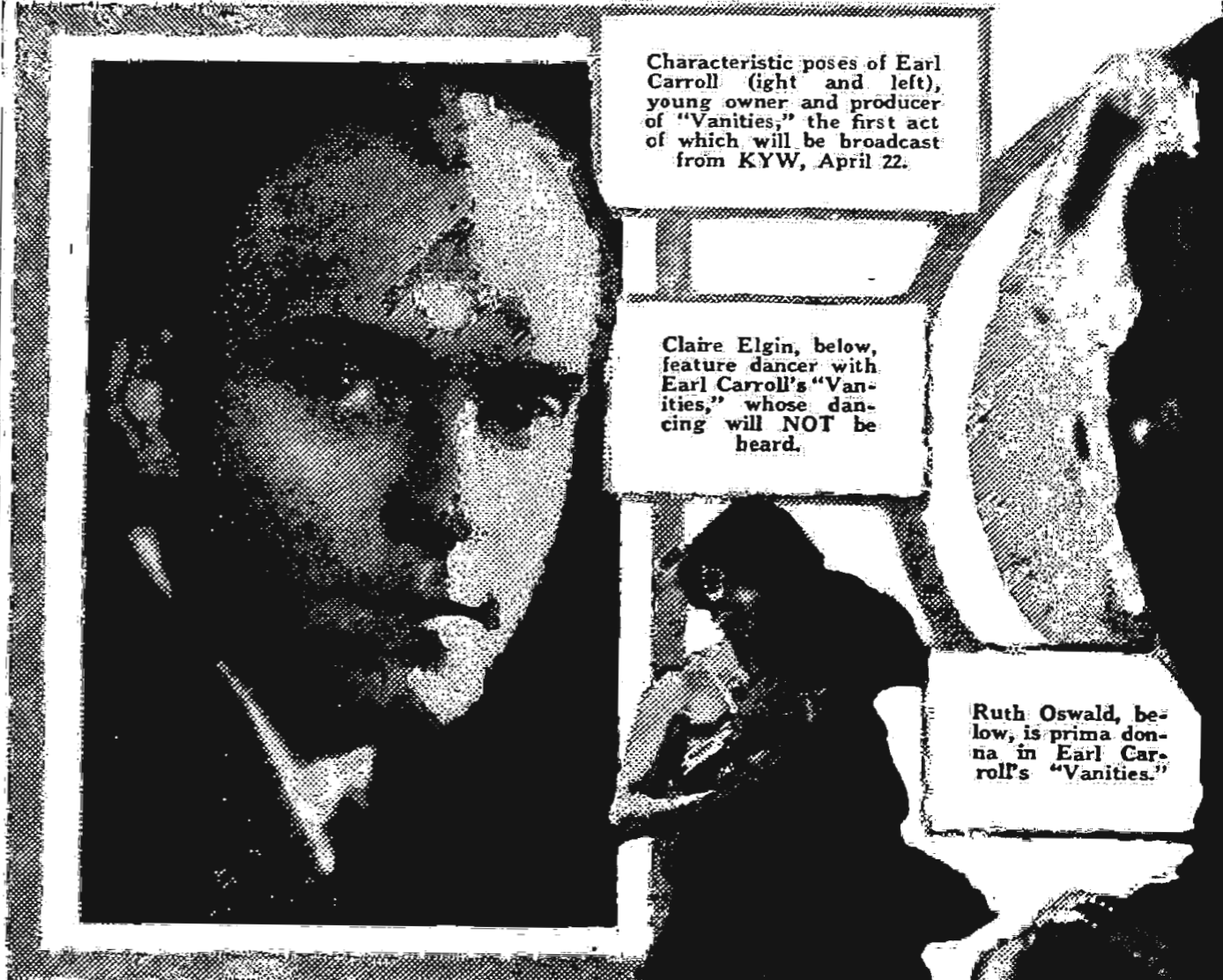
Scene 13—Finale of the Furs
"When the Snowflakes Fall".....

.....John Byam
Snow Dears.....Margaret Davies and Claire Elgin
Dance of the Snowballs.....
.....Vanities Dancing Girls
Baby Lamb.....Cardinal Peairs
Baby Lambs...(From Left to Right)
Misses O'Reilly, Cheeke, Lux, Brown
Squirrel.....Carlena Diamond
Squirrels...(From Left to Right)
Misses Butler, Gillingham, Parker, Latham

Mole.....Dorothy Knapp
Moles.....(From Left to Right)
Misses Jackson, Patterson, Washburn, Miller

Seal.....Claire Elgin
Seals.....(From Left to Right)
Misses Borrows, Hyde, Harrison, Palmer

Sable.....Margaret Davies
Sables.....(From Left to Right)
Misses Carr, Powell, King, Greenwalt
Ermine.....Ruth Oswald
Ermines.....(From Left to Right)
Misses Black, DeLorez, Fitch, Larson
Chinchilla, "Queen of All".....
.....Peggy Joyce



Characteristic poses of Earl Carroll (right and left), young owner and producer of "Vanities," the first act of which will be broadcast from KYW, April 22.

Claire Elgin, below, feature dancer with Earl Carroll's "Vanities," whose dancing will NOT be heard.

Ruth Oswald, below, is prima donna in Earl Carroll's "Vanities."

9:30, Musical program, Exchange Club of St. Paul; 10:45, Casino Orchestra from St. Paul Hotel, Sam Helman, director.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Program for the Shut-ins, Wurlitzer Concert Company; 7:15, Selections from "If Wishes Were Horses," musical play, Junior Show Shop Players; 8:00, "All About Stamp Collecting," E. B. Power; 8:15, Choir concert, "The Crucifixion," Choirs of St. Mark's Evangelical Church and Plymouth Congregational Church; 8:45, "Medicine in the Days of King Tutankhamen," Dr. Caswell A. Mayo; 9:00, Warner and Swone Coon Dog Orchestra.

WMAQ, Chicago, Ill. (Central, 447.5), 1:00 p. m., Speeches, Chicago Association of Commerce; 2:35, Lyon & Healy program; 4:20, Items of interest to women; 4:30, Pupils Cosmopolitan School of Music; 7:00, Stories for the children, Georgene Faulkner; 7:30, Lecture, "The Weekly Lecture from Northwestern University"; 8:40, La Salle Hotel Orchestra; 9:00, Talks, various Chicago charities; 9:15, Program, Florence Nelson, soprano.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:30 p. m., Lecture, C. A. Russell; 6:30, Sandman's visit; 8:30, Musicale, Erwin Swindell, musical director; Fern Danerion, soprano; Paul Oehlert, tenor; Margaret O'Donnell, soprano; Haut Dethlefs, violin-concertina.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:02 p. m., Wagoner Crystal Tea Room Orchestra, Robert E. Golden, director; 4:45, Organ recital, Mary E. Vogt; 7:30, Havana Casino Orchestra from Sylvania Hotel, Vincent Rizzo, director; 8:15, Organ recital, Mary E. Vogt; 9:00, WOO Orchestra, Robert E. Golden, director; 10:02, Kentucky Kernals Dance Orchestra from Adelphia Hotel.

WQQ, Kansas City, Mo. (Central, 360), 7:00-8:00 p. m., Edison Recreation program.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., "Should Missouri Farmers Fertilize the Corn Crop?" M. F. Miller; 8:20, Barn dance program, Bill Catton, old-time colored fiddler; his partner, Ola Gathright, guitarist.

WUW, Cleveland, Ohio (Eastern, 390), 3:00 p. m., Musical selections and Easter Chimes, WTAM Symphony Orchestra; Easter story reading, Althea Willard; Solo, Dick Finnegan, boy soprano; Trio, Nell Steek, harpist, Ben Silverburg, violin, Max Schmitt, cello; Solo, Edna Dunham Willard, soprano; Reading, "The Story of the Cross," L. W. Zimmerman; solo, Edna Dunham Willard, soprano; Address, Right Rev. Frank DuMoulin, Bishop Coadjutor of Ohio; Harp solo, Nell Steek; Solo, Arthur M. Parry, baritone; Solo, Florence Wasson; Trio, Nell Steek, harpist, Ben Silverburg, violin, Max Schmitt, cello; Solos, Florence Wasson and Arthur Parry.

WVJ, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises, R. J. Horton; 12:00 m., Goldkette's Orchestra; 3:00 p. m., News Orchestra; 7:00, Newsboys' Band, Jackson, Mich.; Vocal selections, pupils of Blanch Bliss Lyons.

Thursday, April 17

CKAK, Montreal, Canada (Eastern, 425), 4:00 p. m., Weather, stock, news, music; 8:30, Canadian National Railway Artists; Talk, official.

KOKA, E. Pittsburgh, Pa. (Eastern, 326), 12:20 p. m., Lenten services, Trinity church; 5:30, "The Forgetfulness," Rev. Hugh T. Kerr; 6:15, Dinner concert, KDKA Little Symphony Orchestra; 7:30, Wendall Hall; 8:00, Farm program; 11:30, "The Seven Last Words," Choir Ensemble Society; 11:30, Concert, KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Y. M. C. A., concert and sales lecture; 8:00-9:00 p. m., Ambassador Hotel concert; 9:00-10:00, Examiner concert; 10:00-11:00, Concert presented by Celeste Rhyas, pianist.

KFKB, Millard, Kansas (Central, 286), 8:05 p. m., "What Shall the Baby Wear?" Mary Worcester; 8:30, "Line and Form," Prof. Araminta Holman; Thelma Condon, pianist; Vocal solos, Sheldon Storer; Dorothy Hall, violinist.

KFSG, Los Angeles, Calif. (Pacific, 278), 3:30-4:30 p. m., Organ recital through courtesy of Prof. Wm. J. Kraft, Jean de Chauvent, B. E. Ralland and others; 6:30-7:00, Children's hour, Bible stories; 8:00-8:25, Boy talks, by Thos. B. Brown, Boy Scout commander; 9:15, Revival service, conducted by Almee Temple McPherson; 9:15-10:00, Special program presented by students of the Echo Park Evangelistic and Missionary Training Institute and the Angelus Temple choir of sixty voices; 10:02-10:10, The family altar and prayer; The Angelus Temple chimes.

KGO, Oakland, Calif. (Pacific, 312), 8:00 p. m., Bohemian Trio; East Bay Serenaders, Walter H. Bundy, director; Mrs. A. W. Lawson, soprano; Euphonium solo, George M. Flint; Joseph Kearns, bass; Mrs. Adnee Hall, soprano; J. Carlton Hollenbeck, pianist; Irvin Johnson, baritone; Readings, Dorothy Boardman.

KGW, Portland, Ore. (Pacific, 492), 12:30 p. m., Concert; 3:30, Woman's story program; 8:00, Accordion solos, Johnny Schuster; 8:15, Studio program of dance music, George Olsen's Metropolitan Orchestra; 10:00, Dance music, George Olsen's Metropolitan Orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Program presenting Dorothy Bell Robinson, Hawaiian guitar; Edward Murphy, basso balladist; 2:30-3:30, Program through courtesy of Barker Brothers.

ers; 6:45-7:30, Children's program, presenting Jane Adele Riley, reader, age 5 years; Virginia Eberle, pianist, age 10 years; Nancy Parent, pianist, 13 years; Katherine Girard, soprano, age 11 years; Rita Cummings, soprano, age 12 years.

KPO, San Francisco, Calif. (Pacific, 423), 1:00-2:00 p. m., Rudy Selger's Fairmont Hotel Orchestra; 2:30-3:30, Matinee program, Mme. Martha Fawkes-Haun, reader; Mme. Gilbert Moyle, pianist; 4:30-5:30, Rudy Selger's Fairmont Hotel Orchestra; 5:30-6:30, Children's hour stories, "Big Brother" of KPO, Book of Knowledge; 7:00-7:30, Rudy Selger's Fairmont Hotel Orchestra; 8:00-9:00, Organ recital, Theodore J. Irwin; 9:00-10:00, Program by the Cap and Bells, Mabel Radki, contralto; Mrs. Clyde N. White, accompanist; John Afendras, violinist; Helen O'Neal, accompanist; 10:00-11:00, E. Max Bradford's Versatile Band.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 6:45 p. m., Children's bedtime story, "Uncle Bob"; 7:00, Dinner concert, Joska DeBabary's Orchestra, Clyde Doerr's Orchestra; 7:35, Sport talk, Leo Fisher; 8:00, Twenty minutes of good reading, Rev. C. J. Ferrin; 8:20, White Community Choral, Morgan L. Eastman, conductor; John Stamford, tenor; Dorothy Wilkins, soprano; Sallie Menkes, pianist; Thora Martens, contralto.

WAAW, Omaha, Neb. (Central, 360), 8:00 p. m., Talk, W. J. Martin; Sunday school lesson, Rev. E. M. Brown.

WBAH, Minneapolis, Minn. (Central, 417), 12:30-1:30 p. m., Dick Long's Trio; Mabel Redquist, pianist; 9:30-11:00 p. m., Passover Feast services—First Passover Talk, Rabbi C. David Matt; Marion Bearnstain Bearman, violinist; Louise Lupien Jenkins, accompanist; Cantor Eli Kreidberg, soloist; Adeline Wagner, soprano; Mrs. Louise Hummelman, accompanist; auspices United Synagogues of America.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, old-time fiddlers of Strawn, E. L. Tucker, director; 9:30-10:45, Owen Crockett's Yeomen Orchestra.

WBAV, Columbus, Ohio (Eastern, 390), 12:00 m., religious service, Dr. S. S. Palmer, pastor Broad Street Presbyterian Church, speaker; sacred music; news.

WBZ, Springfield, Mass. (Eastern, 337), 7:00 p. m., Music talk, Robert Elisha Stanley Olmsted, Musical forms; The Suite; Sonata and Symphonic Treatment; 7:30, Bedtime story for the kiddies; 7:40, Concert, Spencer Terry, baritone; Mrs. Spencer Terry, soprano; Meeting of the Publicity Club; 9:00, Concert, Massachusetts Institute of Technology.

WCAE, Pittsburgh, Pa. (Eastern, 462), 4:30 p. m., The Sunshine Girl; 6:30, Dinner concert, William Penn Hotel; 7:30, Uncle "Kaybee"; 7:50, Travel talk, Rev. Clyde L. Nevins; 8:30, Musical program.

WCBQ, Zion, Ill. (Central, 345), 8:00 p. m., Mixed quartet; Euphonium solo, William C. Dunn; Glenn R. Sparrow, tenor; Reading, Mrs. Blanche R. Kesler; Song bells solos, George Beem; Mrs. Mayfield, soprano; Tenor and baritone duet, G. R. Sparrow, J. L. Bishop; John Mehaffey, pianist; Florence Farrar contralto.

WCX, Detroit, Mich. (Eastern, 517), 2:20 p. m., Sunday School Lesson, Rev. Glenn Atkins; 4:15, Music; 6:00, Dinner concert, Hotel Tuller; 8:30, Ford Band, Acadia auditorium.

WOAF, Kansas City, Mo., Star (Central, 411), 3:30-4:30 p. m., Musical matinee, D. Ambert Haley Orchestra; 6:00-7:00, School of the Air; Piano tuning-in number, Duo-Art; Address, speaker from William Jewell College, Liberty, Mo.; Reading, Miss Cecile Burton; Tell-Me-a-Story Lady; Frits Hanlein's Trianon Ensemble; 11:45 p. m., "Nighthawk Frolic," "Merry Old Chief" and the Coon-Sanders Orchestra.

WDAP, Chicago, Ill. (Central, 360), 7:00-8:00 p. m., Drake Ensemble and Blackstone Quintet; 8:00-8:50, Ralph Emerson, organist; 10:00, Tom Mallee, Jack Little, Jack Chapman's Orchestra.

WDBR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02, Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00, Arcadia Cafe Concert Orchestra; 4:30, Mah Jong Lessons, Evelyn Merriew; 7:30, Dream Daddy's bedtime stories; 8:00, Arcadia Cafe Concert Orchestra; 8:30, "Care of Children," Mrs. Louis Love; 10:10, Howard Lanlin's Arcadia Cafe Dance Orchestra.

WEAF, New York, N. Y. (Eastern, 492), 11:00 a. m., Mabel Empire, pianist; 11:15, John Martin; 11:30, New York Tuberculosis Society; 12:00 p. m., Lenten church services; 4:00 p. m., Montmartre Orchestra; 5:00, Talk by Mary Paddon; 5:15, John E. Eckles, tenor, and Blanche Eckles, soprano; 7:00, Synagogue services; 7:30, Thornton Fisher; 7:50, American Agriculturist; 8:00, Columbia University; 8:20, Marjorie Horton Haskell, soprano, and Paul Haskell, tenor; 8:50, Program by Greeting Card Association; 9:00, 11:00 program; 10:00, Salvation Army Band.

Wednesday, April 16

(Continued from page 15)

Hotel, Joska DeBabary's Orchestra, Clyde Doerr's Orchestra; 8:00, Radio surprise, Morgan L. Eastman; Sammy Stewart and his Knights of Synopation; 9:05, Program, Union Trust Co.; 9:15, Talk, auspices of the Federal Health Bureau; 10:00-2:00, m., Mid-night revue, W. Remington Welch, organist; Herbie Mintz, pianist.

WBAH, Minneapolis, Minn. (Central, 417), 12:30-1:30 p. m., Dick Long's Trio; Mrs. A. B. May, reader; 7:00-7:30 p. m., Lectures program, Dr. J. W. Holland.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Concert, Sam S. Lesh, baritone; 9:30-10:45, Concert, George Freeman's Sooner Serenaders.

WBAV, Columbus, Ohio (Eastern, 390), 12:00 m., Piano music, Ila Lorbach Owens.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., Dinner concert, WBZ String Orchestra; 7:00, "Medical Section of the Organized Reserves," Major Charles A. Thuls; 7:30, Bedtime story for the kiddies; 7:40, Chamber music, WBZ String Orchestra; Mrs. Dorothy White, soprano; 8:30, Meeting of the National Republican Club.

WCAE, Pittsburgh, Pa. (Eastern, 462), 3:30 p. m., Piano recital, Fred Rosenfeld; 4:30, Uncle "Kaybee"; 6:30, Dinner concert, William Penn Hotel; 7:30, Sunshine Girl; 7:45, Theatrical review; 8:30, Musical program.

WCX, Detroit, Mich. (Eastern, 517), 4:00 p. m., Music; 6:00, Dinner concert, Hotel Tuller; 8:00, Music, Dolores Hackett.

WOAF, Kansas City, Mo., Star (Central, 411), 3:30-4:30 p. m., Musical matinee, Johnnie Campbell's Kansas City Club Orchestra; 6:00-7:00, School of the Air; Piano tuning-in number, Duo-Art; Address, speaker, Health Conservation Association; Tell-Me-a-Story Lady; Frits Hanlein's Trianon Ensemble; 8:00-9:15, Program by the students of the Kansas City (Kan.) University Fine Arts Department; 11:45 p. m., 1:00 a. m., Nighthawk frolic, "Merry Old Chief" and Coon-Sanders Orchestra.

WDAP, Chicago, Ill. (Central, 360), 7:00-8:30 p. m., Drake Ensemble and Blackstone Quintet; 10:00, John Stamford, Ralph Emerson, organist; Jack Chapman Orchestra.

WDBR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02, Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00, Arcadia Cafe Concert Orchestra; 4:30, Mah Jong Lessons, Evelyn Merriew; 7:30, Dream Daddy's bedtime stories; 8:00, Arcadia Cafe Concert Orchestra; 8:30, "Care of Children," Mrs. Louis Love; 10:10, Howard Lanlin's Arcadia Cafe Dance Orchestra.

WEAF, New York, N. Y. (Eastern, 492), 11:00 a. m., Mabel Empire, pianist; 11:15, John Martin; 11:30, New York Tuberculosis Society; 12:00 p. m., Lenten church services; 4:00 p. m., Montmartre Orchestra; 5:00, Talk by Mary Paddon; 5:15, John E. Eckles, tenor, and Blanche Eckles, soprano; 7:00, Synagogue services; 7:30, Thornton Fisher; 7:50, American Agriculturist; 8:00, Columbia University; 8:20, Marjorie Horton Haskell, soprano, and Paul Haskell, tenor; 8:50, Program by Greeting Card Association; 9:00, 11:00 program; 10:00, Salvation Army Band.

WEAO, Columbus, Ohio (Eastern, 360), 4:00 p. m., Agricultural lecture, Ohio State University faculty member; musical program.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., Musical recital, the Red-Headed Girl of the Journal.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, March, Junior High School Orchestra of Easton, Pa.; A. J. Fregans, director; 6:00, Sunny Jim's bedtime stories; 6:30, Meyer Davis Bellevue Stratford Concert Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selection on the Amp in Chickering; Chat with ladies, Marjorie Dreyer, Selections on Brunswick; 7:00 p. m., Meeting of the Amrad Big Brother Club; Message to Camp Fire Girls, Chas. W. Casson; "Big Smoke"; 7:30, Concert, Revere High School Orchestra.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, director; 2:30-4:00, The Radio Dealers musical program; 6:30-7:30 and 11:30, Vincent Lopez Hotel Statler Orchestra; 8:50, Address, "Swindler," John N. Garver, secretary, Buffalo Better Business Commission; 9:00, Concert, direction Edgar Messersmith.

WGY, Schenectady, N. Y. (Eastern, 380), 6:30 p. m., "Adventure Story," Youth's Companion.

WHA, Madison, Wis. (Central, 360), 7:30 p. m., "Better Times with More Alfalfa," Prof. L. H. Graber.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Walnut Theater Orchestra; 7:30-9:00, Mrs. Emory Nold, soprano; Reading, Gordon B. Seppendorf; Martin H. Berger, tenor; Mrs. Thomas D. Herrick, accompanist; Agricultural tabloid talk, faculty of the State Agricultural College; Frank Holand, tenor.

WHB, Kansas City, Mo., Sweeney School (Central, 411), 12:35-1:00 p. m., Popular music, Sweeney Radio Orchestra; 2:00-3:00, Ladies' hour program, Sweeney Radio Orchestra; 3 p. m., Weather and market information; 7:00-8:00, Sweeney Radio Orchestra.

WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Gimbel Brothers Tea Room Orchestra, Ray Steen, director; 6:05, St. James Hotel Dinner Dance Orchestra; 7:00, Uncle Wip's bedtime stories.

WJZ, New York, N. Y. (Eastern, 455), 12:00 m., Lenten service, Trinity Church, Rev. Charles Fiske; 1:00 p. m., Nantz's Schraff's Tea Room Orchestra; 2:00, New York Board of Education; 3:00, Landau and His Harbor Inn Serenaders; 4:00, Edna Gunna's lashion talk; 4:10, "Peeps at People," Edythe H. Browne; 4:20, "Interior Decorating," Good Housekeeping; 4:30, Tea concert, Hotel Commodore; 5:30, Lecture, Dr. Herman H. Home; 7:00, Story Book Lady; 7:30, Dance program, Irving Selzer and his Cafe Boulevard Orchestra; 7:45, The Progress of the World, a Review of Reviews Talk; 8:00, Dance program, Irving Selzer and his Cafe Boulevard Orchestra; 8:30, "The City Record," Hon. Peter J. Brady; pianist; 9:00, Christian, soprano; Clinton Sommer, pianist; 9:15, "Romantic Castles of Europe," Wert Barnitz; 9:15, Wallace J. Drwos, pianist; 9:30, New York University Glee Club; 10:30, Dance program, Enid Coleman's Trocadero Orchestra.

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., "Dressmaking," Mme. Myrtle Saperston; "Haldresting"; 4:00-4:30, Maxrazine Carrell; 6:00-6:30, Sport hour, "Construction and Purpose of Signs," E. R. Kelley; "Cleanup Week Talk"; 7:30-8:15, Farm lectures, "Come to Scott, but Remain to Spray," A. G. Ruggles; "Attacking Minnesota Blossom," Mrs. John Howard Todd; "Feeding Baby Chicks," E. H. Smith; 9:15, Business message;

FROM KYW TUESDAY, APRIL 22

Pretty Peggy Jnyce, below, and humerus Joe Cook, right, stars of "Vanities." Pretty Peggy is wearing her famous chinchilla robe and a MILLION dollars worth of jewels.



7:40, Vee Lawhurst, pianist; 8:00, "How to Plant the Home Grounds"; 8:20, Bank of America; 8:30, Hunter College musical program; 9:20, Oratorio Society of Christian Science Inst.; 10:30, Sarah Edwards, contralto; 11:00, Vincent Lopez Orchestra.

WEAO, Columbus, Ohio (Eastern, 360), 8:00 p. m., Talk, "Home Reading Courses by College of Agriculture," J. E. McClintock; Concert, Columbus Grand Opera Company.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "Dallas in Old Days and Dallas Up to Date," Epps G. Knight; 6:30-9:30, Musical recital, Ella Stegall Williams and assisting musicians; 6:45-7:00, Boy Scout program; 11:00-12:00, Musical recital, Circle Theatre Orchestra.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Loretta Kerk, pianist; 6:05, Sunny Jim's bedtime stories; 6:30, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00, "Weymann Five" Orchestra; 8:00, Boy Scouts Radio meeting; 10:10, Charlie Kerr and his Symphonic Dance Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selection on Ampico in Chickering; Chat with Ladies, Marjorie Drew; Selections on Brunswick; 7:00 p. m., Meeting of the Amrad Big Brother Club; 7:30, Musical popular song hits.

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, featuring Ann Joseffer, violinist.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., "Spring House Cleaning," Mrs. Edward P. Pressey; 6:30, Dinner music, Romano's Orchestra; 7:45, Radio drama, "Passers By," WGY Players; A Few Moments with New Books, William Jacob; 4:00-5:00 p. m., WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Walnut Theatre Orchestra; 7:30-9:00, Ella Sharrard Violin Quartet; Four-minute digest of International Sunday School lesson; Four-minute Radio Forum talk.

WHB, Kansas City, Mo., Sweeney School (Central, 411), 12:35-1:00 p. m., Popular program, Sweeney Radio Orchestra; 2:00-3:00, Ladies' hour program, Sweeney Radio Orchestra; 3:00 p. m., Weather and market information; 7:00-7:45, Solos by members Sweeney Radio Orchestra; 8:00-10:00, Program of vocal and instrumental solos interspersed by selections, Sweeney Radio Orchestra.

WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Gimbel Brothers Tea Room Orchestra; Ray Steen, director; 3:00, Program for Two Pianists, Pearl Hechner and Emily Sellers; Grace H. Taylor, elocutionist; 6:05, Harold Leonard's Redjackets from Club Madrid; 7:00, Uncle Wags' bedtime stories; 8:00, Philadelphia Quartet; 9:30, "Timely Talks to Motorists," by Eugene Hogle, of Automobile Club of Philadelphia; Philadelphia Music Pageant, Fullerton L. Waldo; 10:05, Radio Vocal Lesson by Herbert Wilbur Greene; 11:15, Ted Weems and his Cafe L'Aiglon Orchestra.

WJAX, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Concert, Hotel Cleveland Orchestra, Ivan Francis, director; Piano solo, Mrs. R. A. Carle; Violin solo, Mrs. Frederic M. Nicolaus; Songs and ballads, Viola Miller, soloist; Monologues, Messers. W. N. Rossington, A. E. Hill and Jimmy Hindson; Solos, Jimmy Hindson; A. E. Hill, haritone; W. N. Rossington; Scraps, Messers. Rossington, Hill and Hindson.

WJY, New York, N. Y. (Eastern, 405), 7:30 p. m., "Food Supply and Distribution in Greater New York," William T. Donnelly; 7:45, Josephine Evans, soprano; 8:05, "Gold," Innis Brown; 8:20, Sterling Male Quartet; 8:45, "South American Jungles at Night," Harold E. Anthony; 9:00, The White Way Trio; 9:30, Ralph L. Grosvenor, baritone; 10:00, Montage Newman, violinist; Mrs. J. W. Anderson, soprano; 10:40, J. Vincent Moore Entertainers.

WJZ, New York, N. Y. (Eastern, 455), 12:00 m., Lenten service, Trinity Church, Rev. Charles Fiske, minister; 1:00 p. m., Pennsylvania Concert Orchestra; 2:00, New York Board of Education; 3:00, Afternoon Auditorium concert, Wanamaker Auditorium; 4:00, Elinor Gunn's Fashion talk; 4:10, "Joys of Collaboration," Harriet Ford; 4:20, "Food for the Middle Years," Winifred S. Gibbs; 4:30, "Fashions," Harper's Bazaar; 4:45, Ella Schreiber, soprano; 5:00, Refaluto Sisters, Dave Corv's "Jack Rabbit Stories"; 7:30, "Time's Top Question Game"; 7:45, Emily V. Ebert, soprano; 8:00, "Socialism," Dr. Henry P. Fairchild; 8:30, Wanamaker organ recital, Wana-

maker Auditorium; 9:15, At Home with J. Andrew White and his guest, O. O. MacIntyre; 9:30, Bordetown Male Quartet; 10:30, Dance program, Theodore's Hotel Majestic Orchestra.

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 Wiggles," Tess Cooperman; 2:40-4:00, Daylight concert; 4:00-4:30, Magazine reading; 5:30-6:00, Children's stories, Ellen Nye; 6:00-6:15, "Health Expositions," Dr. John M. Lajolo; 6:15-7:00, Dinner concert, Traffic Club Orchestra; 7:30-8:15, Farm lectures, "Has Drainage Been Overdone," Dalton G. Miller.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Adelalde Aptel, pianist; 10:00, Concert, Junior faculty, Cincinnati Conservatory, Mrs. Saylor Wright, vocalist; Songs, Corrine M. Lawson; Mrs. Jemmie Vardeman, pianist; Reading, "Sundried," Margaret L. Spaulding; Duet, Mrs. Wright, Mrs. Phau; Heiman Weinstein, violinist; Songs, Mrs. Mary Towlesy Phau; 11:00, Doherty's Melody Boys.

WMAQ, Chicago, Ill. (Central, 447.5), 4:20 p. m., Items of interest to women; 4:30, Illinois Federation of Women's Clubs; 7:00, Boy Scouts' weekly talk; Talk, Rockwell R. Stephens; Humorous readings, Golda Brant; 8:40, La Salle Orchestra; 9:00, Lecture from U. of Chicago; 9:15, Program.

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

WOAW, Omaha, Neb. (Central, 526), 6:00 p. m., Child's story hour, Grace Sorenson; 6:30, Goldenrod orchestra, Wallace Johnston, manager; 9:00, Regular monthly meeting of World Radio Camp, E. E. May; 9:30, Musical program, Kiwanis club; "Kiwanis," E. O. Rutledge; Dr. J. D. Bellamy, tenor; Mrs. E. M. Carpenter, violinist; Vocalist, Mrs. Helen Crane; Vocalist, Jim Ahlgren; W. W. Benedict, pianist; "The Sunny Side of Life," Rev. H. H. Pittman; Quartet; Vocalist, Mrs. E. E. May; "Our National Anthem," E. R. Ferguson.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:00 p. m., "Hypochlorhydria," Karl G. Stephan; 5:45, Chimes Concert; 6:30, Sandman's Visit; 9:00, Orchestra program, The Palmer School Radio Orchestra, Erwin Swindell, conductor.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:02 p. m., Wanamaker Crystal Tea Room Orchestra, Robert E. Golden, director; 4:45, Organ recital, Mary E. Vogt.

WQQ, Kansas City, Mo., Western Recreation program, 7:00-8:00 p. m., Edison Recreation program, Arzograms and information talks; 8:00-10:00, Regular Benzo Gas Co. program.

WRC, Washington, D. C. (Eastern, 469), 6:00 p. m., Children's hour, Peggy Alhion; 7:45, Talk on motoring, auspices of the American Automobile Association; 8:00, Dance program, Better Ole Orchestra; 8:45, Song recital, Raymond G. Moore, haritone; 9:00, Lillian Harmon Burke, pianist; 9:15, The Lee House Trio; 9:30, Easter Oratorio, The Atonement, R. Dean Shure, Choir of the Mount Vernon Place M. E. Church.

WVJ, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises, R. J. Horton; 12:00 m., Edward Barnes, haritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 5:00, Baseball scores; 7:00, News Orchestra; William Baggott, pianist and baritone; Edwin Baggott, haritone; Richard Baggott, tenor; Jack Baggott, bass; 10:00, Goldkette's Orchestra.

Friday, April 18

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 12:20 p. m., Good Friday services, Rev. Percy G. Kammerer, Trinity Church; 5:30, "The Life Everlasting," Rev. Hugh T. Kerr; 6:15, Organ recital, Cameo Motion Picture Theatre; 7:15, Sunday School lesson, Dr. R. L. Lanning; 7:30, Wendell Hall; 8:00, Good Friday services, First Baptist Church, Rev. Carl Wallace Petty; 9:15, Concert, Mrs. James H. Green, director; Christine Adams, cellist.

KFAE, Pullman, Wash. (Pacific, 330), 7:30 p. m., "The Growth of International Interdependence," Prof. F. R. Yoder; "Alfalfa in Rotation with Wheat Benefited by Gypsum," Prof. R. P. Cope; "Value of a Milk Campaign," Mary Sutherland; Varsity Quartet; Song hits, Fred Marshall; Book chat, Alice L. Webb.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Vocal and instrumental concert; 8:00-9:00, Evening Herald concert; 9:00-10:00, Examiner concert; 10:00-11:00, Concert of vocal and instrumental numbers arranged by Harry Porter; 11:00-12:00, Concert by the Ambassador-Max Fischer Coconut Grove Orchestra.

KFKB, Milford, Kansas (Central, 286), 8:05 p. m., "Kansas Roads," Prof. C. H. Scholer; 8:30, "Problems in Rural Electrification," Prof. J. L. Brenne-man; Elsie H. Smith, pianist; Vocalist, Prof. Ira Pratt; Robert Gordon, cellist.

KFOA, Seattle, Wash. (Pacific, 455), 8:30 p. m., Leo Feist night, a program of late song hits of the Leo Feist Publishing Company, arranged by Lew Mahan.

KFSG, Los Angeles, Calif. (Pacific, 278), 3:30-4:30 p. m., Special musical program under direction of Gladwyn N. Nichols; 6:30-7:00, Children's hour; International Sunday School lesson for April 20th, reviewed by Mrs. M. Kennedy; 8:00-9:15, Revival services by Aimee Semple McPherson; 9:15-10:00, Con-

Where to Hear Concerts

THESE are the stations for music lovers to dial, and you can hear, providing you dial correctly and read the programs carefully, everything from jazz to opera.

Tuesday: KDKA, KFKB, KFI, KFSG, KGO, KIIJ, KPO, KSD, KYW, WAAM, WAAW, WBAH, WBAP, WBZ, WCAE, WCX, WDAF, WDAI, WFAF, WFAA, WFI, WGN, WGY, WHAS, WHB, WIP, WJAX, WJY, WJZ, WLAG, WLW, WMAQ, WMC, WOAW, WOO, WOR, WSB, WWJ.

Wednesday: KDKA, KFKB, KFAE, KFI, KFNF, KFOA, KFSG, KGW, KHJ, KLX, KPO, KSD, KYW, PWX, WAAM, WAAW, WBAP, WBZ, WDAF, WDAI, WDAE, WCAE, WCX, WFAF, WFAA, WFI, WGN, WGY, WGAZ, WGI, WGN, WHAS, WHB, WHN, WIP, WJZ, WLAG, WLW, WMAQ, WOC, WOO, WOR, WOS, WSB, WTAM, WWJ.

Thursday: CKAC, KDKA, KFI, KFKB, KFSG, KGO, KGW, KHJ, KLZ, KPO, KSD, KYW, WAAM, WBAH, WBAP, WBZ, WCAE, WCAL, WCBD, WCX, WDAF, WDAI, WDAE, WFAF, WFAA, WFI, WGI, WGN, WGY, WHAS, WHB, WHN, WIP, WJAX, WJY, WJZ, WLAG, WLW, WMAQ, WMC, WOAW, WOC, WOO, WOR, WSB, WWJ.

Friday: KDKA, KFAE, KFI, KFKB, KFOA, KFSG, KHJ, KGW, KLX, KPO, KYW, WBAH, WBAP, WBAV,

cert program by the Angelus Temple Band and Crusaders; 10:02-10:10, Family altar, prayer and Chimes. KGW, Portland, Ore. (Pacific, 492), 12:30 p. m., Program, Peck Holton's Orchestra; 3:30, Lecture, Eather B. Colley; 8:00, Lecture, Extension Division of University of Oregon; 10:30, Hot Ovals.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Program presenting the Farrar Sisters, Captulu V. F. Cannon of the Los Angeles Motor Patrol; 2:30-3:30, Program presented through courtesy of Barker Brothers; 6:45-7:00, Children's program presenting Kathryn Stillwell, mezzo-soprano; The weekly visit of Richard Headrick, screen juvenile; 7:00-7:30, Organ recital from First Methodist Episcopal Church, Arthur Blakeley, organist; 8:00-10:00, Program presented through courtesy of the Wiley B. Allen Music Company; Studebaker Radio Orchestra of Long Beach, Calif.

KLX, Oakland, Calif. (Pacific, 509), 8:00-10:00 p. m., KLX Concert Trio, vocal solos, Aimee Dorothy Raegan Talbot; Hattie French, violinist; Zozenia Vander Ende, cellist; Original Serenaders.

KLZ, Denver, Colo. (Mountain, 360), 7:30 p. m., "Denver Climate," J. M. Schierer, meteorologist.

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), 12:00 m., Good Friday "Tre Ore" service, Church of St. Francis Xavier; 8:00, "Seven Last Words of Jesus," Mercantile, Christ Church Cathedral.

KY, Chicago, Ill. (Central, 536), 11:35 a. m., Table Talk, Anna J. Peterson; 6:00 p. m., Spanish lesson, Prof. A. A. Brauchl; 6:45, Children's bedtime story, "Uncle Bob," Dinner concert, Congress Hotel, Joska DeBabary's Orchestra; Clyde Doerr's Orchestra; 10:00-2:00 a. m., Midnight revue, W. Remington Welch, organist.

WAAW, Omaha, Neb. (Central, 360), 8:00 p. m., Bridge talk, Mrs. Guy Purdue; 8:25, Special Good Friday service, First Lutheran church, Rev. W. A. Siefert, pastor.

WBAH, Minneapolis, Minn. (Central, 417), 12:30-1:30 p. m., Dick Long's Trio and soloists; 7:00-7:30 p. m., Pierrot and Pierrette Review.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, Junior Euterpean Club; 9:30-10:45, Concert, artists of Texas Christian University.

WBAV, Columbus, Ohio (Eastern, 390), 12:00 m., Plann Riehl, soprano; News; 8:00 p. m., Dispatch-Little Symphony Orchestra; Miss Marcella Hartman, soprano.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., Dinner concert, WBZ Orchestra; 7:00, Dramatized story, Youth's Companion; Current book review, R. A. MacDonald; 7:30, Bedtime story for the Kiddies; 7:40, Vesper services, Boston Herald-Traveler; 11:00, Program, Chamber music, WBZ Orchestra; Mrs. Harry G. Kitson, soprano.

WCAE, Pittsburgh, Pa. (Eastern, 462), 4:30 p. m., Sunshine Girl and Uncle Kaybee; 6:30, Dinner concert, William Penn Hotel; 7:30, Uncle Kaybee; 8:30, Musical program, William Fogerty, baritone; Mrs. C. A. Kinnard, soprano.

WCAL, Northfield, Minn. (Central, 360), 8:30 p. m., "Rereading the Ancient Classics," Dr. George Welda Spohn.

WCX, Detroit, Mich. (Eastern, 517), 4:15 p. m., Music; 6:00, Dinner concert, Hotel Tuller; 8:30, Special Good Friday program.

WDAF, Kansas City, Mo., Star (Central, 411), 3:30-4:30 p. m., Musical matinee, Leo R. Davis "Request" Orchestra; 6:00-7:00, School of the Air; Piano tuning in number, Duo-Art; Address, speaker, Kansas City Children's Bureau; Tell-Me-a-Story Lady; Fritz Handl's Trio and Ensemble; 8:00-9:15, Program of old-time songs arranged and presented by O. J. Ochs; 11:45 p. m., "Nighthawk Frolic," "The Merry Old Chief" and the Coon-Sanders Orchestra.

WDAI, Chicago, Ill. (Central, 360), 7:00-8:30 p. m., Drake Ensemble and Blackstone Quintet; 10:00, Cambridge Sisters, William Benson, Ralph Emerson, organist; Jack Chapman's Orchestra.

WDAE, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02, Organ recital, Stanley Theater; Arcadia Cafe Concert Orchestra; 2:00, Arcadia Concert Orchestra; 4:30, Edna Finestone, pianist; 7:30, Dream Daddy's bedtime stories; 8:30, WDAE Male Quartet; Playlet by WDAE Players, direction Walter Greenough; 10:10, Howard Lanin's Dance Orchestra; Special "Morning Glory Club" program; Musical comedy features from Philadelphia's leading theaters.

WFAF, New York, N. Y. (Eastern, 492), 11:00 a. m., Eugenie Farrar, pianist; 11:10, E. Ruth Anderson; 11:25, Talk by Minnie Vining Kennedy; 12:00 noon, Lenten church services; 4:00 p. m., Hazel Ione Moses, harpist; 4:40, Wynona George Clayton, soprano; 5:00, Children's hour, Wynona George Clayton, soprano; 5:00, 30 Pillins; 7:30, Thornton Fisher; 8:00, Comtesse Morichard lo Ferré de Montagny, dramatic soprano; 8:30, Sybil Sanderson Fagen, whistler, and George Osborne, violinist, and George Ballard, tenor; 9:00, Astor Coffee Orchestra.

WEAO, Columbus, Ohio (Eastern, 360), 4:00 p. m., Agricultural lecture, Ohio State University faculty member; Musical program.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., Address, Dr. Robert Stewart; Hysor; 8:30-9:30, Musical recital, Dr. Richard Mandell, Denton, Texas, and assisting musicians.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., WFI, Philadelphia Bellevue Stratford Concert Orchestra; 6:05, Sunny Jim's bedtime stories; 6:30, Meyer Davis Bellevue Stratford Concert Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selection on Ampico in Chickering; Chat with Ladies, Marjorie Drew; Selections on Brunswick;

(Continued on page 15)

in hear,
every-

WDAF,
A. WFII,
WHAS,
Y. WJZ,
V. WOC,
J.

KFI,
O. KSD,
WCAL,
WEAF,
WHAS,
WLAG,
WOO,

KFSG,
KYW,
WDAP,
WGN,
WLAG,

KFI,
WBAH,
WCBD,
WGY,
WJC,
WOS,

KPO,
AAW,
WOO,

Brother Club;
Wagner, Radio
10-1:00 p. m.,
1:30-4:00, The
30 and 11:30,
1:50, Address,
B. Powers;
Abes, Buffalo
H. F. Wind,
ual Missions,
9, 12:00-3:00
children's pro-
Department of
Koush; WGY
ster Schmidt,
Leah Zeh,
no. violonists,
p. m., Read-
thy.
0-5:00 p. m.,
son, director;
ggott; Frank
Central 411),
eeney Radio
um, Sweeney
ket informa-
and instru-
m., Din-
9.3, "The
sacred capita, Love
Alicia Stelzer,
soprano; Dr. J. W. Dindinger, bass; M. V. Johnson,
tenor; Johanna Anderson, director; Enid Lindberg, ac-
companied.
WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes
concert; 3:00 p. m., "Muscles and How They Act,"
R. G. Maybach; 5:45, Chimes concert; 6:30, Sand-
man's Visit; 8:00, Musical program, Erwin Swindell,
musical director, by the Orchestra of the Reorganized
Church of Jesus Christ.
WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m.,
Organ recital, Mary E. Vogt; 12:03 p. m., Wana-
maker Crystal Tea Room Orchestra, Robert E. Golden,
director; 4:45, Organ recital, Mary E. Vogt; 7:30,
Hotel Adelphia Concert Orchestra; 8:30, Special pro-
gram from Fox Theater; 9:30, Organ recital, Mary
E. Vogt; 10:03, Kentucky Kernels Dante Orchestra
from Adelphia Hotel.
WOC, Kansas City, Mo., Western Radio Co. (Central,
360), 7:00-7:45 p. m., Edison Recreation program,
vocal solos, orchestra numbers, service reports.
WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m.,
Program, Jefferson City Rotary Club Boys' Band.
WRC, Washington, D. C. (Eastern, 469), 3:00 p. m.,
Fashion Developments of the Moment, Women's Wear;
3:10, Song recital, Arthur McCormick, baritone; 8:00,
"Beauty and Personality," Elsie Pierre; 8:35, I'll
Grant, pianist; 3:50, Magazine of Wall Street.

WJY, New York, N. Y. (Eastern, 405), 7:30 p. m.,
"Food Supply and Distribution to Greater New York,"
William T. Donnelly; 7:45, Josephine Evans, soprano;
8:05, "Golf," Innis Brown; 8:20, Sterling Male
Quartet; 8:45, "South American Jungles at Night,"
Harold E. Anthony; 9:00, The White Way Trio; 9:30,
Ralph L. Grosvenor, baritone; 10:00, Montague New-
man, violinist; Mrs. J. W. Anderson, soprano; 10:40,
J. Vincent Moore Entertainers.
WJZ, New York, N. Y. (Eastern, 455), 12:00 m.,
Lenten service, Trinity Church, Rev. Charles Fiske,
minister; 1:00 p. m., Pennsylvania Concert Orchestra;
2:00, New York Board of Education; 3:00, Afternoon
Auditorium concert, Wanamaker Auditorium; 4:00,
Elinor Gunn's Fashion talk; 4:10, "Joys of Collabora-
tion," Harriet Ford; 4:20, "Food for the Middle
Years," Winifred S. Gibbs; 4:30, "Fashions," Harp-
er's Bazaar; 4:45, Ella Schreiber, soprano; 5:00,
Regalberto Sisters, pianists; 5:15, Ella Schreiber, so-
prano; 7:00, Uncle Dave Cory's "Jack Rabbit Stories";
7:30, Time's "Pop Question Game"; 7:45, Emily V.
Ebert, soprano; 8:00, "Socialism," Dr. Henry P.
Fairchild; 8:30, Wanamaker organ recital, Wana-

concert, Mrs. James M. Green, director; Christine
Adams, cellist.
KFAE, Pullman, Wash. (Pacific, 330), 7:30 p. m., "The
Growth of International Interdependence," Prof. F. R.
Yoder; "Alfa in Rotation with Wheat Benefited by
Gypsum," Prof. R. P. Cope; "Value of a Milk Cam-
paign," Mary Sutherland; Varsity Quartet; Song hits,
Fred Marshall; Book chat, Alice L. Webb.
KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m.,
Vocal and Instrumental concert; 8:00-9:00, Evening
Herald concert; 9:00-10:00, Examiner concert; 10:00-
11:00, Concert of vocal and instrumental numbers
arranged by Harry Porter; 11:00-12:00, Concert by
the Ambassador-Max Fischer Coconut Grove Orches-
tra.
KFKB, Milford, Kansas (Central, 286), 8:05 p. m.,
"Kansas Roads," Prof. C. H. Scholer; 8:30, "Proble-
ms in Rural Electrification," Prof. J. L. Brenne-
man; Elsie H. Smith, pianist; Vocalist, Prof. Ira
Pratt; Robert Gordon, cellist.
KFOA, Seattle, Wash. (Pacific, 455), 8:30 p. m., Leo
Feist night, a program of late song hits of the Leo
Feist Publishing Company, arranged by Lew Mahan.
KFSG, Los Angeles, Calif. (Pacific, 278), 3:30-4:30
p. m., Special musical program under direction of
Gladwyn N. Nichols; 6:30-7:00, Children's hour; in-
ternational Sunday School lesson for April 20th, re-
viewed by Mrs. M. Kennedy; 8:00-9:15, Revival ser-
vices by Aimee Semple McPherson; 9:15-10:00, Con-

dream Daddy's bedtime stories; 8:30, WDAF Male
Quartet; Playlet by WDAF Players, direction Walter
Greenough; 10:10, Howard Lanin's Dance Orchestra;
Special "Morning Glory Club" program; Musical
comedy features from Philadelphia's leading theaters.
WEAF, New York, N. Y. (Eastern, 492), 11:00 a. m.,
Eugenie Farrar, pianist; 11:10, E. Ruth Anderson;
11:25, Talk by Minnie Vining Kennedy; 12:00 noon,
Lenten church services; 4:00 p. m., Hazel lone Moses,
harplst; 4:40, Wynona George Clayton, soprano; 5:00,
Children's hour stories; 7:00, Gladys Gayreau and
30 violins; 7:30, Thornton Fisher; 8:00, Comtesse
Morchard le Fevre de Montagny, dramatic soprano;
8:30, Sybil Sanderson Fagen, whistler, and George
Osborne, violinist, and George Ballard, tenor; 9:00,
Astor Coffee Orchestra.
WEAO, Columbus, Ohio (Eastern, 360), 4:00 p. m.,
Agricultural lecture, Ohio State University faculty
member; Musical program.
WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m.,
Address, Dr. Robert Stewart Hyer; 8:30-9:30, Musical
recital, Dr. Richard Mandell, Denton, Texas, and as-
sisting musicians.
WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m.,
Meyer Davis Bellevue Stratford Concert Orchestra;
6:05, Sunny Jim's bedtime stories; 6:30, Meyer Davis
Bellevue Stratford Concert Orchestra.
WGI, Medford Hillside, Mass. (Eastern, 360), 12:00
m., Selection on Ampico in Chickering; Chat with
Ladies, Marjorie Drew; Selections on Brunswick;

WDAF, A. WFII, WHAS, Y. WJZ, V. WOC, J. KFI, O. KSD, WCAL, WEAF, WHAS, WLAG, WOO, KFSG, KYW, WDAP, WGN, WLAG, KFI, WBAH, WCBD, WGY, WJC, WOS, KPO, AAW, WOO, Brother Club; Wagner, Radio 10-1:00 p. m., 1:30-4:00, The 30 and 11:30, 1:50, Address, B. Powers; Abes, Buffalo H. F. Wind, ual Missions, 9, 12:00-3:00 children's pro- Department of Koush; WGY ster Schmidt, Leah Zeh, no. violonists, p. m., Read- thy. 0-5:00 p. m., son, director; ggott; Frank Central 411), eeney Radio um, Sweeney ket informa- and instru- m., Din- 9.3, "The sacred capita, Love Alicia Stelzer, soprano; Dr. J. W. Dindinger, bass; M. V. Johnson, tenor; Johanna Anderson, director; Enid Lindberg, ac- accompanied. WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:00 p. m., "Muscles and How They Act," R. G. Maybach; 5:45, Chimes concert; 6:30, Sand- man's Visit; 8:00, Musical program, Erwin Swindell, musical director, by the Orchestra of the Reorganized Church of Jesus Christ. WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:03 p. m., Wana- maker Crystal Tea Room Orchestra, Robert E. Golden, director; 4:45, Organ recital, Mary E. Vogt; 7:30, Hotel Adelphia Concert Orchestra; 8:30, Special pro- gram from Fox Theater; 9:30, Organ recital, Mary E. Vogt; 10:03, Kentucky Kernels Dante Orchestra from Adelphia Hotel. WOC, Kansas City, Mo., Western Radio Co. (Central, 360), 7:00-7:45 p. m., Edison Recreation program, vocal solos, orchestra numbers, service reports. WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Program, Jefferson City Rotary Club Boys' Band. WRC, Washington, D. C. (Eastern, 469), 3:00 p. m., Fashion Developments of the Moment, Women's Wear; 3:10, Song recital, Arthur McCormick, baritone; 8:00, "Beauty and Personality," Elsie Pierre; 8:35, I'll Grant, pianist; 3:50, Magazine of Wall Street. (Continued on page 15)

Saturday, April 19

(Continued from page 17)

CKAC, Montreal, Canada (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, Nap Danserou, cellist; Rex Battle, pianist; 8:30, Frontenac Breweries' Band and Artists direct from Frontenac Breweries; 10:30, Joseph C. Smith and his Mt. Royal Hotel Dance Orchestra; George Filsburg, pianist.

Where to Hear Dramas

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

Tuesday: KHJ, A Play, Pasadena Community Broadcasters; WLAG, "Suicides," WLAG Players. Wednesday: WLW, "If Wishes Were Horses," Junior Show Shop Players.

Thursday: WGY, "Passers By," WGY Players. Friday: WJAR, Playlet, WJAR Players. Saturday: KGO, "The Pipers," KGO Players.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:30 p. m., "Synthetic Perfumes and Flowers," C. C. Hall; 5:45, Chimes concert; 6:30, Sandman's visit; 9:00, Musical selections, the Palmer School Radio Orchestra, Erwin Swindell, conductor; Y. B. Rochte, baritone soloist.

WRC, Washington, D. C. (Eastern, 469), 6:00 p. m., Children's hour; Peggy Albion, 7:45, Bible talk, auspices of the Meta Organized Bible Class; 8:00, Dance program; McWilliams' orchestra; 9:00, Piano recital; 9:15, Song recital; Anna Brett Summy, contralto; 9:30, Violin recital; 10:00, Song recital.

WTAM, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Dance program by WTAM Dance Orchestra, assisted by Y. M. C. A. Minstrels; Solos by Joseph Kuhn, Edson Hill, Jack Clemmons, Tom Lydyard, and Gerald Forstner.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WJL, Detroit, Mich. (Eastern, 517), 8:00 a. m., Setting-up exercises; R. J. Horton; 12:00 m., Edward Barnes, baritone; LeRoy DeTurk, tenor; 3:00 p. m., News Orchestra; 7:00, News Orchestra.

WIP, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Glimb Brothers' Tea Room Orchestra; 3:00, Easter Cantata; 0:05, "Baseball Dope" by Monte Cross. 6.15 p. m., St. James Hotel Dinner Dance Orchestra; 7:00, Uncle Wip's bedtime stories.

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., "20th Century Housekeeping," Bernice Bell; 2:40-4:00, Daylight concert; 4:00-4:30, Magazine reading; 4:30-6:00, Children's hour, Ted Cooperman; 6:00-6:15, "Sport Review," John Getchell; 6:15-7:00, Dinner concert; 7:30-8:15, Farm lectures, "Area Plan for Eradicating Tuberculosis," W. A. Peck; "Modern Banking," J. G. MacLane.

WLW, Cincinnati, Ohio (Central, 309), 8:00 p. m., Concert, Lions Club Quartet; Edgar Guest's poem, Margaret M. Bryan; Prize Chorus of the Evanston Mother's Club; 9:30, Crosley theatrical review; Woody Meyer's Cincinnati Dance Orchestra.

WMAQ, Chicago, Ill. (Central, 447.5), 4:30 p. m., Concert. WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Hotel Gayoso Orchestra.

Monday, April 21

CKAC, Montreal, Canada (Eastern, 425), 1:45 p. m., Mt. Royal Hotel Concert Orchestra; 4:00, Weather, news, stocks; 4:30, Mount Royal Hotel Dance Orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 12:15 p. m., Noon concert; 6:15, Organ recital, Howard Webb; 7:15, "A Look Ahead Toward Oncoming Events," "Our World"; 7:30, Children's period; 8:00, Radio Girl Scout Meeting, Laura Holland, director; 8:15, "Political Parties from Grant to Wilson," Dr. John W. Oliver; 8:30, KDKA Little Symphony Orchestra.

KFAE, Pullman, Wash. (Pacific, 350), 7:30 p. m., Agricultural engineering talk, Prof. C. H. Johnson; "The Peace Movement to 1914," Prof. C. H. Woodruff; "Cow Testing and Its Value," Don G. Magruder; Mrs. La Verne Askin Kimbrough, contralto; Mrs. Ruth Keiser, pianist.

KFAF, Denver, Colo. (Mountain, 360), 8:30 p. m., "Fishing in Colorado," R. G. Parvlin, State Fish and Game Commissioner.

KFI, Los Angeles, Calif. (Pacific, 469), 8:00-9:00 p. m., Evening Herald concert; 9:00-10:00, Examiner concert; 10:00-11:00, Ambassador-Max Fischer Cocacout Grove Orchestra.

KFOA, Seattle, Wash. (Pacific, 455), 8:30 p. m., Pacific States Electric Company program presenting Bab's B.E. Ladies' Orchestra; Margaret Dicken, leader.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Literary program, Portland Library Association; 7:00, Talk, Florence Holmes Gerke; 8:00, Jolt harp recital, Ruth Lorraine Close, Helen Martin; 9:30, Portland Civic Music Club.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Special Concert program.

KPO, San Francisco, Calif. (Pacific, 423), 1:00-2:00 p. m., Rudy Selger's Fairmont Hotel Orchestra; 2:30-3:30, Jack Falit's Entella Cafe Orchestra; 4:30-5:30, Rudy Selger's Fairmont Hotel Orchestra; 5:30-6:30, "Big Brother" of KPO; Natalie Heymann, violinist; 7:00-7:30, Rudy Selger's Fairmont Hotel Orchestra; 8:00-9:00, Theodore J. Irwin, organist; Mme. Natatis; Albin, soprano; Mrs. Raymond Marshall, soprano; 9:00-10:00, Nevada Hour, soprano; Nazaretti Regoli, tenor; Miss Cole, Milscha Lohvino, pianist; Lilly Stadd, soprano; 10:00-11:00, E. Max Braddfield's Versatile Band.

WAAW, Omaha, Neb. (Central, 360), 7:30-9:00 p. m., Roy Watson's Wild Rose Orchestra; Charles Lang, baritone; Clara Stieden, Laurette Voss.

Sunday, April 20

CKAC, Montreal, Canada (Eastern, 425), 4:30 p. m., Sacred concert.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 11:00 a. m., Services, Point Breeze Presbyterian church, Rev. Percival H. Barker; 2:45 p. m., Concert; 4:00, Organ recital, Dr. Charles Heinrich; 4:45, Vesper services, Shady Side Presbyterian Church, Rev. Hugh T. Kerr; 6:30, Dinner concert, Pittsburgh Athletic Association Orchestra, Gregorio Scalzo, director; 7:45, Services, Calvary Episcopal church, Rev. E. J. Van Etten; 9:15, Open forum, Rev. John Ray Ewers.

KFI, Los Angeles, Calif. (Pacific, 469), 10:00-10:45 a. m., Service by the L. A. Church Federation; 10:45-5:00 p. m., Vesper concert by courtesy of Federated Church Musicians; 6:45-7:30, Concert; 8:00-9:00, Ambassador Hotel concert; 9:00-10:00, Examiner concert; 10:00-11:00, Orchestra concert.

KFSG, Los Angeles, Calif. (Pacific, 278), 10:30 a. m.-12:30 p. m., Entire devotional service by Aimee Semple McPherson; 2:30-4:30 p. m., Entire devotional message of worship by Aimee Semple McPherson; 6:30-6:55, Children's hour, conducted by Mrs. M. Kennedy; 7:00-10:00, Special concert of sacred music, followed by revival services conducted by Aimee Semple McPherson; 10:02-10:10, The family altar and prayer, conducted by the pastor; Angelus Temple chimes will ring KEFS of the air.

KGW, Portland, Ore. (Pacific, 492), 6:00 p. m., Church services, First Presbyterian church, Rev. Harold Leonard Bowman, pastor; 7:00, George Olsen's Concert Orchestra; 8:00, "Seven Last Words of Christ," St. Mary's Cathedral Choir.

KHJ, Los Angeles, Calif. (Pacific, 395), 10:00 a. m., Sermon in KHJ Studio; 10:30 a. m.-12:30 p. m., Organ recital and service from First Methodist Episcopal Church, Arthur Blakeley, organist, Rev. E. E. Helms, pastor; 7:00-7:30, Organ recital from First Methodist Episcopal church, Arthur Blakeley, organist; 8:00-10:00, Special De Luxe program.

KPO, San Francisco, Calif. (Pacific, 423), 11:00 a. m.-12:00 m., Radio church services, "Easter Questions Divinely Answered," Rev. W. C. Sherman; Etta Wilson, soprano; Norman Simon, baritone; Festo Aspre, violinist; College Male Quartet; 8:30-10:00, Rudy Selger's Fairmont Hotel Orchestra.

KYW, Chicago, Ill. (Central, 536), 7:00 p. m., Chicago Sunday Evening Club; Mrs. Rose Lutiger Gannon, vocalist; Stanley, organist; choir of 100; Informal Bible talk, Clifford W. Barnes; Address, Rev. Charles W. Gilkey.

WAAW, Omaha, Neb. (Central, 360), 8:00 p. m., Bridge service, Cross Lutheran church, Rev. Titus Lang, pastor.

Tuesday, April 22

CKAC, Montreal, Canada (Eastern, 425), 4:00 p. m., Music; 7:00, Kiddies' stories in French and English; 7:30, Rex Battle and his Mt. Royal Hotel Concert Orchestra; Herbert Spencer, organist; 8:30, "La Presse" studio variety entertainment; 10:30, Joseph C. Smith and his Mt. Royal Hotel Dance Orchestra.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Concert; 8:00-9:00, Ambassador-Max Fischer Cocacout Grove Orchestra; 9:00-10:00, Examiner concert; 10:00-11:00, Concert.

KGO, Oakland, Calif. (Pacific, 312), 8:00 p. m., Paradise Hawaiian Trio; Geraldine Jackson, soprano; William and Bonita Keasbey, pianists; Reading, "The Forgotten Actor," Richard Mill; The Rose Florence Ladies' Quartet; "The Jovs of Spring," Otto Blehl; Leslie H. Jackson, baritone; Norma MacPherson, pianist; Vocal selections, Rera T. Ker, Irene Carroll, Janie Johnston, Emily Beal; Lenore Keithley, vocalist; Martha Jalava, vocalist.

KGW, Portland, Ore. (Pacific, 492), 12:30 p. m., Concert, Music Club of Portland; 3:30, Talk, Jeanette P. Cramer; 7:45, Talk for farmers, Oregon Agri. College extension service.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert; 2:30-3:30, Matinee Musicale through courtesy of Barker Brothers; 6:45-7:30, Children's program; Bedtime story, "Uncle John"; 8:00-10:00, Special De Luxe program of vocal and instrumental selections.

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; 5:30-6:30, Stories from the Book of Knowledge, Big Brother of KPO; 6:30-7:00, "Clara and Sid" Orchestra; 7:00-7:30, Rudy Selger's Fairmont Hotel Orchestra; 8:00-10:00, Orpheus Club of Oakland; 10:00-11:00, E. Max Braddfield's Versatile Band.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, Frank Cheek, baritone; 9:30-10:45, Monthly program, Fort Worth Harmony Club.

WBAV, Columbus, Ohio (Eastern, 390), 12:00 m., Piano music, Ila Lorbach Owens.

WDAP, Chicago, Ill. (Central, 360), 7:00-8:00 p. m., Drake Ensemble and Blackstone Quintet; 10:00, Rosemary Hughes, Bob Cougle, Fred W. Aagaard, Jack Chapman's Orchestra.

WDF, 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; 4:30, Cotton Pickers' Orchestra; 7:30, Dream Daddy's bedtime stories.

30 Minute A-B-C Lessons for Radio Beginners

Chapter V—What Condensers are Good for

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 VI—Uses of Resistance in Radio.
 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.

EVERY receiving set contains one or more condensers. A condenser is a capacity or device for temporarily holding electricity. A large condenser holds a big quantity of electrons much as a gallon jar holds water. A tiny condenser can only hold a small amount of

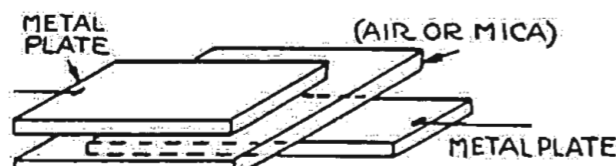
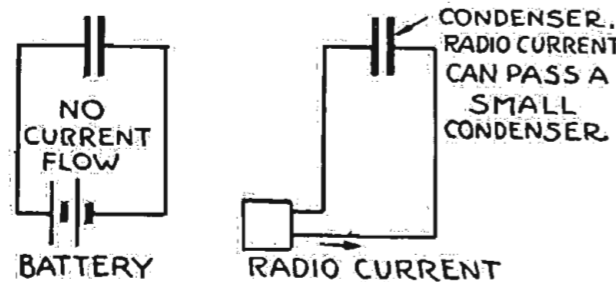


Figure 40.

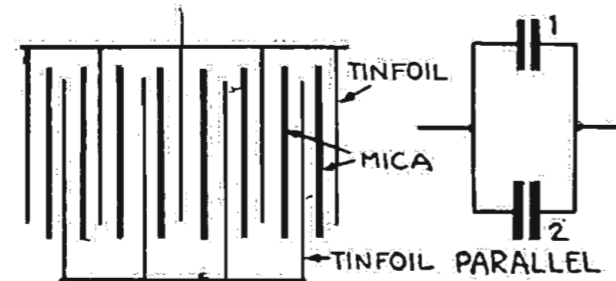
electrons, corresponding for example to a thimble full of water.

Figure 40 illustrates how any two conducting surfaces separated by a dielectric, form a condenser. The dielectric means



Figures 41 and 42.

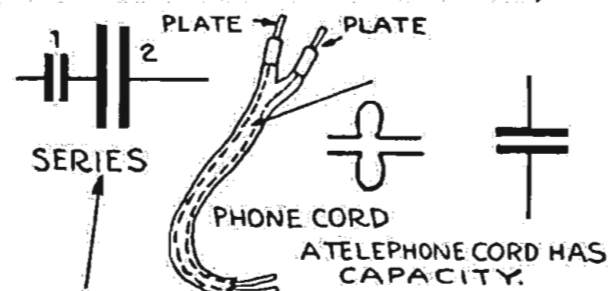
the insulator between the metal plates, such as air or mica. When an electric charge is applied, a bunch of electrons rush onto the plate and set up a strain in the dielectric between the two plates. One plate is said to become negatively



Figures 43 and 44.

and the other positively charged, which means simply that there is more electricity on one plate than on the other.

Both plates want to be discharged or have an equal quantity of electrons, and to do this electrons must be moved, con-



Figures 45 and 46.

stituting a current. Starting with unequally charged plates, if electrons are added to one plate, it is said to be charged, and the other plate has an equally opposite ability to take away this extra charge. This ability to take away the

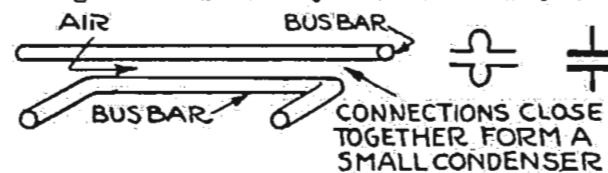


Figure 47.

charge from the other plate is called a positive charge. The dielectric is an insulator and prevents the electron flow necessary for equalizing the charge or amount of electrons on each plate. This is then accomplished externally by con-

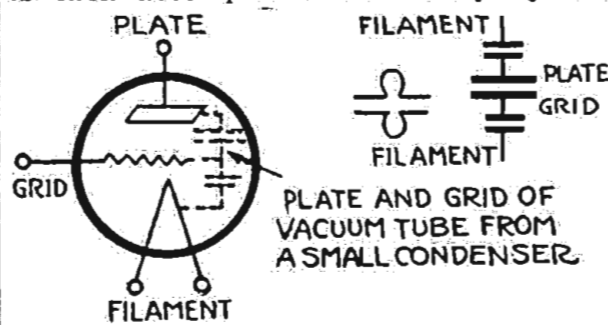


Figure 48.

necting a suitable circuit around the condenser plates.

Charging a Condenser

If a battery is connected to a condenser, it is charged to the same voltage as the battery can give, but no current can

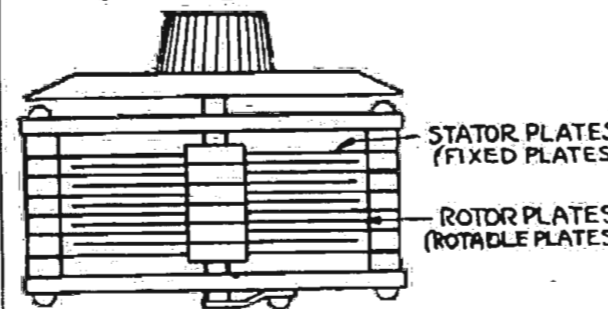


Figure 49.

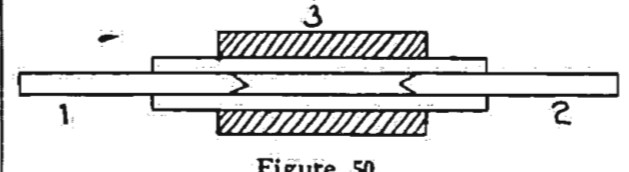
flow through the condenser. If alternating or Radio current is applied to a condenser, it can however pass right

through. The condenser, charges first in one direction and then reversely, following the alternating supply current, thus acting as a temporary reservoir to take and give back electrons in large quantities. This is diagrammed in Figures 41 and 42.

Instead of one plate for each side of a condenser there can be a group sandwiched in between insulating dielectric material, as illustrated by Figure 43. Each group acts as one plate.

Parallel and Series Connections

Two condensers can be connected to make one larger or one smaller condenser.



The parallel connection to give a larger condenser effect is shown in Figure 44, and the capacities of the two condensers simply add together. In the series connection, Figure 45, the combined capacity is always less than the capacity of the smallest individual condenser. Thus in this example the total series capacity is less than the capacity of the smallest condenser alone.

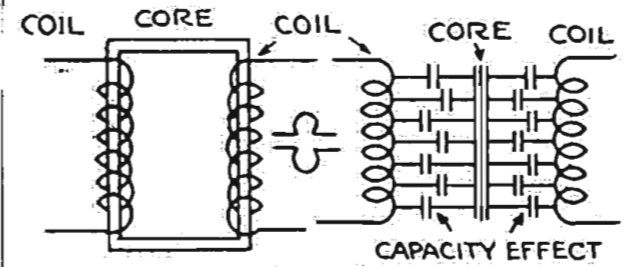
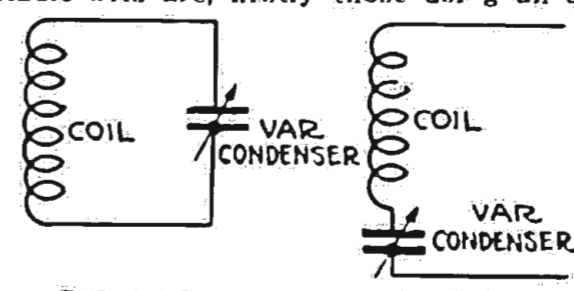


Figure 51.

The two wires in a telephone cord such as used in Radio receiving sets form a considerable capacity, as illustrated in Figure 46. So do two close parallel busbar connecting wires form a tiny Radio condenser, as in Figure 47. Sometimes such tiny condensers can pass considerable Radio frequency current.

Another small condenser is naturally formed in the vacuum tube used in a receiving set, as illustrated in Figure 48.

Types of Condensers
 The main types of condenser used in Radio sets are, firstly those using an air



Figures 52 and 53.

dielectric and usually variable or adjustable as to capacity size, and secondly, those using mica or some other solid dielectric material. The latter are more compact and can be fixed or adjustable. Air is the unit in measurement of dielectric capacity, and other insulators, as mica, have a much larger dielectric constant. Thus for the same dimensions mica can hold a greater dielectric strain and form a larger capacity condenser than air. Some materials, as paper, are not good dielectric because they absorb and dissipate energy. Figure 49 diagrams the popular type of plate variable condenser and Figure 50 shows one of the smallest.

The windings of an ordinary audio frequency transformer have considerable capacity of condensers in and between

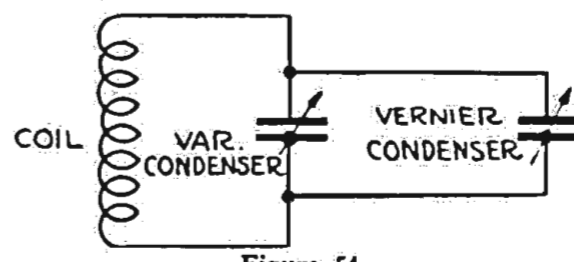


Figure 54.

the windings, as illustrated in Figure 51.

Combinations of Condensers and Coils
 Figures 52 and 53 show the two principal connections of a condenser and a coil, as used in tuning. Such combinations become adjustable packages to fit

(Continued on page 22)

PEERLESS RADIO, 349 Fulton St. BROOKLYN, N.Y.

Parcel Post prepaid on all orders above \$5.00. Express Money Order, Certified Check, Bank Draft accepted; also C. O. D. Guarantee with all merchandise.

LOUD SPEAKERS	HEATH'S RADIAN VERNIER CONDENSERS	PHONES
Magnavox (new type).....\$27.25	13 Plate.....\$4.75	Turneys.....\$2.85
Music Master.....25.45	23 Plate.....5.25	Pacnet.....3.45
Pathé (new type).....16.50	43 Plate.....5.95	Brandes Superior.....4.85
Dictogrand.....17.95		Federal.....4.95
Stromberg Carlson.....17.75	VARIOMETERS	Nathaniel Baldwin Type C.....7.95
Mercury with Baldwin Unit.....9.95	Fisher, large, 600 meter.....\$2.55	Peerless Phones.....3.95
Natl. Baldwin Type C Unit.....4.85	Shamrock.....2.65	Western Electrico.....9.85
Manhattan Electric.....22.50	Sleepy.....5.65	Ambassador.....3.50
Brandes Table Talker.....9.95	Workite.....2.95	Potter Precision.....4.25
Acusticola Phonograph Unit 9.45	Gillfillan, small.....4.95	Wiener Phones.....3.95
	Gillfillan, large.....7.45	
	Pathé.....2.85	VARIOCOUPERS
	Columbia.....4.95	Fisher, 180°.....\$2.35
VARIABLE CONDENSERS		Shamrock.....2.65
11 Pl. Admiral or Signal.....\$1.35	TRANSFORMERS	Sleeper, no taps.....3.75
17 Pl. Admiral or Signal.....1.60	Acme Audio and Radio.....\$ 3.90	Workite.....2.95
23 Pl. Admiral or Signal.....1.65	All-American (all ratios).....3.90	Gillfillan, small.....5.95
43 Pl. Admiral or Signal.....1.75	Federal No. 65.....5.95	Gillfillan, large.....7.45
11 Pl. Montrose Vernier Cond. 2.35	Modern.....4.95	Pathé.....5.35
17 Pl. Montrose Vernier Cond. 2.75	Thornderson.....3.95	Genuine All Wave.....3.25
23 Pl. Montrose Vernier Cond. 2.85	Erla Reflex and Audio.....4.45	Cockaday Coil.....1.85
43 Pl. Montrose Vernier Cond. 3.65	Akray.....3.35	Unxld, 180, Bakelite.....1.95
11 Pl. U. S. Tool.....3.35	Modern Push-Pull.....10.75	Columbia.....5.25
22 Pl. U. S. Tool.....3.65	Come Push-Pull.....10.75	
43 Pl. U. S. Tool.....4.10	Rasla Transformers.....3.95	

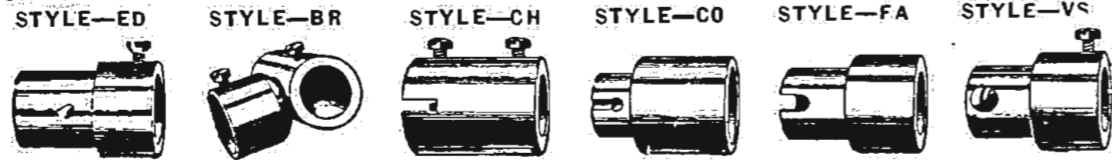
Complete Parts for Neutrodyne 5 Tube Set	Complete Parts for Ambassador 1 Tube Set	Complete Parts for Erla 1 Tube Set
1 7x26 Panel 2 Single Sockets	1 Ambassador Coil	1 Hilco Variocoupler
1 Triple Socket 2 Neutrotons	1 U. S. L. 23 Pl. Ver. Condenser	1 Signal 23 Pl. Var. Cond.
3 Neutroformers	1 Tillman 6 Ohm Rheostat	1 Bolt Socket
2 All American Transformers	1 Bell Bakelite Socket	1 ERLA Reflex Transformer
1 Battery Switch	1 .00025 Fixed Dubilier Cond.	1 ERLA Audio Transformer
3 4" Dials Fada Type	1 3" Dial Fada Type	1 .002 Fixed Dubilier Cond.
1 Power Rheostat	1 Single Circuit Jack	1 .001 Fixed Dubilier Cond.
1 Vernier Rheostat	1 7x12 Panel	1 .00025 Fixed Dubilier Cond.
8 Binding Posts	1 6 Ohm Tillman Rheostat	2 3" Dials Fada Type
1 Closed Circuit Jack	1 6 Ohm Tillman Rheostat	12 Marked Binding Posts
1 Filament Control Jack	1 Single Circuit Jack	12 Switch Points
27 Ft. Insulated Tubing	1 6 Ohm Tillman Rheostat	4 Stops
27 Ft. Tinned Bus Bar	1 6 Ohm Tillman Rheostat	1 ERLA Fixed Crystal Detector
2 Fixed Condensers .006 Mfd.	1 Diagram for Above Set	1 ERLA Blue Print
1 Fixed Condenser .00025 Mfd.		
1 Grid Leak 2 Megohms		
1 Diagram for Above Set		
Our Price \$32.50	Our Price \$12.25	Our Price \$19.45

Complete parts for FADA 5 TUBE NEUTRODYNE SETS. ALL GENUINE FADA PARTS. LIST PRICE \$65.00. OUR PRICE \$51.00. Assembled in cabinet ready to operate, \$71.50.
 Complete parts for FREED-EISEMANN 5 TUBE NEUTRODYNE SETS. GENUINE PARTS. LIST PRICE \$80.00. OUR PRICE \$62.50.
 FADA 160 NEUTRODYNE. Factory made machine. LIST PRICE \$120.00. OUR PRICE \$89.50.
 FREED-EISEMANN 5 TUBE NEUTRODYNE NR5. Factory made machine. LIST PRICE \$150.00. OUR PRICE \$125.50.
 FADA NEUTRODYNE KIT—3 NEUTROFORMERS—2 NEUTROTONS. LIST PRICE \$25.00. OUR PRICE \$21.00.
 FREED-EISEMANN NEUTRODYNE KIT—3 NEUTROFORMERS—2 NEUTROTONS. OUR PRICE \$22.50.
 SHAMROCK KITS—3 NEUTROFORMERS—2 NEUTROTONS. OUR PRICE \$15.45.
 SUPERDYNE COILS \$5.75.

MISCELLANEOUS	Cutler-Hammer 30 ohm Rheostat, Plain.....\$1.20	Shelton Midget Vernier.....\$1.40
Bell Socket, Bakelite Panel Mounting.....\$.89	Cutler-Hammer 400 ohm Potentiometer.....1.20	Freshman Grid Leak & Cond. .75
Amsco 6 ohm Rheostat......95	Filkostat.....1.85	Federal Sockets......95
Amsco 20 ohm Rheostat.....1.15	Bradleystat or Bradleyleak.....1.70	General Radio 10 ohm Rheo. 1.20
Amsco 30 ohm Rheostat.....1.25	Bruno 14 Tap Inductance Sw. .70	General Radio 30 ohm Rheo. 1.20
Amsco 400 ohm Potentiometer. 1.40	Sta-put Phone Plug......35	General Radio Potentiometer, 200 ohms.....1.25
Cutler-Hammer 6 ohm Rheostat, Plain......95	Phone Plug for 6 pr. Phones. 1.25	General Radio Potentiometer, 400 ohms.....2.85
Cutler-Hammer 6 ohm Rheostat, Vernier.....1.20	Phone Plug for 2 pr. Phones. .60	PANELS
ELECTRAHOT Solder Iron.....2.50	Single Circuit Jacks......35	7x10.....\$.80
New Improved Cockaday Coil.....5.50	Double Circuit Jacks......45	7x12.....1.05
Pathé Pulsiformers.....\$8.50	4" Dials, Fada Type......45	7x14.....1.15
New Improved Cockaday Coils, silk wound.....5.50	3" Dials, Fada Type......30	7x18.....1.50
	Triple Sockets, Fada Style 2.65	7x21.....1.70
	Marked Eby. Bind. Posts, Ea. .17	7x24.....1.75
	Ambassador Coil.....5.95	7x26.....1.75

Your Phonograph is a Perfect Loud Speaker

PHONOGRAPH engineers spent millions of money and years of time to perfect the acoustic properties of the phonograph. One of the 6 Cross Phonograph Adapters will fit your phonograph, eliminating the unsatisfactory makeshift loose coupling—and giving you a guaranteed satisfactory connection.



STYLE—ED Fits Edison
 STYLE—BR Fits Brunswick
 STYLE—CH Fits Cheney
 STYLE—CO Fits Columbia
 STYLE—FA Fits Phonographs not listed
 STYLE—VS Fits Victor
 Vocalian
 Silvertone
 Sonora
 Jewetc
 Bent
 Starr

Made to fit the following Popular Loud Speaking Units
 Morrison, Western Electric, Holzer-Cabot, Rhamstein, Acousticola, Music Master, "R. C. A.," Duzenbury, Atwater-Kent, Jewett, Dictaphone, New Type Baldwin, Ackerman, Model A & B Radioceiv, Model A & B Firth, Model A & B Murdock, Burns, Victaphone, Amplion, Trinity, Peerless, Model A & B "CIC," Melotone.

Address Radio Division, Jos. Mack Bldg., Detroit, Michigan
 CROSS GEAR & ENGINE WORKS



Radio Digest

EVERY WEEK **Illustrated** TEN CENTS
REG. U. S. PAT. OFF. AND DOM. OF CANADA

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone: State 4843, 4844, 4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
H. J. Marx, Technical Editor M. W. Thompson, Associate Editor

Eastern Office, 611-12 Times Bldg., Times Square, New York;
Telephone Bryant 4909, 10462

Member of the Audit Bureau of Circulations

58
PUBLISHED WEEKLY

SUBSCRIPTION RATES

Yearly in U. S. and Possessions and Canada, \$5.00.
Foreign postage, \$1.00 additional. Single copies, 10 cents.

Vol. IX Chicago, Saturday, April 19, 1924 No. 2

Government Control Much Needed Radio Not Unlike Many Other Problems

RADIO has rapidly developed into a great commercial proposition, with sharp competition for control of the element in which it operates. It seeks monopoly, and adds a transportation problem to the question of the day, for its business profits depend on the transportation of sounds to the ears of the public.

All through our history transportation facilities and privileges have been extremely valuable. Some men now living remember when good roads meant toll gates and a price to be paid to pass over a bridge and the like because they were privately owned, but business demanded free roads and got them. This was once a laud problem.

The government had to step in once and make the water free. Had it not done so every navigable river and lake, and every seat of water power would have been controlled and owned by private interests. Yet the public has to fight to preserve public rights in water power. This is the water problem.

The last on the list comes Radio for private profit. Just air is left. Shall it remain free? It can be with that freedom which permits no infringement on the rights of the people. Not free to grab and monopolize, but free to use under equal and equitable opportunity guaranteed by the government in its most important function, that of promoting the general welfare and holding it above and prior to any private profit.

It becomes quite natural that the government must control the air as it does the earth and its waters, not as an owner robbing the people of proper business enterprises, but as a power protecting the rights of the people to produce wealth on earth, water and in the air, so long as they do not infringe on the equal rights of the others.

Comparison of Sets

Number of Tubes Has No Meaning in Efficiency

COMPARISONS for the efficiency of a receiver on the basis of the number of tubes does not mean anything and is not a criterion of the possibilities of any set.

In order to get a clear conception of the various systems that are used for the reception of broadcast programs, it is necessary that the fan understand clearly that the transmission from the broadcast station actually consists of two different things—first, the electromagnetic waves, which act as a bond between the broadcast station and the receiving apparatus; second, the waves of electrical current vibrating at audible frequencies which are carried on the electromagnetic waves vibrating at Radio frequencies.

The distinction between these two is contained in their names: Audio frequency means all of those vibrations which transmuted into sound waves can be heard by the human ear; while Radio frequency covers everything that is above the range of the human ear.

The sensitivity of a set naturally depends upon the means taken to amplify the Radio frequency portion of the waves coming from a broadcast station. All engineers are concentrating on this phase of the development of Radio, but the wise thing is to keep the number of tubes down to practical limits, while improving the overall efficiency of each stage that is used. This is just as true with regard to the regenerative system as to all others. Regeneration consists of Radio frequency amplification, but in this case it is obtained through the medium of the same tube that is employed for detection, and unless the circuits about this tube are efficiently designed and constructed, the best results will not be obtained.

Mushiness Not Always in Set

Broadcasting Stations May Be at Fault

WHEN sounds in your headphones or loud speaker are distorted and "mushy," do not always blame it on the set. The transmitting station may be at fault. If your set brings in three or four stations clear and strong and the fourth and fifth come in "mushy," it's a pretty safe bet that transmission is bad. To attempt to clear up "mushy" broadcasting would be the same as trying to make a sharp, clear copy from a photograph that has "out of focus." It can't be done.

RADIO INDI-GEST

The Radio Announcer's Dream

(Dedicated to C. R. Emery, WGI Director and Announcer.)
The Radio Announcer had a dream; he thought that he had died, that he had crossed the narrow Styx and reached the other side. He saw the jasper gates of Heaven loom high upon the shores, He heard the chantings of the Blest behind the closed doors.

And in the dream he saw himself go boldly forth and knock, He heard a key by someone held turn softly in the lock, He heard the hinges groan and creak, the gates flew open wide, There stood St. Peter with his keys, who said, "You stay outside."

"But why?" the poor Announcer said, "Why can't you let me in? I've done no wrong to anyone, I'm free from every sin, I've lived a model life indeed, my work I have done well, Why send me, good St. Peter, now into the depths of Hell?"

St. Peter calmly answered him, "Are you the man below Who made announcements every night upon the Radio?" "Why yes, but that's no crime," said he. St. Peter said, "Young man,

How many lies did you broadcast, remember if you can?

"Have you not said, 'One minute, please,' and made folks wait fifteen?"

And every 'ham' have introduced as the best you'd ever seen? Have you not said 'I hope you have enjoyed this just as much As we have here,' and in your heart the lie you knew as such?

"How many poor performers have you told with a straight face That they were good and yet you knew their work was a disgrace? Do you remember how you've lied about your microphone? How you have claimed your station was the finest ever known?"

"Do you forget those made-up tales about the 'super-power' That you were using on the air, you told them by the hour? And how about those letters that contained a slam or knock? What awful cuss words you did use when of them you would talk."

"Have you forgotten how you've sung and read to fill up time? How you have murdered English and made free with honest rhyme? You have no place among the saints, the Devil takes your kind. He has a splendid place for you, the hottest he could find."

And then St. Peter slammed the door so loud it shook the skies, The poor Announcer with the noise awoke and rubbed his eyes, He vowed that henceforth no such tales he'd tell to raise your ire, But just between ourselves, my friends, the poet is a liar.

CHARLES L. H. WAGNER.



Condensed

By DIELECTRIC

WGN, the old familiar Chicago station, WJAZ, has become the property of The Tribune, and will broadcast news, music and general information under the direction of this newspaper. Publishers are evincing interest in this system of posting bulletins for all the world to hear, for another paper, The Herald and Examiner, has joined with the farmers' station—WJR—to fill the air in country districts. How does the A. T. & T. control these stations? What are the Radio editorial policies of the A. T. & T.?

I wish Fall had put off his oil deal until the White Radio Control bill had been enacted into law. It is really an urgent measure to which you may lend your support by following the directions given in the appeal from the American Radio Association. No matter how busy you or they may be, your Congressmen will pay heed to letters from twenty million fans and it will pay you to write. Don't say "writing to Washington accomplishes nothing," but sit down and DICTATE what you wish done. When Radiophans get sore, Congressmen "fade out." Get busy!

Every now and then we see signs of encouragement for those whose lives must be spent on a bed or in a wheel chair, for the appeal to provide receiving sets in such cases finds some responsive hearts. May the slogan adopted by the Radio shut-in committee of the Dallas, Tex., Rotary Club be taken up by other clubs until "Bringing Sunshine to the Shut-Ins" shall brighten many suffering individuals. Send your set over to a neighbor while you spend the evening in your Radio-less home. Pretty tough? Sure it is; but what of a lifetime in our room—without a set! Think that over.

One of the surest signs of failure is a box office in a theater with "Standing Room Only" displayed over the window. "Failure," that is, for the argument advanced opposing broadcasting of theater productions as a sure means of losing patrons. Roxie and his gang have attracted the attention of thousands of fans through their informal Sunday evenings spent by Radio with listeners in. On their tour recently it was impossible to accommodate all who sought tickets for the performances. If that shows anything, it is the gain to be derived from broadcasting plays and players for publicity.

It begins to look as if there were other ways to span great distances via Radio without resort to wired assistance. A short time ago we had the pleasure of listening to a program which was relayed through four stations in this country and one in England. KFI, Los Angeles, determined to cross this continent and the Atlantic ocean with a program to be heard in the British Isles. KGO and WGY did their bit to boost the concert on its way across with the result that 2LO, London, sent a cable with the joyous news of success. Why rent wires? Just Radio the news.

Once again the wily promoters of discord in music circles have met with rebuff. Not content with attempting absolute control of all musical productions used in broadcasting entertainment, an effort has been made to have musicians exact an exorbitant sum from any station transmitting union music. The one is failing rapidly; the other has failed completely. While in studio the standard union rate will prevail. Where playing elsewhere there will be no extra charge to station broadcasting. There are some eye-balls in the music world.

Mrs. Partington Speaks Out

Dear Indi: Mrs. Partington says she has listened in to another politics lesson in Radio Extension course by W. R. C. at Washington, and she's heard that "The situation, badly distorted at first, is now beyond comprehension of the uninitiated, if not of those who have passed through the middle chamber," and says she don't know but mebbe it is.

She's heard that the accusations is likely to become more complicated before the conventions, while the Static will certainly continue in violence but more centered from then to the election.

She is pleased to hear that ex-Gen. Dough Herty is not even implicated by any grid leak whatsoever through close relatives or friends in the Rum deal, as they can't prove these folks didn't have no more sense than to mix cheap oil with good whiskey that costs \$15 a case just to bail out.

SIGNING OFF.



A Reverse Darwin

My neighbor says,
Says he to me:
"Your Radio
Ain't worth a D,"
And now from up
A tall elm tree
He broadcasts: "Save
Oh, Save thou me."

CACTUS JACK.

We Wondered Howcum the Foam on Our Dials

Dear Indi: Didja tune in on the April 5, 8:30 p. m. program from CKAC, La Presse? No? 'Twas the "Famous Frontenac Breweries Band and Artists Direct from the Brewery." Mama said the mushiness was caused by rushing the growler.

INNOCENT EYES.

They're Ashamed of 'Em

Dear Indi: I was just thinking that it is a good thing that broadcasting was not in vogue when they were naming Indians, because I know some announcers would have been called Man-That-Is-Afraid-of-His-Call-Letters.

INSULATION.

With Flowing Currents, Grid Exposure

Clipped by A. W. F.

HOT WATER KENT Radio Set, five tubes, batteries, extra large loud speaker, charger in perfect condition: will sell cheap. Geo. Farrar, Box 317, Iberville, Que. 70 2

Yep, Single, 24, Six Feet, Slender, Brunette, Looking for a Good Home

Dear Indi: Re the contrib headed "Who Gets the Point? Write Indi, He Doesn't," don't you imagine that FRESH MAN means that he hopes there is no increase in the number of Ohms? I guess you are single—a married man could never have failed to see the point.

RHEO STAT.

Keeping Out the Strays

Dear Indi: I have an improvement on the 10c wave trap. Get one whose mesh is so fine your neighbor's strays can't crawl through and cause interference, or somebody might hear (or feel) a scratching noise.

INSULATION.

New Simple and Compact Radio Receiving Set

Part II—Main Panel Layout for Harkness Neutroflex Set

By H. J. Marx

THE layout of the panel is shown in Figure 2. The location of the two condensers are shown by center line only. The mounting holes can be laid out

Sub-panel Layout
The layout of the sub-panel is shown in Figure 3. Here again only center line locations are given since the dimensions

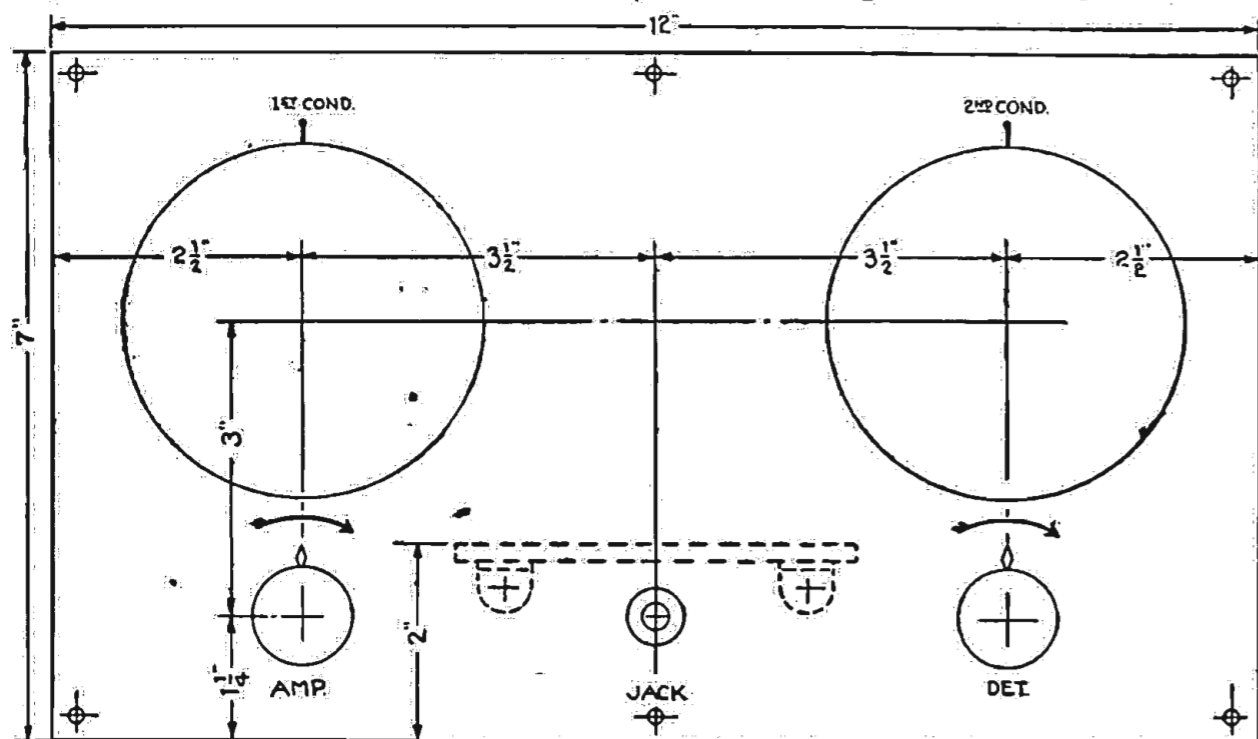


Figure 2.

and drilled according to the apparatus used. This also holds true of the two rheostats, the panel mounting angles, jack

of the mounting holes depend entirely upon the parts used. The clearance of the sub-panel over the two condensers in

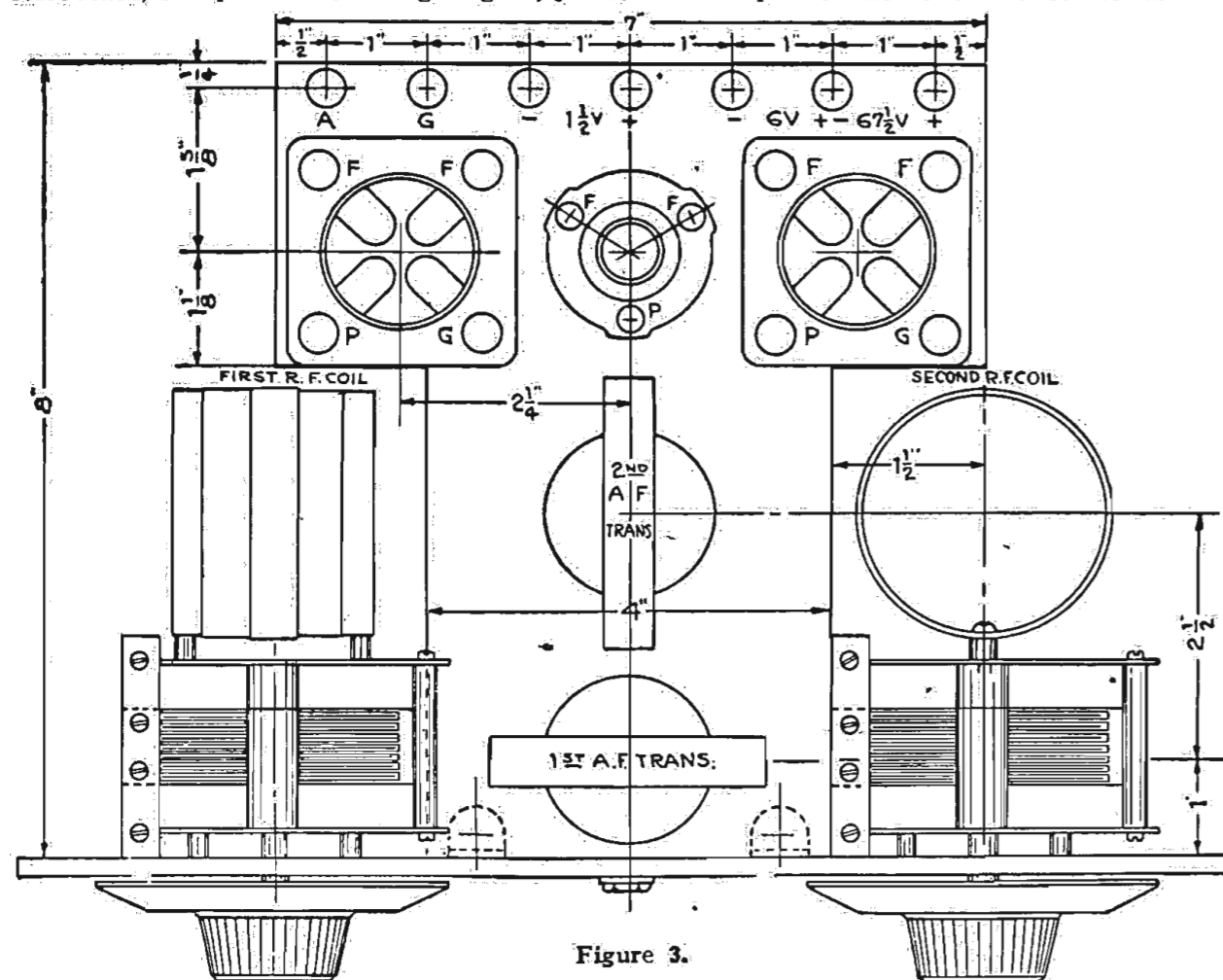


Figure 3.

and the holes used for fastening the panel into the cabinet.

The amplifier rheostat is on the left side under the first condenser, whereas the detector or two element tube rheostat is on the right side under the second condenser. The jack is in the center in line with the two rheostats to make neater appearance.

the coils is sufficient to take care of almost any type of variable condenser. Ample room is provided for the location of the two audio frequency transformers.

Dimensions of standard tube sockets are fairly uniform so that their location will fit in well regardless of the type used.

All binding posts are kept in the rear of the sub-panel and it should be noticed that the arrangement in Figure 3 corresponds to the layout of these binding posts as shown in Figure 1, last issue. The socket for the two element tube is located centrally between the two amplifier tubes. All filament terminals on these sockets should face toward the rear and the binding posts so as to shorten all filament leads as much as possible and keep the plate and grid leads close to the Radio and audio frequency transformers located in the front. This will permit shortest possible wiring with minimum amount of interference.

First Radio Frequency Coil

Figure 4 shows the first Radio frequency coil and consists of two windings. The first or lower layer has 80 turns of number 24 ssc. wire, over this a strip of paper is then wound in a single layer. On this paper is wound 20 turns of the same wire running in the same direction which makes up the primary winding. The use of adhesive coatings is not recommended. If possible it is suggested that the primary winding be spaced in order to reduce capacity. This is not absolutely essential.

Second Radio Frequency Coil

The second coil, which varies slightly from the first, is shown in Figure 5. In this coil the secondary winding again con-

sists of 80 turns as above, but the primary winding has 60 turns. In both coils all

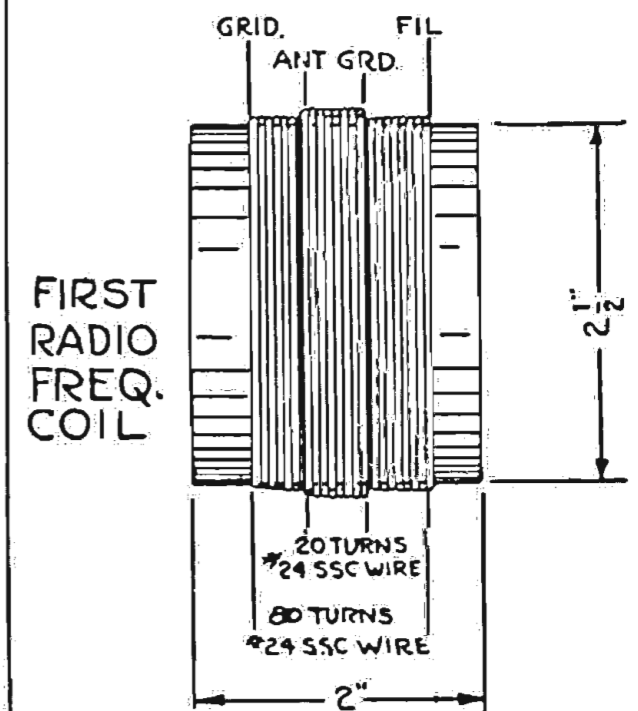


Figure 4

windings should run in the same direction. These coils are mounted on the ends of (Continued on page 26)



UV-201-A

Radiotron UV-201-A is a high-power vacuum tube which, while suitable for a detector, is intended primarily to be used as an amplifier, at either radio or audio frequency.

It is famous for volume, for clearness and for economy of service—drawing but .25 ampere.

Price
\$5.00

Radio Corporation of America

Sales Offices—Dept. 314
233 Broadway, New York

10 South LaSalle St.,
Chicago, Ill.

433 California St.
San Francisco, Cal.

Be sure that every vacuum tube you buy is marked **RADIOTRON.**

Radiotrons

REG. U. S. PAT. OFF.

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.

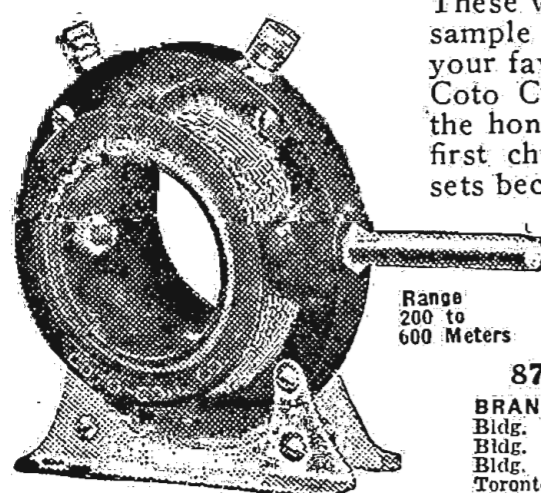
207 Chicago St.

ELGIN, ILL.

Coto

"Built First to Last"

"Very Much Better Than Your Advertising Claimed"



These words from a user's letter are just a sample of nation-wide favor. Wherever your favorite circuit calls for a variometer, Coto Compact Moulded Variometer with the honeycomb wound stator coils is your first choice. Also available for portable sets because of small size.

If your dealer fails you, write us, giving his name and address and list of Coto parts you need.

COTO-COIL CO.

87 Willard Ave., Providence, R. I.
BRANCH OFFICES: Los Angeles, 329 Union League Bldg. Minneapolis, Geo. F. Darling, 705 Plymouth Bldg. Atlanta, C. P. Atkinson, Atlanta Trust Co. Bldg. Canada, Perkins Electric Co., Ltd. Montreal, Toronto, Winnipeg.

THIRTY MINUTE A-B-C

(Continued from page 19)

certain frequencies. A vernier condenser, Figure 54, is really two, one large and one tiny, so that the size of the frequency container of the condenser and coil combination may be more finely adjusted.

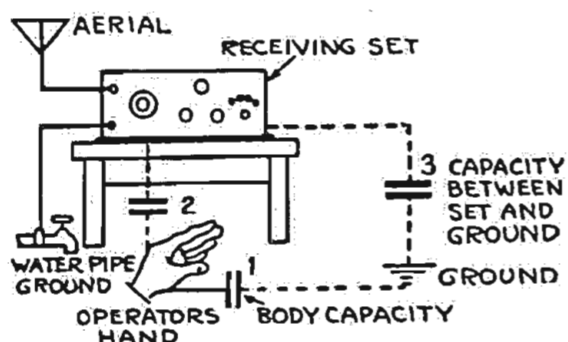


Figure 55.

Body capacity occurs when a small condenser is formed by the operator's hand or body and the receiving set. The human body when insulated from the earth makes a small condenser, number 1, Figure 55, with it. The hand insulated from the receiving set makes a tiny condenser, number 2, with it. The set and

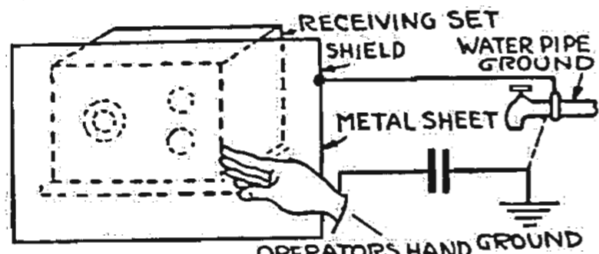


Figure 56.

its batteries will usually make a condenser, number 3, with the ground. This has an interfering effect in tuning some sets and can be avoided by grounding the movable plates of the condenser used

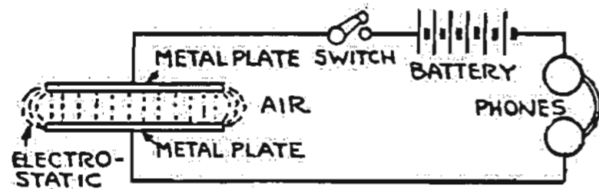


Figure 57.

in tuning the set or by employing a capacity shield. The principle of a capacity shield is shown in Figure 56,

where a metal plate is connected to the ground and interposed between the operator's hand (usually back of the instrument panel) and the set.

Electrostatic Field

There is an electrostatic field set up between the plates of a condenser, as diagrammed in Figure 57. Tubes of force extend in the dielectric between the plates. In an aerial, such tubes of force extend between the aerial wire and ground, as indicated in Figure 58. A transmitting aerial sends off a pair of field components, one electromagnetic and the other electrostatic and at right angles thereto. A receiving set employing an aerial operates on both of these components, while one employing a loop, functions mainly on the electromagnetic part of the travelling field, known as Radio waves.

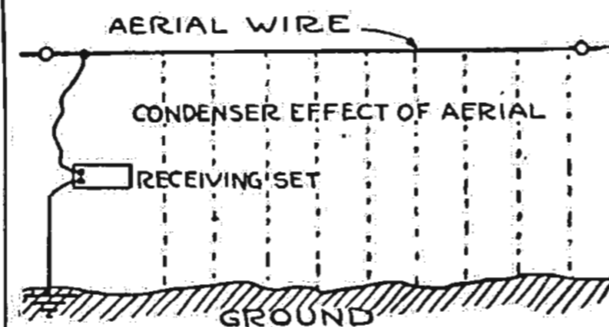


Figure 58.

The practical unit used to express the size of condensers or capacity in Radio is the microfarad. Sometimes condensers are spoken of by the number of plates, as 23-plate, 43-plate, etc., but this is less precise than to say .0005 microfarad, .001, etc. Many fixed condensers on the market at the present time are inaccurately labelled as to capacity. Good fixed condensers usually are made from mica, compactly compressed and insulated and marked with reasonable accuracy. Good variable condensers are well built mechanically, have carefully rounded plates, and must run true. If one plate touches another, the device is no longer a condenser but a conductor the same as any scrap piece of wire might be. Some manufacturers design condensers with a so called minimum "phase angle" loss, which simply means that the dielectric is arranged to be as perfect as possible.

The next thirty minutes in this series will take up resistances and what they do.

(TO BE CONTINUED)

How Telephones are Ruined

As much care should be exercised in handling your head phones as you exercise in handling your tubes. Phones are delicate. If you drop them or subject them to a hard jar you may put them out of adjustment. The same accidents will have a tendency to demagnetize the magnets. In fact, some phones lose their magnetism easily.

Dropping the phones is also apt to crack the ear piece. A cracked ear piece, while it may still be comfortable on the head, will not hold the diaphragm down tightly upon the seat. A crack will also relieve the air pressure and cause a shallow tone.

Most phones made by reputable manufacturers have one lead or terminal marked with a red or colored thread in the insulation. This terminal should be attached to the positive B binding post or jack contact. If both leads are colored, one being red, the red one is attached to B plus, the other to plate.

Review of Books

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

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

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

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.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest Illustrated,

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

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

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

Radio Operator's Handbook. A pocket course in Radio. Every page tells you something useful, and there are 154 pages; hundreds of illustrations and diagrams. It is the biggest dollar's worth in Radio, and will save you from wasting money on things that don't work. Price \$1.

The book department of the Radio Digest is prepared to send you any of the books on Radio published whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

Amplification

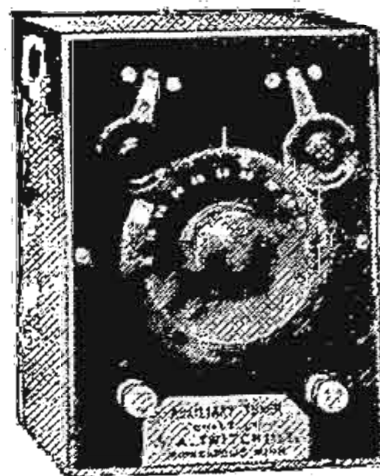
The higher the voltage placed on the plate of the last step of amplification used in connection with the loud speaker, the louder will be the signal up to a certain point. Amplifying tubes now on the market will stand about 150 volts without any trouble. This requires six or seven B batteries.

The Twitchell Auxiliary Tuner

Patents Pending. Name Registered.

MORE THAN A WAVE TRAP

A TWITCHELL AUXILIARY TUNER connected to any make of tube receiving set will positively cut out any local broadcasting or code stations so you may tune in all long distance stations any time regardless of local conditions.



Unlike any wave trap, THE TWITCHELL AUXILIARY TUNER does not ever decrease but in many cases increases the volume from distant stations.

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.

This instrument will also enable you to bring in programs sent out on longer waves than you can tune in without it, thus bringing all the broadcasting stations within the wave length range of the many sets of limited range now in use.

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

A New and Wonderfully Efficient Coil for the Reinartz circuit for those who want the best. Price \$4.00, or with blueprint for either one or three tubes, \$4.50.

This circuit brings in both coasts loud and clear and is the most successful Reinartz modification yet produced.

All goods prepaid. These instruments are easy to build, easy to operate. Everything clearly shown

1925 WESTERN AVENUE S. A. TWITCHELL MINNEAPOLIS, MINN.

30 STATIONS In One Hour!

—heard with one Myers Tube (name and address furnished on request). The remarkable results being obtained with Myers Tubes are due, largely, to the elimination of socket with its bunched leads.

Myers Tubes

(practically unbreakable) give you distance with clarity. They add 50% to the efficiency of any set by reducing interference. See that you get the New Improved Myers Tubes. Others are not guaranteed. Insist on Myers at your dealers—otherwise send purchase price and be supplied postpaid.

Two types—Dry Battery and Universal (for storage battery). Write for free circuit diagrams.



(Actual Size)

\$5

EACH Complete with clips ready to mount on your set; no sockets or other equipment necessary.

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

Kenneth Harkness Says:—

"Fil-Ko-Stats provide fine regulation essential if maximum efficiency is to be obtained and are particularly useful in tuning in weak stations. Fil-Ko-Stat gives such fine control of filament temperature that it has become almost indispensable."

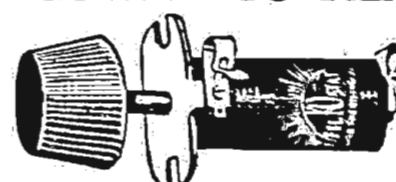
FIL-KO-STAT

The Scientifically Correct Radio Rheostat

Is Standard Equipment of all

HARKNESS RADIO RECEIVERS

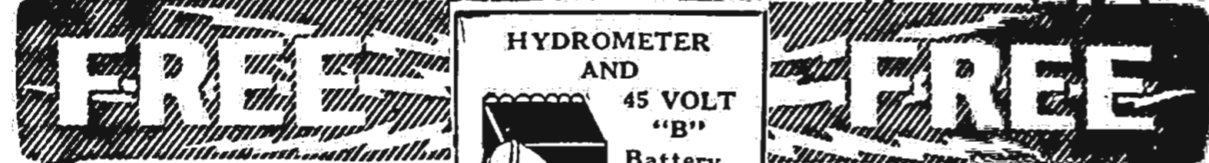
Write for booklet, "Improved Reception Through Scientific Tube Tuning." To D. X. Instrument Co., Harrisburg, Pa., Dept. RD 419.



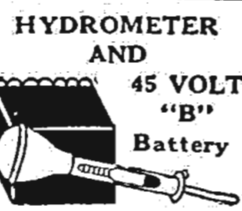
Unconditionally guaranteed to give satisfaction by the Makers, D. X. Instrument Co., Harrisburg, Pa.

RADIO STORES CORPORATION, NEW YORK
Sole International Distributors

World's Biggest Battery Bargain



Guaranteed in Writing for 2 YEARS



Save 50%

Thousands of Radio Digest readers will profit by this amazing offer. They will buy the famous 2-year guaranteed World Battery at the lowest price ever quoted. With it they will get a hydrometer and a 45-volt "B" battery FREE. And they get the best battery built, with 2-year iron-clad guarantee.

Quality Not Cut to Maintain Price	
Special 200-hour Rechargeable Storage Batteries	
2 Volt for WD-11 and 12 Tubes.....	\$ 5.00
4 Volt for UV-199 Tubes.....	8.00
6 Volt 60 Amp.....	8.50
6 Volt 80 Amp.....	10.00
6 Volt 100 Amp.....	12.50
6 Volt 120 Amp.....	14.50
6 Volt 140 Amp.....	16.00

5% Discount for Cash with Order. SEND NO MONEY. Just clip this ad and mail with your name and address. Shipment made same day order is received. When battery arrives, inspect it. Read our 2-year guarantee before paying C. O. D. express charges. Get the 45-volt "B" Battery and Hydrometer FREE. Clip the ad and send your order NOW.

WORLD BATTERY CO., DEPT. L, 60 E. Roosevelt Rd., Chicago, Ill.

World

Send Your Order Today



Selection of Sets Having Desirable Hook-Up

Part II—Combinations That Control Regeneration

By Thomas W. Benson

HAVING considered in the previous article the most efficient methods of tuning we now come to the question of regeneration. It is this ability to regenerate that makes the tube subject to so many trick circuits because there are numerous combinations of methods that can be employed to cause and control regeneration. Since regeneration is obtained by feeding a portion of the energy in the plate circuit back into the grid circuit for re-amplification or to assist the original impulse affecting the grid it

set affects the regeneration. It would be an ideal arrangement were we able to retain perfect regeneration over the entire range of wavelengths without readjustment but this condition has not been obtained in practice. Under most conditions the method of feedback should give regeneration over as wide a band of wavelengths as possible.

Three Methods of Feedback

Of the three methods of feedback the inductive method employing a tickler gives as good results as any. A tuner employing tickler feedback is staple in operation and will be found to operate consistently at all times. Where somewhat greater selectivity is desired the tuned plate method of regeneration may be employed but this circuit is a little trickier in its operation than the tickler feedback. However, for all around reliable service stick to the tickler and the circuit will prove satisfactory.

Now we are ready to lay out the circuit as outlined in the preceding chapter and then to consider the final constructional details that will make it a real go-getter. In Figure 1 is a circuit that shows nothing really new and, in fact, it may be so old that it is forgotten, but it is second to none when it comes to bringing the stuff in all the time.

We find the aerial circuit is untuned and comprises 8 turns, a secondary of 30 turns and a tickler of 24 turns. A variometer is used to turn the grid circuit and a small variable condenser for vernier tuning on the secondary. The problem now is to build and mount this apparatus so it will get the greatest amount of energy into the tube and then use it to the best advantage. The circuit meets the requirements as far as the circuit goes, from here on its construction counts and unless a set is properly constructed with a view to eliminating every possible avoidable loss it will not work up to its maximum efficiency.

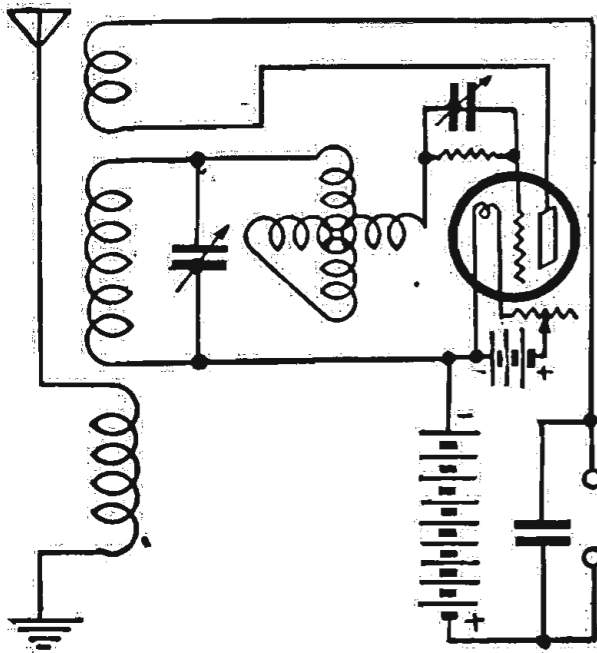


Figure 1.

is very obvious that the method giving the easiest and simplest method of control is to be preferred.

We will find on analyzing the trick circuits that they employ either capacity, inductive or conductive feedback, or a combination of these methods. But too often the regeneration control is so designed or arranged that the tuning of the

Reducing Resistance

The first thing to reduce to the lowest point in a receiving set is the resistance. It is generally accepted that the resistance of a circuit when oscillating is reduced and becomes negative, this is very true but if the circuit has a low resistance to begin with that negative resistance will become still greater and louder signals will be produced. To that end we will cut the resistance of the windings to the lowest point practical.

To do this we must use heavier wire, but there is a limit to this, else the coils will be unwieldy. Number 18 dcc. wire will be found the best to use for the secondary and tickler windings. For the primary we are permitted to use a somewhat heavier wire and number 12 or 14 will be employed. In addition it is not only the wire itself that offers resistance but the support on which that wire is wound will also increase its resistance. Strange as it may seem bakelite is not to be advised as core material in the form of a tube, as it has a high hysteresis loss. Other materials are preferable but the best insulator for high frequency inductances is air. Give your Radio apparatus plenty of air and it will work better. To this end we will make the tuner self supporting as far as possible.

The secondary coil is wound by setting 14 pegs in a 4-inch circle by drilling holes in a board and inserting stiff steel wires. Number 18 wire is then wound around

these pegs as shown in Figure 2 to form a basket wound coil. When the 30 turns are in place, the coil is bound together with thread. The easiest method of doing this is to sew the turns of the coil together with heavy thread. The

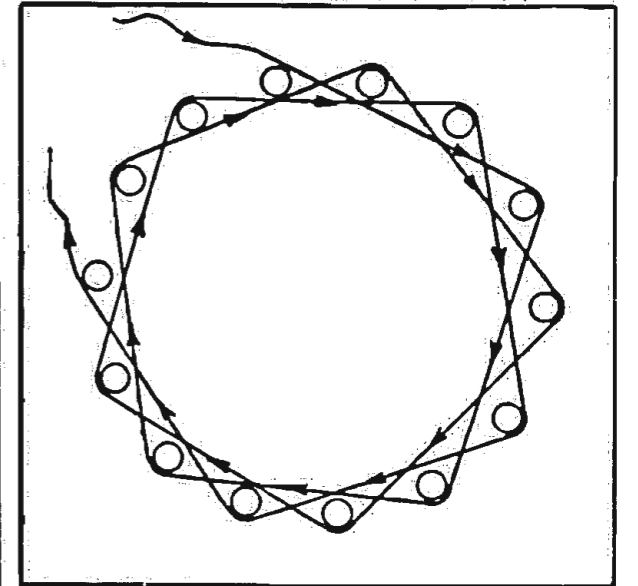


Figure 2.

wire is fairly stiff and will help hold the coil together.

The tickler coil is wound in the same

(Continued on page 24)

STA-RITE RADIO BATTERIES SAVE YOU 60%

And Guarantee You in Writing 2 Years of Better Battery Performance
STA-RITE RADIO BATTERIES are made especially for Radio and the big saving is made possible by coming direct to you instead of thru distributors, dealers, etc. Boxes are made of oak, finished in mahogany and the plates very thick and will give a steady discharge over a long period. No premiums, just good, honest battery value.

TRY TO BEAT THESE PRICES

2 Volt for W. D. 11 and 12	\$4.00	6 Volt 60 Ampr.	\$ 7.50
4 Volt for U. V. 199 Tubes	7.00	6 Volt 80 "	8.50
RADIO B. STORAGE		6 Volt 100 "	10.00
Glass Jars, Heavy Plates—Case of 12 Cells, 24 V.	4.90	6 Volt 120 "	12.10
		6 Volt 150 "	14.00
		6 Volt 200 "	17.00

Get Yours Today—NOW—Send No Money

The batteries are fully guaranteed in writing and shipped subject to examination on the day your order is received. You pay on delivery or deduct 5 per cent if full cash accompanies order. You may deduct 10 per cent if two or more are ordered at one time.

STA-RITE BATTERY CO.

Department 5

LOUISVILLE, KY.

WEIGHS ONLY 8 OZ

The Scientific

SEND NO MONEY!

20,000 TURNS EQUIVALENT TO 3,000 OHMS

\$2.95

POST-PAID

LOUD SPEAKER UNIT \$1.95

Order TODAY by Postcard and Pay Postman on arrival

A \$200,000.00 COMPANY stands squarely back of the guarantee on every Scientific headset

THE PHONE IT TOOK A SOLID YEAR TO DESIGN

We Guarantee The Scientific Headset to be the greatest value on the market. Try it for five days. If not satisfactory send it back and your money will be refunded immediately. Circular on request. Dealers wanted.

THE SCIENTIFIC ELECTRIC WORKS

98 Brookline Ave. DEPT. W. BOSTON, MASS.

Agents for New York and Vicinity—AMBASSADOR SALES CO.,

74 Cortlandt St., Phone Cortlandt 6296

The Air-Way Wonder Set of Radio

“Getting Pacific coast stations strong with loud speaker on type F,” writes E. S. White, Lowell, Mich. “Heard concerts from Havana, Cuba, Forth Worth, Texas, Atlanta, on a loud speaker,” Austin Rhemer writes from Chicago. W. E. Culver, Savannah, Ga., says, “I get stations from all over the country loud and clearly.” “Picked up 72 stations—ten in Canada, and got them back any time I want them,” writes Jas. Berne, Aberdeen, So. Dak. Like this hundreds certify the genuine quality and perfect performance of Air-Way—a radio set built to represent the highest permanent quality, and offered at nominal and fair price.

Four Tube—(Loud Speaker Set) Guaranteed Under Seal

This is not a “cheap” or “bargain” set. Only the finest quality instruments are used. Employs the reliable tuned radio frequency circuit with one step radio frequency, detector, and two steps of audio. Capable of coast to coast reception and use of any loud speaker to its full efficiency. Reproduces in loud, clear, melodious tone. Critical—selective. Recording position of controls for any station enables resetting at same position to bring station back. Quiet in operation, simple to tune. Furnished in beautiful Mahogany finished cabinet. Responsible dealers can show you this Air-Way. Ask to see it or write to us.

Manufactured and Guaranteed By
AIR-WAY ELECTRIC APPLIANCE CORPORATION
TOLEDO, OHIO

Type F

only \$50

Air-Way sets are put out under sealed guarantee. Thorough testing of each set on actual broadcasting by our experts insures perfection.

\$25 for \$10

The Famous Bel-Canto Acoustical Amplifier

Direct from Manufacturer to You!

YOU cannot buy the Bel-Canto through any dealer; only direct from us. We save you these three profits—Distributor, Jobber and Dealer.

Delivered C. O. D. Free to your door

Sent prepaid to any part of U. S. and Possessions

PRICE \$10

7 POINTS OF BEL-CANTO SUPERIORITY

1. Our own Fiber horn. Crystalline finish.
2. Our Own adjustable loud speaking unit, giving a wide range of tone quality and volume without distortion.
3. The base of cast iron, weighing four pounds, eliminating top heaviness.
4. All other metal parts are of heavy cast aluminum, highly polished.
5. Complete instrument stands 24 inches high, 10-inch bell.
6. Guaranteed for one year from date of purchase a guarantee against mechanical defects of any kind.
7. No auxiliary batteries required. Just plug in on 2d stage.

Guarantee

Money back any time within ten days if dissatisfied. We further guarantee to the publication carrying this advertisement that each and every speaker sold will be exactly as advertised in this issue.

Bel-Canto Mfg. Co.

BENSIL-BONIS, INC., Dept. R. D.
General Office & Factory, 417-419-421 E. 34th St., N. Y. C.
Telephone 8959 Vand.

DESIRABLE HOOK-UP

(Continued from page 23)

manner on pegs placed in a 2 1/4-inch circle of the same size wire and sewed together before removal. The primary coil is wound on the same pegs as the

each other. The knitting needle is pushed through the hole in the upright strip, then through a space into the rotor, then out on the other side, through another space and into the other bakelite upright. The flexible leads are wrapped around the shaft a few times and attached to the

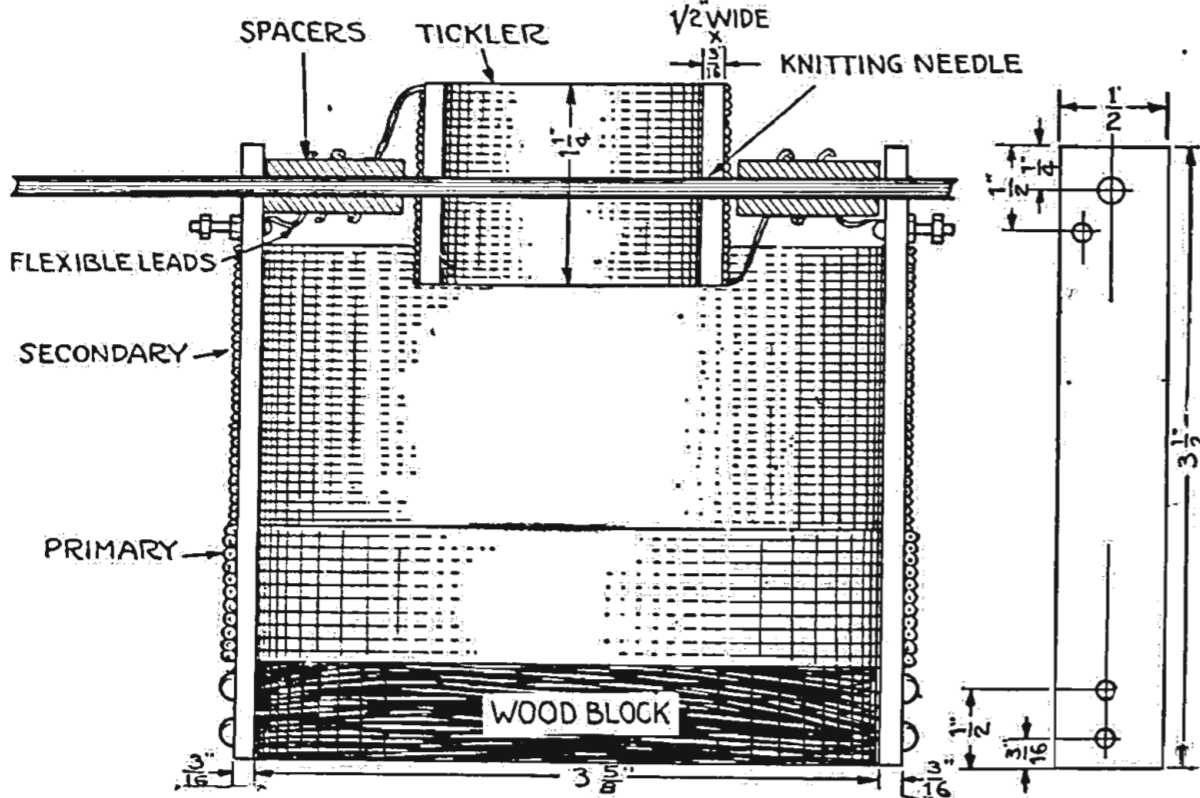


Figure 3

secondary and can be held in shape with a few ties. This completes the windings for the tuning unit.

Tuner Construction

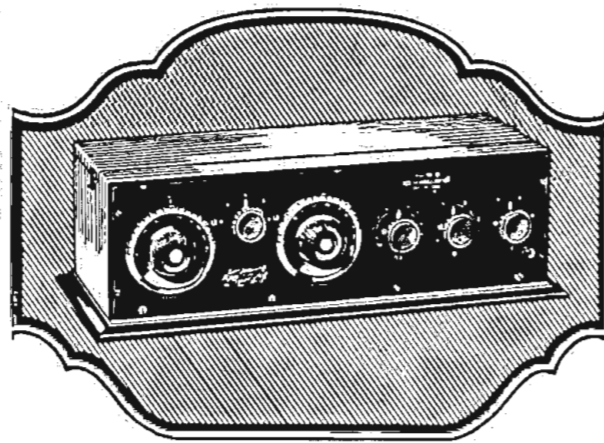
In Figure 3 is given the constructional data on the tuner. Two strips of bakelite are cut for uprights and securely screwed to a square wood stick to form two upright legs to which are bound the primary and secondary coils. The ends of the strips are drilled to mount a terminal bolt for the tickler and for a bone knitting needle to pass through. The long celluloid needles are excellent for the purpose. The rotor is made up by cutting two strips of bakelite 1/2-inch wide and 1 1/2-inches long. Through the center of the strip is drilled a hole that will just pass the knitting needle. These strips are lashed inside the tickler coil at opposite sides and the wires covering the holes carefully spread. Two spacers for the tickler are made by drilling a hole through short lengths of dowel sticks to pass the needle. Solder flexible leads to the rotor before assembly.

The complete assembly of the tuner should be fairly obvious. The primary and secondary are placed right against

terminal screws in the uprights. The needle should fit the cross pieces in the rotor fairly tight and can be firmly attached with a good grade of glue. Do not cut any off the needle as you may need entire length.

You now have a tuning unit that looks about as rough an article as can be conceived, but do not try to paint it with shellac, for despite its looks it has none of the defects of the beautiful instruments you see advertised, no bearing troubles, low hysteresis losses, low distributed capacity or low direct current

COAST-TO-COAST RECEPTION — and Beyond —



RADIODYNE

"The Voice of the Nation"

NO LOOPS . . . NO AERIAL

WITH the RADIODYNE you can select broadcast programs from all parts of the country. Honolulu and London have often been picked up by operators in the central states without interference from nearby stations.

The Radiodyne is ready for operation by simply grounding to a water pipe or radiator, and throwing a few feet of wire on the floor. Uses any standard tubes—dry cell or storage battery. Extremely selective. Simple to operate—Only two controls—you can tune in on any program you wish—any wave length from 200 to 700 meters.

For use in apartments, boats, automobiles, railroad trains, etc., the RADIODYNE is enjoyable where other receiving sets would not be practical.

Price, \$150.00

Write for illustrated folder which describes the RADIODYNE in detail. Every radio fan will be interested in this new type (antennaless) receiving set.

Western Coil & Electrical Co.
312 5th St. Racine, Wisconsin

resistance. The next article will cover the other instruments in the set and show the method of mounting apparatus to obtain maximum range and volume.

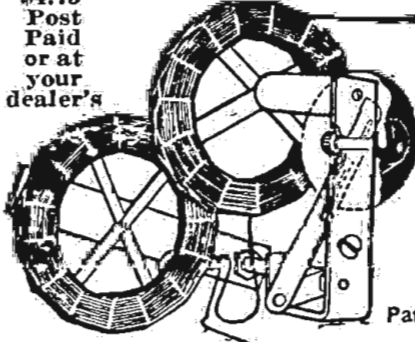
(TO BE CONTINUED)

Get Selectivity by Using the New

Pfanstiehl VARIOMETER

IN THE "Hagerman-Universal Circuit" As Sharp as the Neutrodyne!

\$4.75 Post Paid or at your dealer's

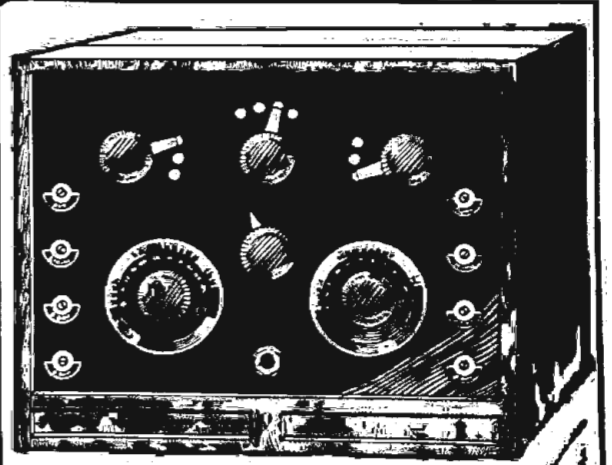


Pat. Pending

Pfanstiehl Variometer, P-301 MANUFACTURED BY PFANSTIEHL RADIO SERVICE CO. HIGHLAND PARK, ILL.

Enclosed find 10 cents in stamps, for which send me Pfanstiehl Book of Hook-ups showing recent achievements in efficiency of tuning.

Name
Address
City



Send \$1.00 Only

for this Long Distance RADIO

\$5.00 W.D.-12 Vacuum Tube Absolutely FREE To First Order in Your County

A large distributor of regenerative radio instruments has employed me to dispose of his entire stock at once—my orders are to turn these wonderful instruments into cash immediately.

The regular price on this high-grade instrument is \$50.00 but they must be sold at once.

Heavy oak cabinet 15 inches high, 12 inches wide and seven inches deep, lid in top. Put all batteries inside, Genuine bakelite, 11 x 11 inch panel. Detector tube is controlled by vernier rheostat. Jack for connecting headphones. A high grade, long distance instrument—thousands in use. All parts of the highest grade—very selective. Two very high grade condensers are used, one for tuning and one for regeneration. So simple in operation a child can tune in. Don't forget, this is a genuine regenerative receiver, manufactured for us under Armstrong License No. 1,113,149.

You Will Receive 1000 Miles Easy

Thousands of users have proven what it will do.

Tonight I heard very plainly stations WAAJ, Boston, Mass., and WLD, and have no trouble in tuning in WOC at most any time. Have also heard Denver, Colo. I am more than pleased with the set. R. T. Shawnee, Okla. I have heard Drake Hotel, Chicago; Cleveland; WGY, Schenectady, N. Y., real good; Newark, N. J.; Pittsburgh; Astor Hotel, N. Y.; Springfield, Mass., and others. P. S., South Royalton, Vermont.

I have tuned in many stations. I have received Chicago, Minneapolis, Los Angeles. Two evenings I have tuned in Havana, Cuba, from Cyril L. D., Selby, South Dakota. The first station I was in on was at Atlanta, Ga., and today my wife heard a concert from Beverly Hills, Oakland, Cal. I wish to say we are perfectly satisfied and delighted with the instrument. L. G., Peru, Ill.

I am getting good service from the set. I regularly hear Denver, Colo.; Detroit News; Detroit Free Press; Kansas City Star; Davenport, Iowa; Ft. Worth, Texas, and have had Schenectady, N. Y., and Los Angeles, Cal., a few times. F. T., Memphis, Tenn. To date I have picked up 26 different stations, ranging from Chicago to Los Angeles, perfectly clear. M. C., Silverton, Texas.

Enjoy All Concerts

You can enjoy all the concerts on this instrument just as well as on the highest priced instruments on the market. All you need in addition to the receiver is a 2 1/2 volt "B" battery, \$1.75, a set of headphones, \$5.00 a dry cell, 45c, and some aerial wire. You can purchase these at any radio store. Remember, this is not a toy, but a real long distance receiver. Don't write for literature—Order right from this advertisement. The price of this receiver is only \$20.00. All you need send me \$1.00—the instrument with the FREE tube will be sent by parcel post. When it arrives pay your postman \$19.00 plus a few cents postage. Don't forget, with the first order from your county you get a genuine Radio Corporation

\$5.00 W.D.-12 TUBE FREE

Our Financial Responsibility—Mid-City Trust and Savings Bank, Chicago, R. G. Dun and Bradstreet.

I reserve the right to withdraw this Special Offer at any time, so don't delay. H. A. Fischer, Secy., 226 W. Madison St., Chicago.

Use the Coupon Now!

H. A. FISCHER, 226 W. Madison St., Chicago, Ill.
Gentlemen: Enclosed is \$1.00. Please send the Radio Receiver as described, also the FREE W.D. 12 Vacuum Tube. I agree to pay the postman \$19.00 plus a few cents postage on receipt of the instrument.
Name
Address
County
State
Be sure to give name of your County.

Biltmore Reflex



THREE THOUSAND miles on the loud speaker, without outdoor antenna, or loop. This is what the Biltmore Reflex is capable of. But a few feet of concealed wire and a ground connection are all that is required. Actually, the results are better than those obtained on the eight-tube super-heterodyne.

The quality of the tone is clear and pure, due to the Erla rectifier which is employed.

In appearance, the receiver is unsurpassed—a beautiful Radion Mahogany panel, a heavy, hand-rubbed mahogany cabinet, nickelplated metal parts. All connections to the rear of the cabinet.

The most efficient reflex circuit is used—four tubes, but equivalent to eight.

The best of apparatus is employed—Radion Mahogany panel, bakelite reflex variocoupler, moulded bakelite sockets and dials, Frost jacks, Acme Radio Frequency, and Acme Audio Frequency Transformers, Dubilier Micadons, Erla Rectifier. We can obtain no better apparatus.

It is extremely selective. Local stations may be tuned out at will. The tuning is very simple. A child can operate it with no practice. You have but to snap on the switch to listen to the world.

It is but slightly affected by static—ideal for summer reception.

It may be operated entirely on dry cells! And, the price, \$100! Anyone can afford this receiver. Should you operate it, and see it, and hear it, you would have no other. And, we assure you of, and guarantee you complete satisfaction.

DEALERS—YOU SHOULD CARRY THIS MOST POPULAR RECEIVER. WRITE US.

BILTMORE RADIO COMPANY
DEPT. D BOSTON 30, MASS.

What's Wrong with Your Receiving Set?

(Continued from page 13)

Between grid and plate	199	200	201A
	4.0	6.0	7.5

The successful elimination of the bothersome capacity effect within the tubes led indirectly to other improvements in the construction and manipulation of the inter-stage Radio frequency transformers. These so-called neutroformers are made with a step-up ratio in the windings, in that there are four times as many turns of wire on the secondary as on the primary. Consequently, the induced secondary potential is increased four times, due to this step-up ratio, resulting in further amplification.

Construction of Coils

The construction of the neutroformer coils is such that their distributed capacity and inductance, mutual inductance, coefficient of coupling, and the mechanical disposition of the primary and secondary windings are quite important. The secondary of the neutroformer is wound on a tube outside the primary coil, so as to act as a sort of a screen for some of the coupling capacity effects which usually are present between the transformer primary winding of one stage and the secondary circuit of the preceding stage. Furthermore, the neutroformers should be mounted approximately at an angle of 60 degrees from the horizontal and at least 6 inches from each other. This precautionary measure is very important to bear in mind, so that the transformers will not be in the electromagnetic fields of each other and cause objectionable reaction.

Tuning the neutroformers into resonance with the incoming wave is accomplished by the careful adjustment of variable condensers connected directly across the secondary coils. The regular Radio frequency transformer cannot be employed for this purpose, because the special transformer has a step-up ratio and is provided with a tap in the secondary winding for a neutrodon connection. This tap and consequent connection, are of special importance in connection with the correct operation of this type of receiver. As constructed commercially, the neutroformer coils are mounted upon standard variable condensers, which function as noted above. Efficient coupling between stages is effected by mounting the coils extremely close together. This condition makes it unnecessary to provide bypass fixed condensers in the amplifier grid circuit.

Hook-Up For a Neutrodyne Receiver

Before finally deciding which type of neutrodyne circuit receiver to construct, it will be advisable to consider in some degree the capabilities and the limitations of some of these receivers, so that a ready comparison may be made. There have been selected for this purpose only those types which through general usage have been sustained by popularity. Obviously, the variety of hook-ups that can be devised, using the neutrodyne principle as a basic, are legion, and the several standard types presented herewith will permit the Radiophan to select the number of stages of amplification as desired.

Perhaps the simplest of the neutrodyne circuit receivers is that shown diagrammatically in Figure 1. This three-tube receiver consists of two stages of tuned Radio frequency amplification and a detector. Special Radio frequency transformers, or neutroformers, are used for interstage coupling, and neutrodons are provided for neutralizing the tube capacity effects. It will be noted that the neutroformer secondary windings are constructed with one special tap each. No connection is to be made to this tap on the neutroformer which is employed as the tuner. The connections from the taps on the interstage coupling neutroformers should lead directly to one terminal of the corresponding neutrodons, as shown in the diagram. Three terminals are provided on the neutralizing condensers, affording three different ranges of capacities combined in one condenser by changing the connections to the three terminals. Ordinarily, connections are made to the two terminals at the ends, but under some circumstances, this arrangement does not give a good minimum signal balance. In such a case, it is advisable to join one of the neutroformer connections to the center terminal. Such a connection will give a greater capacity range to the neutrodon and generally a good minimum or inaudible signal adjustment may be secured.

Four-Tube Reflex Neutrodyne

Figure 2 gives the hook-up diagram for a four-tube reflex neutrodyne receiver, consisting of two stages of tuned Radio frequency amplification, detector and two stages of audio frequency amplification. The first stage of the latter is reflexed back into the first Radio frequency am-

plifying tube. Although it is advisable to employ five tubes in order to get sufficient distance and signal strength, the use of four tubes reflexed in the manner shown, while not increasing the overall efficiency of the circuit, will effect quite a material economy in tubes and consequently current consumption.

The precaution should be taken to see that the audio frequency amplifying transformers are not located so as to lie in the electromagnetic field of the neutroformers, because under such conditions the interaction may cause distortion and howling. This is especially important in reference to the reflexed stage.

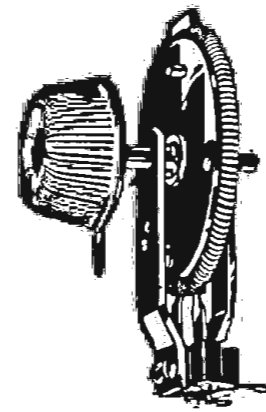
(TO BE CONTINUED.)

How to Get Clear Signals

Use a good panel. Avoid varnished

KELLOGG
USE-IS THE TEST

Build Your Radio Set With
Kellogg
Guaranteed Parts



THE Kellogg rheostat assures sharp, positive tuning. It is of a most practical design. There is only one moving part, the resistance element which is securely mounted on a Bakelite rotor. The wide staggered contact springs grasp the resistance element firmly, eliminating scraping, open circuits, and assuring certain, even control of the current. The Bakelite knob attaches securely to the shaft without threads, nuts or set screws—an exclusive Kellogg feature. Easy to mount and unusually smooth operation.

Specify Kellogg radio equipment and know you are getting the best. If your dealer does not handle Kellogg communicate direct with us.

Kellogg Switchboard & Supply Company
1066 W. Adams · CHICAGO

USE-IS THE TEST
KELLOGG

colls. Solder all connections. Keep away from masses of metal materials.

Use good tube sockets (especially the first tube.) Use coils which are insulated by air as much as possible.

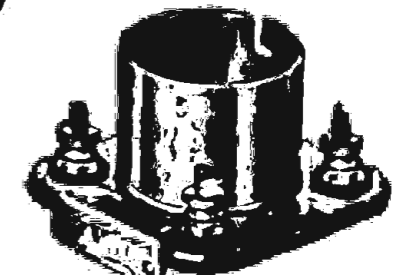
Where rotating secondaries are used, use pig-tailed connections to the rotor windings.

Keep the grid lead away from the plate wire or the filament wires, particularly on the first tube.

Avoid taps to a coil if possible, but where essential so select the constant that the taps will be only on a few turns at one end.

Keep stray capacity down by locating the connecting leads to the inductance, condensers, etc., as far away from each other as possible.

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

WALNART ELECTRIC MFG. CO.

Dept. 431, 1249 W. Van Buren St., Chicago

The "Goode" Two-o-One

A

Le Ton d'argent



BY MAIL ONLY
\$2.39

Postpaid

QUARTER AMPERE
AMPLIFIER-DETECTOR
RADIO TUBE

GUARANTEED SATISFACTORY

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

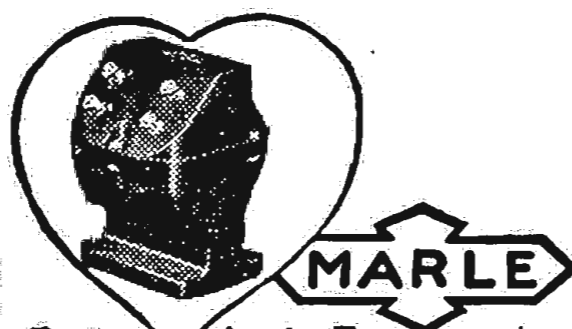
ONE—"Goode" Detector-Amplifier **\$2.39**
THREE—"Goode" Detector-Amplifiers **6.42**

(All postage prepaid)

The "Goode" Two-o-One A Tube amplifies or detects. It is a quarter ampere, six volts, standard base silvered tube.

Send express or postal money order or New York draft to—

The Goode Tube Corporation
Incorporated
EVANSVILLE INDIANA



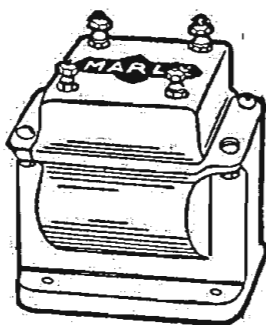
Radio & Audio Frequency
TRANSFORMERS

"The Heart of a Good Receiver"

EQUAL to the widest range of reception requirements, Marle Transformers amplify the weakest broadcasting, over frequencies all the way up to 3500 cycles without variation. Perfect tone quality. Utter absence of howling or distortion. To get the most out of radio—use Marle Transformers.

Specially adapted to the latest circuits, the SUPERDYNE, SUPER-HETERODYNE, FOUR-CIRCUIT TUNER, NEUTRODYNE, INVERSE DUPLEX and any circuit that makes high requirements of a transformer.

Type A 9 Shell Type Ratio 5 to 1 Audio F. \$6.00	Type A 6 Ratio 5 to 1 Audio F. \$4.25	Type A 4 3 3/4 to 1 Ratio Audio F. \$3.75
---	---	--

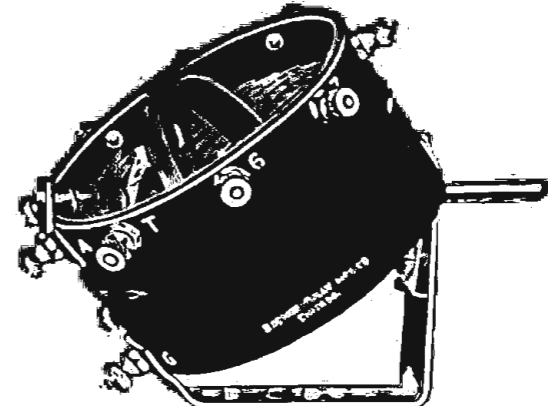


MARLE
Engineering
Company
ORANGE
New Jersey

Type A 7 Audio F. Shell Type Ratio 3 3/4 to 1 \$4.50	Radio F Types R 1 and R 2 \$4.00
--	--

Those Who Know Demand the BREMER-TULLY TUNER

For crystal circuits, or one, two or three tube hookups it has no equal.



Add Radio Frequency when you're ready.

THERE'S A REPUTATION BEHIND IT

"Better Tuning," now in its 5th edition, shows full plan of progressive construction with 40 pages of photo diagrams, hookups and tuning information. See your dealer, or send 4c for your copy.

BREMER-TULLY MFG. CO.

532 S. CANAL STREET

CHICAGO

COMPACT RECEIVING SET

(Continued from page 21)

the condensers. It will be noticed that the first coil is mounted with the core in a horizontal position whereas the second coil has the core in a vertical position. The mountings shown in Figures 4 and 5

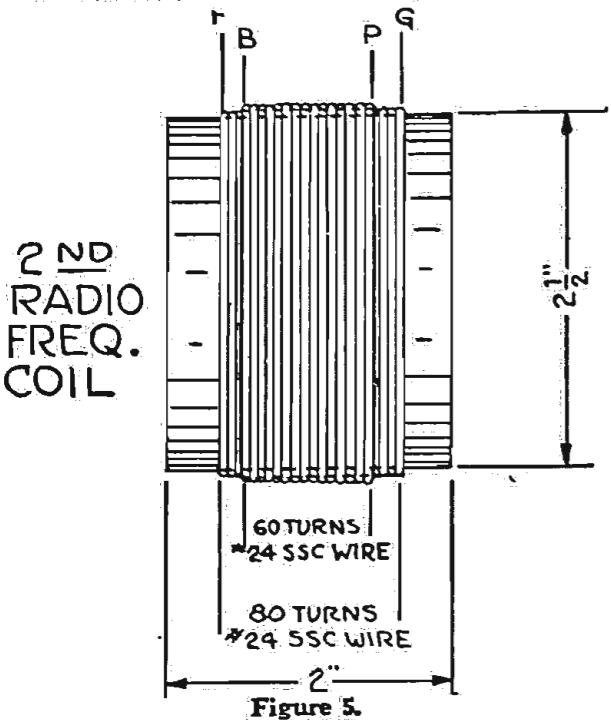


Figure 5.

conform to the markings shown in Figure 1.

Tuning

In tuning this receiver it will be found that the settings of the two condenser dials will be fairly close to one another inasmuch as both secondaries have the same number of turns and are only slightly affected by the inductively coupled primaries. Neither one of the two

rheostats has a critical setting. On tuning in, both condenser should be turned together until the approximate relative ratio is determined. The B battery voltage should not be increased inasmuch as little or no gain of volume is anticipated. It can be decreased as desired since often tubes used for Radio frequency amplification require definite potentials in the plate circuit for best results.

RADIO FREE SETS BUILT

If you purchase the parts from me at standard prices,
Any Type of Set Built
Expert workmanship assured. Only the very best parts used.
Correspondence invited.

HERMAN E. ERICKSON
(Associate, Institute of Radio Engineers)
ONE UNION SQUARE—NEW YORK CITY



Dealers!

A BRAND NEW CATALOG!

Just out—crammed full of everything you want in high quality radio supplies—the most complete display in the Middle West—the biggest stocks, best discounts, quickest shipments.

This book will be sent **ONLY** to dealers. Ask for A1002. No others need apply.

WAKEM & McLAUGHLIN INC.
225 E. ILLINOIS ST., CHICAGO

To Locate Short Circuit

Short circuits in cheap variable condensers can often be remedied by experimenting with the tightness of the various nuts that hold the stationary plates together.

RUSONITE FIXED DETECTOR
TONE ADJUSTER—BAKELITE BASE
GUARANTEED—PRICE \$1.25



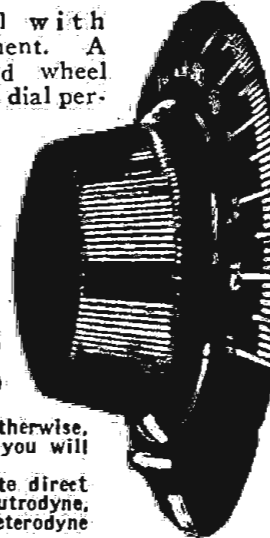
Rusonite Perfect Radio Crystal, Supersensitive. Price Mounted 50c
Rusonite 14K Gold Cat Whisker. Price 25c
RUSONITE PRODUCTS CORP.
15 Park Row New York
RUSONITE PRODUCTS
25 E. Jackson Blvd. CHICAGO

FRESHMAN VERNIER DIAL

A **BAKELITE** dial with Vernier adjustment. A small rubber tired wheel through the slot in the dial permits you to set the dial to the exact point and obtain the same dial setting every time. Just the thing for Neutrodyne, Polydyne and Super-Heterodyne.

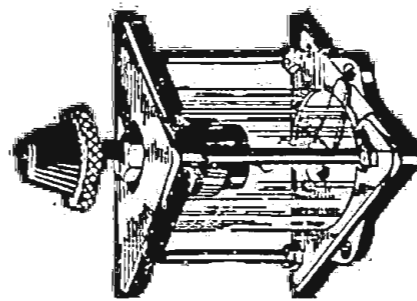
Price, 3 in. \$1.00
Price, 4 in. \$1.50

At your dealer's, otherwise, send purchase price and you will be supplied postpaid.
Ask your dealer or write direct for free diagrams of Neutrodyne, Polydyne and Super-Heterodyne Circuits.



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

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.

Price \$1.50

Freshman Super-Crystal. Sensitive in every spot. Mounted in a special non-metallic housing—eliminating howls and squeals 50c

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

Ask your dealer or write for our free diagrams of Neutrodyne, Polydyne, Super-Heterodyne and other circuits.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 Seventh Ave. N. Y. C.

Captain Orton P. Jackson, U. S. N., is now director of Naval Communications, taking the place recently vacated by Rear Admiral Ziegemeier, now in command at Navy Yard at Norfolk, Va.

RADIO BY MAIL

UV200, UV201A, UV199, WD11, WD12 GENUINE R.C.A. RADIOTRON TUBES... \$4.24

COCKADAY PARTS
Silk wound coil sets on Bakelite tubing.....\$3.38
"LAVITE" resistances (48,000-ohms)..... 1.19
"AMPLEX" Grid-densers89
"AMSCO" 6-ohm rheostat, 89c; 20-ohm..... 1.04
"AMSCO" 400-ohm potentiometer with ptr. sb. 1.47
"AMSCO" 25-pit. vernier condenser with dial... 3.78
"AMERTAN" Audio Transformers..... 5.59
"COMO" Duplex Push-Pull Transformers (pr.)... 9.38

COCKADAY KIT
Complete parts for 5-tube Cockaday set, as specified in January Popular Radio..... \$49.75
Special cabinet for above.....\$7.42

ERLA REFLEX PARTS
"ERLA" Reflex or Audio transformers.....\$3.89
"ERLA" Crystal detector..... .79
"HILCO" Lattice wound varcoupler..... 5.78
"ERLA" SELECTOFORMER 3.96
"RATHBUN" 11-plate condenser..... 2.56
"RATHBUN" 23-plate condenser..... 2.86

NEUTRODYNE PARTS
\$25.00 FADA Neutrodyne Kit of Parts.....\$19.95
65.00 FADA Neutrodyne Kit of Parts..... 51.95
80.00 FREED-EISEMANN Neutrodyne Kit. 63.87
WORKRITE Neutrodyne (Set of 3)..... 4.96

BRANDES "SUPERIOR" Phones.....\$4.69
"TABLE TALKER"..... 8.12
"HEGEHOG" 3-1 & 5-1 Audio transformers.....\$2.79
"ALL AMERICAN" 10 to 1 audio transformers... 3.62
"ALL AMER." 3-1 & 5-1 audio transformers..... 3.84
"ALL AMER." Push-Pull transformers, pr..... 9.86

VARIABLE CONDENSERS
11-Pit. Regular.....\$0.94 Vernier with dial...\$1.89
23-Pit. Regular..... 1.19 Vernier with dial... 2.19
43-Pit. Regular..... 1.34 Vernier with dial... 2.49

2 AMP. Battery Charger with "TUNGAR" Bulb..... \$9.19
5-Ampere size with bulb.....\$18.45

"BREMER-TULLY" Vernier tuner..... \$ 3.94
"UNCLE SAM" Tuning coil..... 4.76
"GOLD SEAL" Homecharger..... 13.24
"VALLEY" New style battery charger..... 15.49

"BURGESS" No. 2156 large 2 1/2 V "B" Bat...\$1.96
"BURGESS" No. 2306 large 4 1/2 V "B" Bat... 3.92
"Eveready" No. 766 Large 2 1/2 V "B" Bat... 1.96
"Eveready" No. 767 Large 4 1/2 V "B" Bat... 3.92

SUPER-HETERODYNE KIT
Consisting of 1 Oscillator Coupler, 1 Filter Coupler, 3 No. 1716 Transformers, 2 Audio Transformers, 2 1 mfd. Condensers, 2 .00025 mfd. Condensers, 1 Blue Print and book of instructions \$47.95

ULTRADYNE KIT
Consisting of 4 Ultradyne Transformers, 1 Tuning Coil, 1 Oscillator Coil..... \$22.95

NEUTRODYNE KIT
3 Transformers mounted on Condensers, 1 7x26" Panel, 5 Sockets, Neutrodons, Audio Transformers, Rheostats, Jacks, Dials, and all parts to build 5-tube set.....\$29.70
7"x26" Cabinet for above.....\$6.59

Prices F.O.B. St. Louis, Mo.
CASH OR C.O.D.—SEND FOR COMPLETE LIST
SIMPLEX RADIO SALES CO.
1806 Lafayette Ave., Dept. B, St. Louis, Mo.



NEUTRODYNE Sensational Offer

For a limited time we are offering complete parts for 5-tube Neutrodyne set \$69.40

FREE: We will make up this remarkable set absolutely FREE for you and guarantee the best results. A genuine MAHOGANY CABINET will also be given FREE.

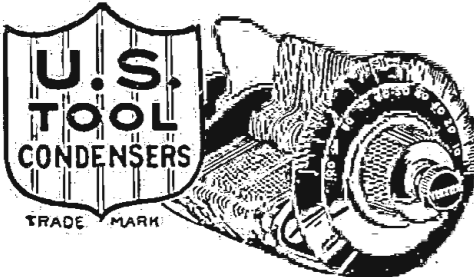
Our guarantee is unconditional. If the set does not work to your satisfaction, or for any reason you are not satisfied, return within two weeks, and money will be refunded.

FADA KIT \$54.40
Sealed and Genuine

MAKE PERFECTION YOUR SELECTION

Perfection Radio Corp.

119 W. 23rd St. 59 Cortlandt St.
118 Nassau St. 78 Cortlandt St.
NEW YORK CITY



Approved by Public Demand

The huge sale of U. S. Tool Condensers proves that these condensers are RIGHT.

100% GUARANTEED End Plates of CELERON

For Superheterodyne
Inverse Duplex
Superdyne
New Four Circuit Tuner

Use Vernier Cap. .00057 Mfd. (24 Pl.)
or
Plain Cap. .00055 Mfd. (23 Pl.)

Condensers of recommended capacity for all known circuits are also carried in stock by leading radio retailers.

Write for Booklet

U.S. TOOL COMPANY, Inc.
122 Mechanic Street NEWARK, N. J.

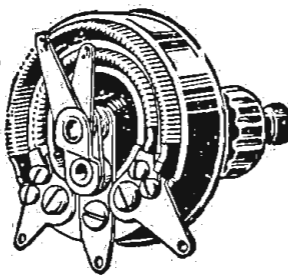
BUY

PREMIER PARTS For Complete Satisfaction

Here are two of the Leaders. Get our FREE Bulletin No. 92 for the complete line.

PREMIER "DUOSTAT"
Trade Mark

Two Rheostats In One



You will see the advantage of this remarkable new apparatus at once. A real innovation. Think of it! One high-class Rheostat that completely replaces two of the ordinary types; does the work even more efficiently, and, in addition, greatly simplifies installation and wiring. One hole to drill, THAT'S ALL. That's what you get in the "DUOSTAT." Two independent resistor windings, each operating one tube, Bakelite Moulded Base, silver etched dial, "NICHROME" wire windings. Made for all types of tubes. No. 12, two windings, each 7 ohms. No. 13, two windings, each 25 ohms. No. 14, two windings, each 40 ohms.

\$3.00

All Types

PREMIER Audio TRANSFORMER "Little-But Mighty"
1/2 actual size



We back this little wonder to the very limit. For all-around efficiency and compactness, it is unequalled. Give it a thorough tryout. Install it in Neutrodyne, Super-Heterodyne, Autodyne, Superdyne, Mloplex, Autoplex, or any of the latest "hook-ups." Judge it for volume, tone quality and consistent performance. Give it every possible test. Then consider its size and price. If you do not find the "HEGEHOG" unsurpassed in every way, your money will be gladly refunded. We guarantee it unconditionally. Make this test. Ratios 1 to 3, 1 to 4, 1 to 5—\$3.50; 1 to 10—\$4.50. Send for FREE Bulletin No. 92 describing Premier Quality Radio Parts in detail.

\$3.50

ASK YOUR DEALER
Premier Electric Company
3810 Ravenswood CHICAGO

EASY TO DO BUSINESS

with "Liberty M.O."

SEND NO MONEY FOR GOODS
Just pay postman on delivery. Postage free. Reference, Corn Exchange Bank, Terminal Branch (capital \$10,000,000).

Largest Stock in New York.
Everything brand new and first-class. Satisfaction guaranteed. Orders shipped quickly and carefully. Prices include delivery.

TUBES, O-T 2. Silvertone; 4-volt; dry cell; made by De Forest; equal to any. Save 34%. List \$6.00 \$3.95
TUBES, RCA WD-11 or WD-12, 1 1/2-volt; dry cell. List \$5.00. Save 16% 4.20
HEAD PHONES, Little Tattler; none ever returned to us unsatisfactory. List \$4.00 2.95
HEAD PHONES, Baldwin "C"; double; none better. Save 30%. List \$12.00..... 8.45
COUPLERS, Genuine Capitol All-Wave, 150-3,000 meters. List \$7.00... 5.45
VARIOMETERS, Liberty, moulded; 150-600 meters; high grade. List \$7.00 2.95
LOUD SPEAKERS, Perfectone, adjustable; excellent. List \$15.00..... 11.45
LOUD SPEAKER UNITS, Blue Streak; single; use with any horn. Very satisfactory. List \$3.45 2.45
TRANSFORMERS, All-American, 3-1, 5-1, 10-1; 500,000 in use. List \$4.75..... 3.45
NEUTRODYNE KITS, Work-Rite, made under Hazeltone patents. High-grade material, fine workmanship. Save 18% 14.25
List \$17.50

FREE With your first order we will send you free a 28 x 38 in. radio station map of the U. S. and a set of 31 Decalcomania name transfers for your panel. Send order today.

CUT-PRICE CATALOG 10c

Amount refunded on your first order. Book crammed full of money-saving offers of sets, parts, accessories and diagrams. You need it.

Write for It Today!

LIBERTY M. O. HOUSE
Dept. 677P, 106 Liberty St. - NEW YORK

Variations on King Miloplex Circuit

Three Wires Placed in Cellar Used for Aerial

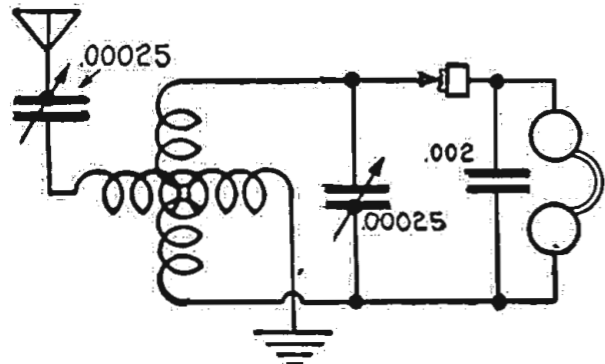
HAVE taken great interest in the various Miloplex hook-ups which you have published since last September, and having tried out all of them, I must

WORKSHOP KINKS? EARN A DOLLAR—

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

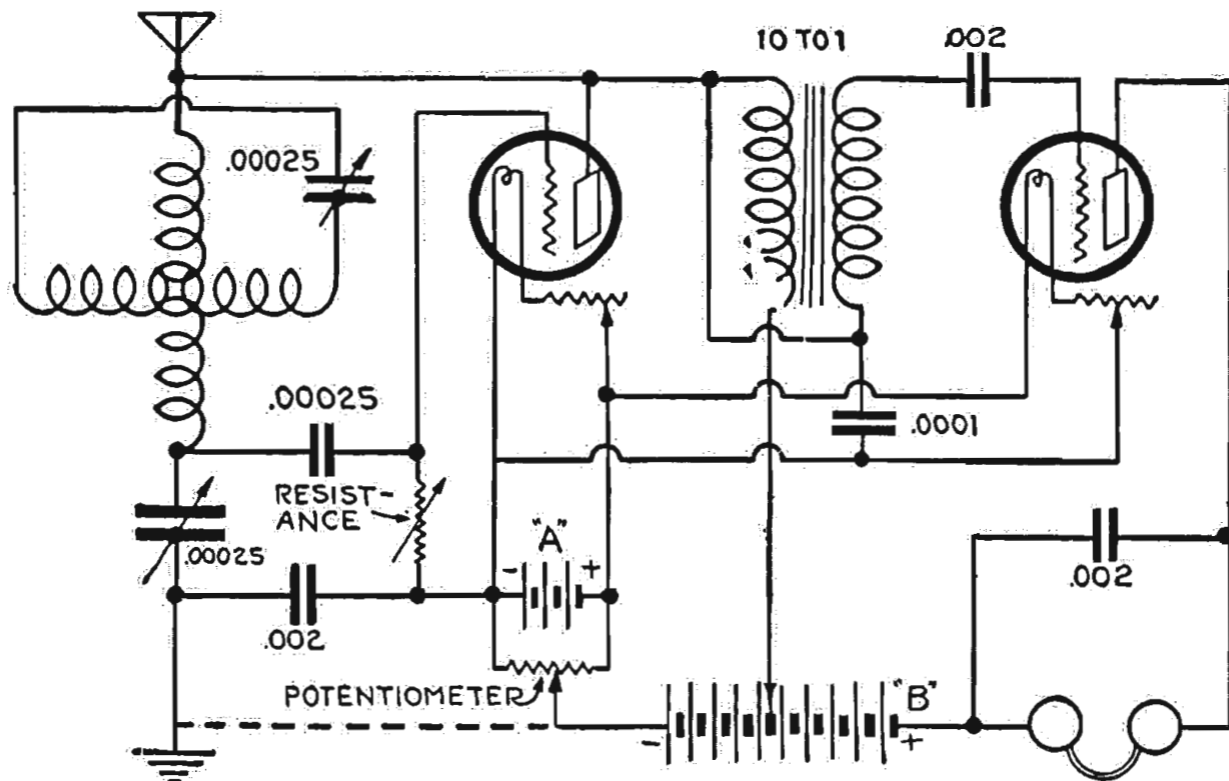
RADIO KINKS DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago

say they are wonderful. I have also tried modifications of them with more or less success. The King, however, is my favorite and I am giving a diagram show-



ing how I have made some slight modifications which I believe will be of interest. These modifications are as follows: Both variable condensers are 11 plate of about .00025 mfd capacity, preferably with verniers.

VALUES OF CONDENSERS USED



A connection is made on the transformer from A— post to P post. A fixed condenser is placed in the lead from A— on the transformer to the A battery. The capacities of these condensers are indicated as I am using them, but other capacities may be found to give even better results. The plate voltages should be determined by trial.

I am using a 3-wire cellar antenna, about 45 feet long, spaced about 4 feet apart with the far ends connected by a cross wire. The lead-in to the set is about 5 feet and the ground, about 8 feet long, is connected to a water pipe where it leaves the house.

With one stage of amplification I have tuned in most of the large broadcasting stations within a radius of 1,000 miles very distinctly. I use UV-199 or C-299 tubes. About 22½-volts on the detector and 45 volts on the amplifier plate. The potentiometer is of 1850 ohms resistance. I will say no more about the volume, it is deafening.

Another diagram is given for a crystal hook-up using a split variometer in a similar manner to the King Miloplex hook-up and I suggest naming it the Prince Miloplex in honor of the Mystery Man.

(Continued on page 28)

To Eliminate Howling in Amplifier Circuit

If adjusting the filament of an amplifier does not stop howling, try attaching a wire from the negative terminal of the battery used for lighting the filament of the tubes to the ground post of the set. Should 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.

YOU DON'T NEED TUBES

to hear concerts from out of town. If you want to get new stations

ON YOUR CRYSTAL SET write me today. I get new records every day from people using my plans who hear programs on Crystal from stations 400 TO 1000 MILES AWAY

No tubes, batteries or amplifying apparatus necessary. I hear KDKA (Pittsburgh Pa.) on Galena. You may already have everything you need and just have it connected up wrong. Send self-addressed envelope for picture of my set, and reasons why you need my plans.

LEON LAMBERT
501 South Volusia, Wichita, Kan.

Make Money as a RADIO Demonstrator

Big Opportunity now to everyone who knows how to set up and operate a radio set—also to take orders on a price and term basis more favorable than regular dealers can offer. Your chance to get into the Radio business. Own a set or not, as you choose. Give all or part time to this work.

Write at Once

Give us this information: Age; Business; Do you own a Radio Set?; What kind?; How much time do you want to spend in this work?

Marshall Radio Products, Inc.
Marshall Blvd. & 19th St., Dept. 56-41 Chicago, Ill



MAGNATRON! If you insist upon that name when you buy tubes, you are insisting upon obtaining the very best in vacuum tubes. You are assuring yourself of better results from ANY set!

The MAGNATRON DC 201A and the MAGNATRON DC 199 are leaders in their respective fields. At their list price of \$5 they are an outstanding value.

Ask Your Dealer for Magnatrons!

CONNEWEY ELECTRIC LABORATORIES
309 Fifth Avenue,
NEW YORK CITY

A New Meaning To Your Crystal Set When You Use the

Genuine
Miller-B-Metal Crystal



(Pat. Pending) **50c**

Alive - Loud

Dealers: Ask for our sales plan
The formula for Genuine B-Metal was originated by the
A. H. Miller Radio Co.
1222 26th Street DETROIT, MICH.

HERE IT IS Burns LOUD SPEAKER


For Phonograph or with horn



Tone can be adjusted to suit any plate voltage. Pleasing tone, loud and clear. No extra batteries required.

UNIT with connector for any make of phonograph \$10.00
SPEAKER complete with non-vibrating horn \$20.00

Manufactured by
American Electric COMPANY
State and 64th Streets CHICAGO



WRIGHT'S RADIO LOG

Wright's Radio Log is the finest, the most comprehensive and the handiest tuning record book ever produced for radio fans. Ruled to fit any set from 1 to 8 tubes—special pages for local stations and daily programs. Contains list of stations. A separate page for each large station.

EVERY FAN NEEDS ONE

Enables you to record all readings for every station; absolutely indispensable to every fan. The aristocrat of radio record books! Cover in color. Beautifully bound—convenient pocket size—44 pages—illustrated. Standard Edition, bound in Lodenstone flexible cover, 50c. DeLuxe Style, bound in Molloy embossed cover, \$1.00. At radio stores and news dealers, or sent postpaid anywhere on receipt of price. Satisfaction guaranteed or money instantly refunded. Order yours today. Dealers, write!

H. C. WRIGHT, 1502 Fisher Bldg., CHICAGO

WRIGHT'S RADIO LOG Standard Edition, 50c. WRIGHT'S RADIO LOG DeLuxe Edition, \$1.00. MY MONEY BACK IF NOT SATISFACTORY TO ME.

Burned Out or Broken RADIO TUBES REPAIRED

All Tubes Guaranteed to Work Like New
Mail Orders Given Prompt Attention

24 HOUR SERVICE—All Tubes returned P.P. C.O.D.

RADIOTRONS	CUNNINGHAMS
WD-11 or 12	C-11 or 12
UV-200	C-300
UV-201	C-301
UV-202	C-302
UV-201A	C-301A
UV-199	C-299
DV-1 or 2	DV-5 or 6A

\$275

RADIO TUBE CORP.
70 Halsey St. Newark, N. J.

OR SEND TO NEAREST REPAIR BRANCH

"RADIO TUBES" 39 West Adams St. Chicago, Ill.	RADIO TUBE SPECIALISTS 137 Market St. Phila., Pa.
GLOBE ELECTRIC CO. 609 Cham. of Com. Bldg. Pittsburgh, Pa.	WELLSTON RADIO CO. 1479 Hediadmont Ave. St. Louis, Mo.

RIDENOUR, SEAVER & KENDIG
Caxton Bldg., Cleveland, Ohio

FAHNESTOCK'S RADIO PRODUCTS

Improved Ground Clamp



Equipped with Fahnestock Patent Wire Connectors Easily Attached.

No Soldering—For Radio Use Only
Our name stamped on all our products. None genuine without it.

FAHNESTOCK ELECTRIC CO.
Long Island City, N. Y.

Dealers can obtain Fahnestock Products from following distributors:

NEW YORK	Spartan Elect. Co.
BOSTON	F. D. Pitts Co.
DETROIT	Detroit Electric Co.
CHICAGO	Barawik Co.
MILWAUKEE	Julius Andrae & Sons Co.
PHILADELPHIA	H. C. Roberts Elec. Supply Co.
PITTSBURG	Ludwick, Hommel Co.
WESTERN DISTRIBUTORS	Marshall & Co., Los Angeles, Cal.

BUY THE NEW KEYSTONE RADIO LIGHTNING ARRESTERS \$1.50



The new Keystone, made of genuine Bakelite, approved by Underwriters. Absolutely weather, dust, damp proof and has no vacuum to lose.

At Your Dealers
Electric Service Supplies Co.
Mfrs. of Lightning Arresters for over 31 Years
17th & Cambria Sts., Phila.

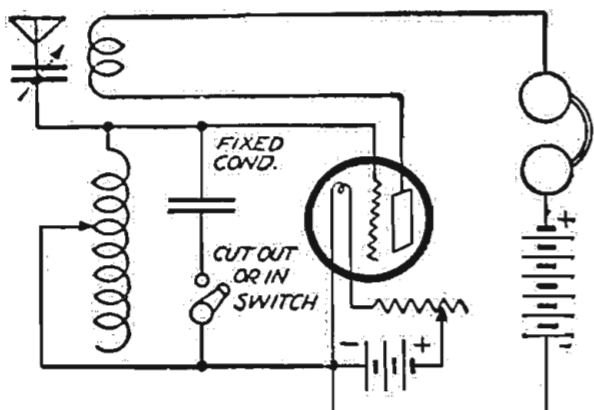
MILOPLEX VARIATIONS

(Continued from page 27)

I have tried out dozens of crystal hook-ups and find this to be one of the best. It has great volume and selectivity. I have my set wired so that I can use the crystal hook-up while my batteries are being charged. The results are practically as good by using the electric light socket with plug for antenna and the radiator for the ground.—James Young, 114 Euclid Ave., Haddonfield, N. J.

Increasing Wave Length

A quick, neat way of increasing the wave length of receiving sets is to place

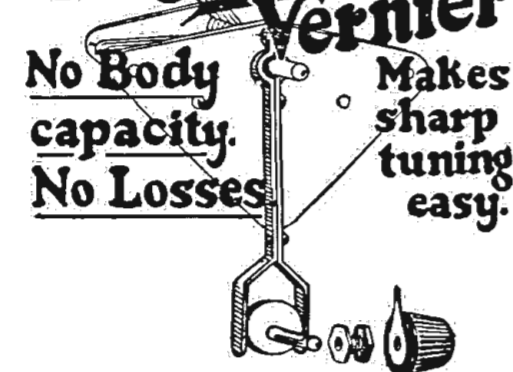


a small fixed condenser across the secondary circuit. As a rule a variable condenser is used, but the fixed condenser will

BROADCAST ANNOUNCERS AND OPERATORS EARN BIG MONEY. We will prepare you for a wonderful position in new field; unusual opportunities for ambitious young men. Catalog free. Dodge's Morse and Radio Institute, Valparaiso, Indiana. Established fifty years.

ride on the peak of the wave

with **Perfection Vernier**



Build them in your new set! Install them in your old one!

Price \$1.00 Postpaid
Perfection Radio Mfg. Co.
24th & Race Sts., Philadelphia

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of Radio Digest, Illustrated, published weekly at Chicago, Illinois, for April 1st, 1924.

State of Illinois, County of Cook, SS.—Before me, notary public in and for the State and county aforesaid, personally appeared E. C. Rayner, who, having been duly sworn according to law, deposes and says that he is the Publisher of the Radio Digest, Illustrated, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 413, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, E. C. Rayner, 745 Junior Terrace, Chicago, Ill.; Editor, Chas. F. Smtor, 4757 Lake Park Avenue, Chicago, Ill.; Managing Editor, Evans E. Plummer, 4338 Clarendon Avenue, Chicago, Ill.; Business Manager, Harry J. Marx, 902 Lawrence Avenue, Chicago, Ill.

2. That the owner is: (If the publication is owned by an individual his name and address, or if owned by more than one individual the name and address of each, should be given below; if the publication is owned by a corporation the name of the corporation and the names and addresses of the stockholders owning or holding one per cent or more of the total amount of stock should be given.) E. C. Rayner, 745 Junior Terrace, Chicago; S. O. Bronstein, 4600 Lincoln Ave., Chicago; F. T. Ryan, 123 West Madison St., Chicago; A. B. White, 7015 Ellwood Ave., Chicago; Jos. Seaman, 200 Fifth Ave., New York City; Geo. Seaman, 2350 Parkway, West Chicago; D. R. Seaman, 49 Cedar Ave., Chicago; Chas. S. Peterson, 1450 Lake Shore Drive, Chicago.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of the total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and that affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is: (This information is required from daily publications only.)

E. C. RAYNER, Publisher.
Sworn to and subscribed before me this 31st day of March, 1924.

(SEAL) SUSAN KNOTT, Notary Public.
My commission expires March 31, 1926.

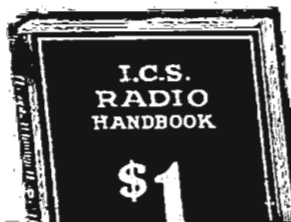
bring the wave length up just as well, and by aid of a small switch can be cut in or out at will.

For a set that will tune up through 400 meters a .00025 or regular grid condenser will bring in the 517-meter stations. If one condenser does not bring in all the higher stations, try connecting two condensers in parallel. If one condenser brings in the higher stations but cuts out some of the lower stations try two condensers connected in series.

It only takes a few minutes to put one of these condensers in place and it will not alter the appearance of any well-made set, nor does it call for any unusual ability to install.—C. L. Smith, Jackson, Miss.

RADIO TUBES, Sold, Exchanged, Repaired. Free Circular. AMERICAN RADIO TUBE WORKS, IRVINGTON, N. J., U. S. A.—Adv.

RADIO HANDBOOK



Only \$1

514 PAGES

Just off the press! The greatest book on Radio ever written. Price only \$1. Filled with sound, practical, tested information for every radio fan, from beginner to hard-boiled owl. Written, compiled, and edited by men of national reputation. Every page tells you something useful—and there are 514 pages. Mail \$1 to-day and get this I. C. S. Radio Handbook before you spend another cent on parts. **Money back if not satisfied**

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 8275H, Scranton, Penna.
I enclose One Dollar. Please send me postpaid—the 514-page I. C. S. Radio Handbook. It is understood that if I am not entirely satisfied I may return this book within five days and you will refund my money.
Name.....
Address.....

Workman Radio Service
"THE ACCENT IS ON SERVICE"
14-16 Vesey St., NEW YORK

VARIOCOUPERS	
\$3.50 Workrite 180° Silk Wound.....	\$2.95
3.50 Fisher, Large, 90°.....	2.75
2.75 Fisher, 180°.....	2.25
4.25 Special Bank Wound Coupler for Haynes Circuit (with diagram).....	3.25
7.00 Ambassador Coil (with diagram).....	5.50
VARIOMETERS	
\$3.50 Workrite.....	\$2.95
5.00 Pathé Moulded.....	2.25
3.50 Fisher, Large.....	2.85
CONDENSERS	
\$2.00 R. C. 11 plate.....	\$1.05
2.35 R. C. 23 plate.....	1.35
2.75 R. C. 43 plate.....	1.65
VERNIER CONDENSERS	
\$4.00 R. C. 23 plate.....	\$2.25
5.00 R. C. 43 plate.....	2.95
PHONES	
\$18.00 DR. SEIBT IMPORTED "SUPER HEADSET".....	\$6.90
\$12.00 N. & K., Imported.....	\$6.90

The above items are just a few of our numerous attractive priced articles, which are contained in our BULLETIN OF RADIO PARTS. Gladly sent to you upon request.

We specialize in the FAMOUS AMBASSADOR LONG DISTANCE CIRCUIT. Write for list of parts for this set. Either single or three tube set. Price of parts for single tube set.....\$15.60 Price of parts for THREE TUBE SET.....28.90 We are headquarters for "Radion" and "Bakelite Diodes" Panels. The best panel material available. Mail orders promptly attended to. All orders amounting to \$5.00 or more will be shipped prepaid. Will ship C. O. D. unless remittance accompanies order.

"MONOPLEX" RADIO

"THE MOST SENSITIVE RECEIVER YET DEvised"

ONE TUBE ONE CONTROL NO AERIAL OR LOOP

Guaranteed to operate loud speaker on distant stations using only one dry cell tube and WITHOUT AN AERIAL OF ANY KIND

Parts for building this set cost less than \$20.

Complete constructional data and blueprints with results guaranteed.

\$2.00 Postpaid

The Monoplex Co.

Rooms 5 and 6 Nunn Bldg. Amarillo, Texas

DEALERS SEND FOR FREE 48-PAGE CATALOG

Dealers who handle quality products should get our unusually attractive discounts.

All high grade standard sets and supplies.

All orders shipped on day received

Write TODAY for catalog

FEDERAL RADIO COMPANY

Distributors of Standard Radio Sets and Supplies
1900 Harney St. OMAHA, NEBRASKA

"Kills Reflex Troubles"

"Lincoln" Detector

Creating tremendous sensation. Enclosed, fixed, adjustable. New. Brings in distant stations loud and clear. You need it. Ask your dealer or write—today. Price only \$2.00. Absolutely guaranteed for one year.

Jobbers, Dealers: Wire or write. Mention this ad.

LINCOLN MFG. CO.

Dept. N-1 Los Angeles, Calif.

Better Tone for Your Radio!

FRANK D. PEARNE, famous Radio engineer, says TRANSCONTINENTAL RIBBON Aerials aid reception by combining maximum surface with minimum resistance. FORREST, eminent inventor, says, "I get best results by twisting Ribbon Aerial, 2 twists per 50 feet. Complete with snap hooks soldered to ends for instant attachment to insulators."

Transcontinental 50-Foot RIBBON COPPER AERIAL \$1.50

75-Ft. \$2.25
100-Ft. \$3.00
150-Ft. \$4.50

(Trade Mark)

Clearer tone, greater volume, increased distance and selectivity guaranteed or your money refunded! Improves any set, tube or crystal. A laboratory product, with capacity, resistance and strength calculated to give better results.

Try It Without Risk! If your dealers you, order direct from manufacturer, enclosing price. 100-foot length most generally used. Money-back guarantee protects you.

Acorn Radio Mfg. Co.

1806 S. Racine Ave. Dept. 410 CHICAGO

DEALERS! Write for Special Offer!

Sterling

POCKET VOLTMETER

It never lies nor alibies

TRUSTWORTHY, accurate and always ready — The Sterling Voltmeter is your handy man for testing "B" Batteries. It has exactly the "right resistance" so as not to overtax the battery under test.

It is sold by all dealers who stock the best in radio supplies.

PRICE \$2.75

THE STERLING MFG. CO.

2829 Prospect Ave., Cleveland, O.

Campbell RADIO CABINETS

"From the Lumber to You"

PRICES—Cash with order, prepaid east of Missouri River; west, add 15 cents to quoted price. Send Post Office or Express Money Order.

Panel Sizes	Imitation Walnut or Mahogany	Genuine Walnut or Mahogany
7x10x7	\$3.54	\$ 6.28
7x14x7	3.84	7.12
7x18x7	4.24	7.30
7x24x7	6.52	11.48
7x26x7	8.78	14.50
7x28x7	9.00	15.50
7x26x8	8.84	13.18
7x28x8	9.14	13.84

Special Sizes to Order

Mounting Boards, 50c Each

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

Manufacturers' and Dealers' Inquiries Solicited

THE PERKINS - CAMPBELL CO.

(Established 1879)
410-440 New Street, CINCINNATI, O.
(References: Dun or Bradstreet's)

Bradleyleak THE PERFECT GRID LEAK

\$1.85 Condenser 35c At All Dealers

Highly Endorsed For Flewelling Sets

Many radio fans report that the Bradleyleak made their Flewelling sets work instantly. Flewelling endorses the Bradleyleak for better radio reception.

Try a Bradleyleak in your set, too. The range is from 1/4 to 10 megohms.

ALLEN-BRADLEY CO.

290 Greenfield Ave. Milwaukee, Wis.
Manufacturers of the Universal Bradleystat

The Best Source for Radio Dealers!

We are faithfully serving many of the most prominent Radio Dealers in the country. We make it our business to fill orders promptly and correctly. You can't buy or sell better merchandise than

CROSLY RADIO CORPORATION SETS

HOWARD
KELLOGG
CUTLER-HAMMER
CARTER
ALLEN-BRADLEY
RAY-O-VAC BATTERIES
RIBBON AERIAL
SPINTITE WRENCHES

We are exclusive Radio Jobbers and do not retail. Write or wire for catalog and discount sheets.

We sell to Dealers Only

C. S. TAY SALES CO.

53 W. Jackson Blvd., Chicago, Ill.

OPERATING AND TROUBLE SHOOTING

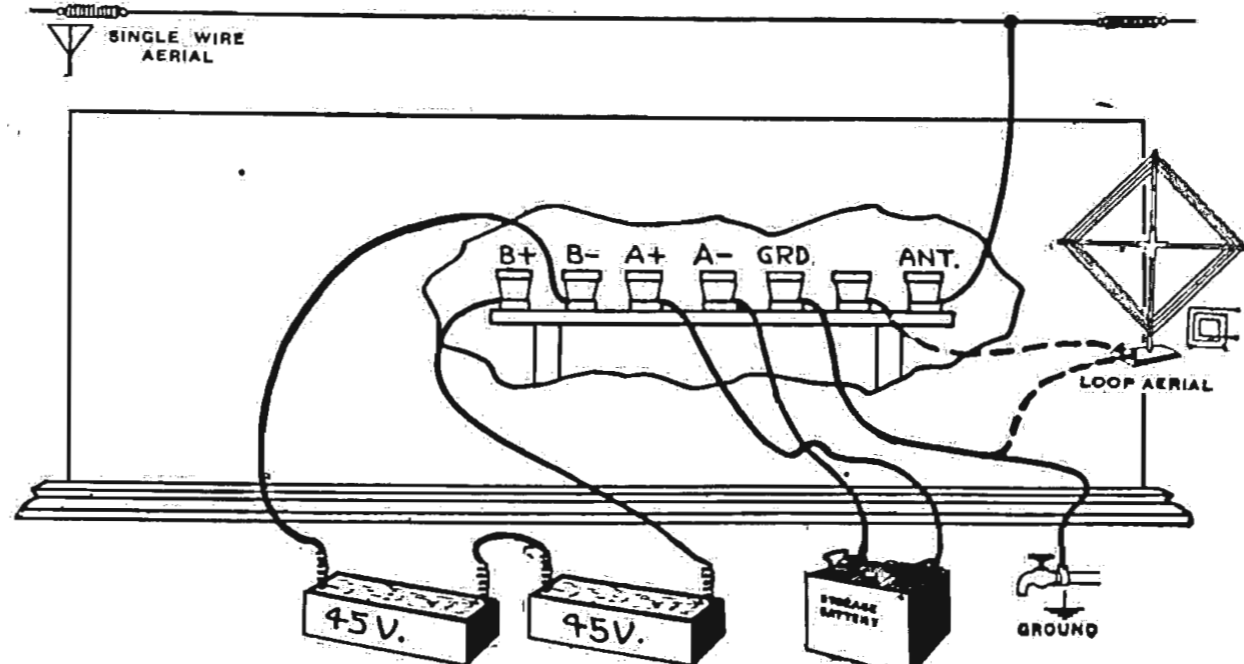
(Continued from page 11)

B+ and B- binding posts should be carefully made by well insulated flexible cord. If these joints are not clean and tight, clicking or scratching noises will be heard. When the tubes are lighted, a loud click is heard when the phone plug is inserted in either jack. If the click is weak or absent, the B batteries are reversed, dead or short-circuited, or the phones are burned-out or phone connections open. Be sure not to connect the B battery across the A battery binding posts. Burned-out tubes are the penalty for this error.

Tuning Instructions

Before attempting to operate the receiver it is wise to carefully check over the installation, beginning with the antenna and ground and seeing that the connections are secure and clean. See that the A and B batteries are new or fully charged and that the wires to them are properly fastened according to the wiring diagrams.

Plug phones or loud speaker into jack marked "Audio Amp.;" turn filament rheostats dial Numbers 6, 7 and 8 until a slight ringing sound as of a bell is heard when the tubes are gently tapped with the finger; set dial Numbers 4 and 5 in accordance with Table II. Note: The two left-hand tubes are the Radio frequency amplifiers and are controlled by rheostat dial Number 6. The tubes must be of the same type. Set Numbers 2 and 3 as indicated in Table III for any particular wave length. For example: Suppose one uses UV-201A tubes for Radio frequency amplifier and detector and wishes to receive 360 meters. Dials 2 and 3 should be set at 40 degrees. Tune with Number 1 until the desired signal is received as shown in Table I. Readjust 2 and 3. If signal is too loud, turn rheostat 6 back a little while finding best settings of 2 and 3. If, on increasing dial 6, a local oscillation appears (evidenced by a whistle and mushy tone) readjust 1 and 2 a few degrees in either direction. Readjust 7 and 8 dials for best tone and volume. Don't burn tubes brighter than necessary for good reception in order to conserve their life. If headphones only are being used, turn off 8 and plug into jack marked "Det."



Distant Stations

In the initial reception of stations over 100 miles distant, it may be of advantage to upset the adjustment of dial 5 by rotating it clockwise to permit a local oscillation to start. This facilitates picking up the carrier wave of the distant station, and may be recognized as a clear whistle whose pitch may be rapidly changed by slight movements of 2 and 3. After dials 1, 2 and 3 have been adjusted to make the whistle as loud as possible, turn dial 5 slowly back until the whistle disappears and the true tone of the station is heard.

Setting for dial 1 for small indoor antenna are given only as a guide. After adjusting dials 2 and 3 in accordance with Table III, vary 1 slowly 10 to 15 degrees either way from the following figures until the station is heard.

TABLE I

Wave Length in Meters	Dial 1
183 meters.....	1 1/2
200 meters.....	6
250 meters.....	19
300 meters.....	29
360 meters.....	40

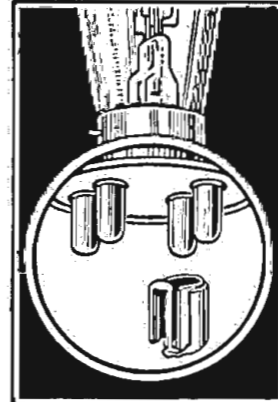
400 meters.....	50
450 meters.....	60
500 meters.....	74
550 meters.....	88
600 meters.....	100

Larger antennas require less degrees on dial 1 for a given wave length while very short antenna require a greater dial reading.

TABLE II

Settings for dials 4 and 5 according to type of tube used.	Dials
Type of tubes in two left-hand sockets	4 and 5
Type UV-201	10
Type UV-201A	22

91 1/2%
of all tubes are
Needlessly Destroyed



RADECO SAFETY FUSES
GIVE
COMPLETE PROTECTION
Price 50 cts. each

Dealers write for proposition.
Radio Equipment Company
20 Stuart Street BOSTON, MASS.

Radio Supplies at Cut Prices

BATTERY CHARGERS	
Tungar Type Charger.....	\$ 9.21
Homechargers	13.25
CONDENSERS	
Crosley D	1.90
Bremer-Tully No. 23 Vernier.....	3.65
Bremer-Tully No. 43.....	4.39
17 Plate Standard.....	1.04
23 Plate Standard.....	1.12
23 Plate Vernier.....	1.98
VARIODUPLERS AND VARIOMETERS	
AC Dayton Coupler.....	5.35
AC Dayton Variometer.....	4.88
LOUD SPEAKERS	
Manhattan	19.20
Western Electric 521 W.....	17.50
Baldwin Standard	19.25
R3 Magnavox	24.80
M1 Magnavox	24.80
Western Electric 10-D.....	39.50
Western Electric Vic. Att.....	9.25
Baldwin C Unit.....	5.21
NEUTRODYNE PARTS	
Valley Special complete parts for 5 tube set including genuine Formica Panel.....	29.10
Alr Coro Transformers.....	1.13
Neutrodons69
TRANSFORMERS	
Aemo Audio	3.55
No. 45 Jefferson Trans.....	5.15
No. 41 Jefferson Trans.....	3.35
Dayton Fan Trans.....	3.95
Killark Trans.....	2.00
Geraco Trans.....	3.25
General Radio Trans.....	3.95
PHONES	
Western Electric	8.50
Baldwin C	8.45
Frost	2.85
SETS	
Precision Aco	\$14.95
Crosley VI	21.25
Crosley NJ	48.75
B. T. Neutrodyne 5 tube.....	87.50
Complete parts Super Heterodyne 8 tubes.....	98.20

Write for Agent's Price List.
Always include Parcel Post and Insurance.
VALLEY RADIO SUPPLY CO.
2206a Locust St. ST. LOUIS, MO.

Type VT-1	25
Type VT-2	22
Type C-301A	22

TABLE III

Settings for dials 2 and 3 with UV-201A or C-201A tubes as Radio frequency amplifiers and detector. (Sockets 1 and 2 at left and extreme right hand.)

Wave length in meters	Dials 2 and 3
183 meters.....	1 1/2
200 meters.....	6
250 meters.....	19
300 meters.....	29
360 meters.....	40
400 meters.....	50
450 meters.....	60
500 meters.....	74
550 meters.....	88
600 meters.....	100

(ANOTHER SET NEXT WEEK.)

DEALERS

We are now making prompt deliveries on the New Grebe RORQ Clarifier.

List - \$30.00

Write for Our Price List

THE RADIO SHOP of NEWARK, Inc.
76 Springfield Ave., Dept. B Newark, N. J.

UV201-A, UV200, WD-12, UV199, WD-11, "Radiotron" Tubes. Postage Extra... **\$4.29**
BRANDES "SUPERIOR" Phones.....\$4.69
"TABLE TALKER"..... 8.12

VARIABLE CONDENSERS
(Moulded End Plates Guaranteed)
11-Plt. Regular.....\$0.94 Vernier with dial...\$1.89
23-Plt. Regular..... 1.19 Vernier with dial... 2.19
43-Plt. Regular..... 1.34 Vernier with dial... 2.49

2 AMP. Battery Charger with "TUNGAR" Bulb..... **\$9.19**

SUPER-HETERODYNE PARTS complete set parts less cabinet for 7 tube set. \$90.00 Value..... **\$72.80**

VARIOMETERS—VARIOCOUPERS
A-C Dayton Moulded.....\$ 3.95
Atwater-Kent Moulded..... 6.25
180° Coupler Bakelite Tube..... 1.50

SETS
Radiola III, Tubes, Phones, Batteries.....\$35.00
Crosley 51 Two-Tube Set..... 14.80
Crosley NJ Four-Tube..... 49.75

"BURGESS" No. 2156 large 22 1/2 V. "B" Bat. 1.96
"BURGESS" No. 2306 large 45 V. "B" Bat. 3.92

SPECIAL
We carry one of the largest stocks in the country and can supply most any standard part at from 15% to 50% from the list price. Send us your orders and they will be promptly filled. Try our service.

INCLUDE PARCEL POST AND INSURANCE. WE ALSO SHIP C. D. D.

RADIO PARTS CO.
3858 Washington ST. LOUIS, MO.

EVEREADY Radio Batteries

—they last longer

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

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

Eliminate Switch Points—

With a

CARTER Inductance Switch

Only one hole to drill.

All contacts positive. Pig tail connection. Solder Terminal and contact one piece, so shaped that when heavy bronze contact arm passes from one to the next there is a slight click that indicates a contact is made. Any Dealer can supply.



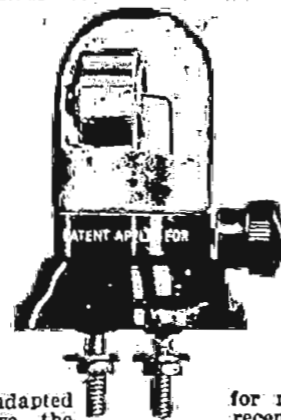
Price \$2.00 Write for Catalog

Carter Radio Co.
7205 S. STATE STREET CHICAGO

The New Marvel BEACON CRYSTAL DETECTOR

The Beacon Will—When Others Fail

Gold Point Replaceable
Positive Contact Crystal
Vernier Adjustment



Especially adapted for reflex circuits. Will improve the reception of any crystal set. Every Beacon is thoroughly tested in our laboratory and fully guaranteed. The gold point and vernier adjustment gives it positive contact at all times. Replaceable crystal and glass cover makes the Beacon the most efficient and economical crystal detector on the market.

Price, \$1.50 — For Sale by All Reliable Dealers

JOBBERS—DEALERS: This is a fast seller. Write for discounts.
Midwest Electric Specialty Co.
106 North La Salle Street, CHICAGO, ILL.

STAR
The Radio Fans Are Gathering the Stars
Every Crystal and Reflex set will have one. A marvelous invention. Takes the place of catwhisker and crystal. Programs always on full volume, just as with a tube set. Price \$1.25 at all progressive dealers. Guaranteed 1 year.
STAR CRYSTAL COMPANY
525 Woodward Ave. Detroit, Mich.
Chicago Branch: 51 West Jackson Blvd
New York Branch: 222 Fulton Street

PYRAMID RADIO OUTLET CO.
23 Duane St., New York City
Mail Orders Promptly Filled
TO ORDER—State number, name and price of items wanted. Enclose Money-Order for total amount. Postage prepaid on orders over \$5.00. Every article sold on a
MONEY BACK GUARANTEE

CONDENSERS		
	R. C.	Comco
11 Plate	\$1.05	\$1.55
23 Plate	1.29	1.85
43 Plate	1.45	2.10
11 Plate vernier.....		2.98
23 Plate vernier.....		3.29
43 Plate vernier.....		3.49
VARIOMETERS AND COUPLERS		
647 VARIOMETER—FISHER TYPE.....		2.10
646 Variometer—Pathé Moulded.....		2.25
643 Variocoupler—Pathé.....		2.15
610 Variocoupler—Sik 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
638 Jefferson Star 6 to 1.....		3.09
637 ACMP AUDIO.....		3.79
634 Acme Radio.....		3.79
636 Erie Reflex.....		4.15
PHONES		
675 PACENT. 22 0 ohms.....		3.35
687 American, 22 0 ohms.....		3.25
MISCELLANEOUS		
603 SOCKET—BAKELITE.....		.44
C 2 Socket—Metal.....		.39
629 Rheostat, 6 ohm.....		.39
630 RHEOSTAT, 30 ohm.....		.49
636 Spa-hetti Tubing, per yard.....		.09
637 Bus Bar Wire, 2 ft length.....		.04
633 Dials and Knobs, 3 inch.....		.30
668 Freshman G. L. & Cond.....		.89
674 Double Phone Plug.....		.55
677 Single Cir-uti Jack.....		.35
678 Double Circuit Jack.....		.45

FREE!!
72 Page Radio Manual if you send us the names and addresses of three or more radio fan friends.
Write for Our List of Parts and Price List.

Questions and Answers

Condenser
(07185) JS, Wetaskiwin, Canada.
I would like to know the make of the variable condenser illustrated in Figure 2, page 19, of the January 12th issue of the Digest, in the article by H. J. Marx; also where can I get one? There is probably some store in Chicago that sells them; if so, will you have them forward a catalogue?

A.—In reference to Figure 2, page 19 of the January 12 issue of Radio Digest, a Cardwell variable condenser is indicated. This unit is available through the Cardwell Condenser Company, Brooklyn.

WHOLESALE ONLY
We Specialize in Equipping
NEW DEALERS
with Complete Radio Stocks
MANHATTAN RADIO CO.
112-114 Trinity Place
New York City

NOTICE—FEDERAL OWNERS AND DEALERS

We are making a specialty of adding a stage of Audio Frequency to Federal No. 110 Receiving sets, making them an extra loud four-tube set. Great volume and work guaranteed. Price \$20.00 with all material furnished. Special rates to Dealers and Federal Distributors. Send in your sets at once.

THE BRACKETT CO.
Des Moines, Iowa

PATENTS PROTECT
RADIO INVENTIONS
Mason, Fenwick & Lawrence
Patent and Trademark Lawyers
Washington, D. C. New York Chicago
ESTABLISHED OVER 60 YEARS

Super Heterodyne

Immediate Delivery - Attractive Discounts

Branson Kit No. R. 100 Complete \$36.50
Contains—3 Intermediate R. F. Transformers, each.....\$6.50
1 Special Transfer Coupler.....7.50
1 Special Oscillator Coupler.....5.00
1 Antenna Coupler.....4.50
Book of Instructions with Template, Blue Prints.....1.00

All American B 100-75-30 K. C. 10,000 M Transformers.....\$6.00
Acme 30 K. C.—10,000 M Transformers.....5.00
Hilco Oscillating Coupler.....7.00
Hilco Antenna Adjustable Coupler.....8.00
Complete Stock of FADA Kits and Sets
128 Page Catalog No. L25 FREE
AMERICAN RADIO MFG. CO.
Dept. V, 6 West 14th St. Kansas City, Mo.

RADIO REPAIRING
TUBES REBUILDING

ALL TUBES REPAIRED
Guaranteed Like New
Detectors or Amplifiers... **\$2.65**

One Amp., 6 Volt Tubes Changed to 1/4 Amp. Tubes
Write Today for Tube Circular on New and Refilled Tubes
American Radio Tube Works
Irvington, New Jersey, U. S. A.
AGENTS WANTED EVERYWHERE

SAMSON TUBES
\$3.50

Mail your order for the 201-A type tube which is as good as human skill can produce.

Mail Orders promptly attended to with Money Back Guarantee
DEALERS' AND AGENTS' TRADE SOLICITED

PHOENIX TUBE COMPANY
1457 Broadway, New York City
Specialist in Good and Reliable Tubes
Try our
Reliability—Uniformity—Service

Miloplex or Reinartz?
(05914) E. H. M., Lakeville, Ind.
I wish to assemble a Radio set. Which set would give me the better service—the Miloplex described on page 4 of your November 10 issue, or the Reinartz on page 14? Can I use dry cells with the Reinartz?

Would it give me better service to purchase a Crosley Model X? Can dry cells be used with the latter?

Variocouplers and variometers are now so cheap that it does not pay to make them.

Use Price 75¢
DURHAM
Variable Grid Leak
At dealers, or postpaid
Durham & Co., 1936 Market St., Phila.

PARTS FOR ULTRADYNE

Transformers, Types A and B, each.....\$4.50
Tuning, Oscillating Coils, pair.....4.50
Full Size Blue Prints, set.....1.50

NOTE: Type B transformers suitable for any super-heterodyne circuit. Maximum efficiency, beautifully finished. Unconditional guarantee, prompt delivery.

BRIDGE DISTRIBUTING COMPANY
126 South Ninth Street Minneapolis, Minn.

3000 mile
RADIO "B" BATTERIES
At Factory Prices
Greatest Radio "B" battery on market. Full number voltage taps; QUALITY GUARANTEED; LOWEST PRICES; brings in concerts LOUDER AND STRONGER; will work on any tube or loud speaker. Order by number TODAY with check, money order or pay postman C. O. D.

No. 322B—22 1/2 volt, variable, regularly \$2.25.....\$1.52
No. 322A—22 1/2 volt, variable, regularly \$3.00.....\$1.85
No. 345A—45 volt, 8 taps, regularly \$5.50.....\$3.25
AYRES BATTERY CORPORATION, Cincinnati, Ohio

DEALERS PROMPT SHIPMENTS LIBERAL DISCOUNTS

ERLA Selectoformer
As Usual We Are First With the Latest
Send in your name so we can send you our complete catalog on all the standard lines.
Note!! We are the largest exclusive Radio Jobbers in the Middle West

HUDSON-ROSS
123 W. Madison St. Chicago

The Dependable Radio Receiver
FADA "ONE SIXTY" with the NEUTRODYNE CIRCUIT
The FADA "One Sixty" is the four-tube Neutrodyne radio receiver that in selectivity, volume, distance and clarity equals the best results of any five-tube set of any type or make. Owners say, "If we don't get 'em on the loud speaker, we don't count 'em." Consistent performance on loud speaker from stations 1500 to 2000 miles away and sometimes much further.
Price \$120 at dealers Extra for tubes, batteries and 'phones
F. A. D. ANDREA, Inc.
1581 Jerome Ave., New York City
Fada RADIO

A.—Either of the circuits you mention are efficient and popular types of receivers, with good range. Dry cell tubes can be used, generally speaking, in any standard circuit. A choice between these two would be largely a matter of personal discrimination.

There is no reason, with average me-

FOR SALE—10 watt set for key or broadcasting. For particulars write A. E. Schilling, 108 Elm St., Kalamazoo, Mich., Station WLAQ. Will mail photo on request.

Wholesale for Dealers
Dealers: We make a specialty of stocking new dealers and radio departments, our large price list will be mailed free to you on request, good discounts and prompt deliveries.
The Radio Shop of Newark Inc.
76 Springfield Ave., NEWARK, N. J.

My latest No. QB balloon aerial. Inflates with common illuminating gas or with hydrogen gas. Hydrogen is obtained in tanks, or by making it in a jug with acid and iron, or by the electrolysis of water with rectified house current.
Balloon aerial complete, \$5.00 C. O. D., with instructions and one extra pilot balloon; 7-inch rapid winding hand reel; 350 feet of special alloy wire for aerial and requisite fixtures for making hydrogen in a jug.
Large, double-action bellows for use with common gas, \$3.50 extra. Extra No. QB balloons, 75c, or \$8.50 per dozen. "There's nothing like a good high aerial." Everett Scanton, Radio Specialties, Lakewood, Rhode Island.

Do Not Ask for a Grid Leak
Ask for a **DAVEN RESISTOR**
It is just as easy and means a lot more.
DAVEN RADIO
8 Campbell St. NEWARK, N. J.

Guaranteed Head-Sets
RED-HEADS are guaranteed radio phones. You run no risk when you buy them. Money back if, after 7 days' trial, you're not satisfied that they're the best receivers on the market at the price. Why not act right now and get a pair? It'll mean getting the maximum from broadcasting from the day you put them into use.
RED-HEAD RADIO RECEIVERS
NOW READY
The new 1924 Model F Per Pair Complete \$6.50 | The new "Red-Head" Jr. Per Pair Complete \$5.00
"Red-Heads" sent prepaid on receipt of price if you are unable to get them at your dealer's.
THE NEWMAN-STERN COMPANY
Dept. R. D., Newman-Stern Bldg., Cleveland

WE REPAIR THE FOLLOWING RADIO TUBES
Dealers and Agents write for Special Discount Mail Orders Solicited and Promptly Attended to
WD-11, WD-12, Our Specialties
WD-11\$3.00 DV-6A\$3.00
WD-123.00 UV-1993.00
UV-2002.75 C-2993.00
UV-2013.00 UV-201A3.00
C-3002.75 C-301A3.00
C-3013.00 Marconi3.00
DV-63.00 Moorhead3.00
DV-13.00 6 V. Plain Det. 2.75
DV-23.00 6 V. Plain Amp. 3.00
H. & H. RADIO COMPANY
P. D. Box 22-A
Clinton Hill Station NEWARK, N. J.

chanical and electrical skill, why you should not have as satisfactory results, often better, with a receiver of your own construction as with a manufactured set.

PATENTS Procured. Send sketch or model today for examination, prompt report and advice. No charge for preliminary advice. Write for free Booklet and blank form on which to disclose your idea. Highest references. Promptness assured. Clarence A. O'Brien, Registered Patent Lawyer, 200-B Security Bank Building. Directly across the street from Patent Office, Washington, D. C.

Thank Your Favorite Stations—Request Your Favorite Station
YOUR OWN Name and Address Printed FREE On Every Card
"Thank You" cards are all the rage. Stations appreciate them. A pleasure to use. Be in style. Low introductory price, 100—\$1.65; 200—\$2.60; 300—\$3.50 POSTPAID. Order today.
MONEY REFUNDED if Not Satisfied
Good quality cards—High-grade printing. You will be DELIGHTED. Send order with check or money order today—NOW.
RADIO PRINTERS, Dept. 44 Mendota, Illinois

INSIDE AERIAL
11 FEET LONG 12 INCHES DIAMETER
Substitute for Outside Antenna
130 Feet Stranded Copper Wire
NOT A LOOP
BUY A FULL SIZE ANTENNA
Suspend near ceiling
Unaffected by Wind-Rain-Sleet-Lightning
Or \$5, if four set owner's addresses are sent to us.
INTER-STATE SIGNAL CO., DEPT. 1, COLUMBUS, O

5 Tube Neutrodyne Set
Completely built in a beautiful solid walnut cabinet, all wired, ready to operate (without tubes or batteries)..... **\$70**
Absolutely Guaranteed
to give satisfaction. Distant stations from coast to coast brought in clearly, distinctly without distortion, whistling or blurring, nor stirring of words and as loud or softly as you wish. Every set is perfectly neutralized, no body capacity whatever. Every station, once located, can be brought in again on the same dial setting. All parts are genuine and guaranteed.
Send \$5.00. We will send C. O. D. for balance, with privilege of three days' trial.
F. WILKINSON
5118 Fletcher Street Chicago, Ill.

Dubilier Duratran
reduced from **\$5.00 to \$4**
Increased production has lowered manufacturing costs of the Dubilier Duratran—the radio-frequency transformer that brings in all the stations loud and strong—not just a few. And you receive the benefit in a big price reduction.
At all good dealers.
DUBILIER CONDENSER & RADIO CORPORATION
42 West Fourth Street, New York

Price 50 cents everywhere
Never sold at cut prices
B-METAL
Loud Talking Crystal
Sold only by reliable dealers and at full price. The Premier Crystal of the Radio World today. Ideal for REFLEX or CRYSTAL sets. Order, if possible, from your dealer. If he does not have it, send to us for one. Price, 50 cents postpaid.
New Jobbers and Distributors Plan Now Ready
B-METAL REFINING COMPANY
625 Woodward Avenue, Suite 48 DETROIT, MICH.
GENUINE B-METAL
Chicago Branch: 53 West Jackson St.
New York Branch: 222 Fulton Street

Radiophone Broadcasting Stations

Corrected Every Week—Part III

CHALLENGE SUPPORTS LIST'S CORRECTNESS

ONE DOLLAR will be paid to the Radiophan reader of Radio Digest submitting the most errors in any one station's listing in the Directory of Radiophone Stations, which appears in four parts, serially continuously, on page 31. Letters must reach Radio Digest's office not later than one week from date of issue corrected. Readers are not limited to correcting one station, but such corrections must be verified by the stations themselves, and NOT by comparison to other so-called accurate broadcasting directories or lists. Turn in corrections for as many stations as you can find—if you can find errors! Use separate sheet of paper for each station submitted and place name and address on each sheet. In case of tie, duplicate awards will be made.

[NOTE.—The third part of the schedule list appears below. The fourth part consists of the remainder of the list and the complete state, city-station index and will appear next week.]

WEA, Vermillion, S. D. 283 meters. 200 watts. Univ. of S. D. Mon, 8:30 pm, music, college activities. Central.

WEAM, North Plainfield, N. J. 286 meters. 100 watts. Borough of N. Plainfield. Mon, 8:10:30 pm, concert, talks. Eastern.

WEAN, Providence, R. I. 273 meters. 100 watts. Shepard Co. Daily ex Sun, 12-1 pm, 4-5, music, reports, weather, concert. Mon, Wed, 6-7 pm, Mon, Tues, Wed, Fri, 8-10, concert. Sat, 9-11 pm, dance music. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern.

WEAO, Columbus, O. 360 meters. 500 watts. Ohio State Univ. Daily ex Sun, 1:30 pm, Wed, Fri, 4 pm, lectures, music. Thurs, 8-10 pm, lecture, concert. Eastern.

WEAP, Mobile, Ala. 360 meters. 150 watts. Mobile Radio Co. Daily ex Sun, 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3:30 pm. First Mon each month, 11-12 midnight. Central.

WEAR, Baltimore, Md. 360 meters. 500 watts. Baltimore American and News Publishing Co. Tues, Thurs, Fri, 7-10 pm, music, weather, sports. Eastern.

WEAU, Sioux City, Ia. 360 meters. 100 watts. Davidson Bros. Co. Slogan, "The Heart of the Corn Belt." Daily ex Sun, 11 am, 12:30-1 pm, 2, 5, 6-7, Mon, Wed, Fri, 8-9 pm, concert. Sun, 7-9 pm, church services. Central.

WEAY, Houston, Tex. 360 meters. 1000 watts. Iris Theatre (Will Horwitz, Jr.). Slogan, "Where All the Oceans Meet All the Railroads." Daily ex Sun, 11 am, weather, news; 12 u, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news, sports. Fri, 8-9 pm, band. Sat, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 273 meters. 500 watts. The Benwood Co. Inc. Tues, 9-10:30 pm, Wed, 8-9:30 pm, Sat, 7:30-9 pm, 11 pm-1 am. Central.

WEV, Houston, Tex. 360 meters. 100 watts. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thurs, 8 pm, concert. Central.

WEW, St. Louis, Mo. 261 meters. 100 watts. St. Louis Univ. Daily ex Sun, 9 am, 10, 2, 5 pm, reports. Central.

WFAA, Dallas, Tex. 476 meters. 500 watts. Dallas News and Dallas Journal. Slogan, "Working For All Alike." Daily, 10:30 am, reports; 12:30-1 pm, address; 2:30-3:30, reports, news; 5:30, bedtime story; 6:45-7, sports, news; 8:30-9:30, concert, weather (silent Wed). Tues, Sat, 11-12 pm, music. Sun, 6-7 pm, Bible class; 9:30-11 pm, music. Central.

WFB, Syracuse, N. Y. 234 meters. 100 watts. C. F. Woese. Sun, 9:30-10 pm, Service; 10-11, concert. Eastern.

WFAF, Poughkeepsie, N. Y. 273 meters. 20 watts. H. C. Sprally Radio Co. Temporarily discontinued.

WFAP, Port Arthur, Tex. 236 meters. 150 watts. Elec. Supply Co. Mon, Wed, Sat, 9-10 pm. Central.

WFAJ, Asheville, N. C. 360 meters. 50 watts. Hi-Grade Wireless Instrument Co. Sun, 7:30-8:30 pm, church services. Eastern.

WFAW, St. Cloud, Minn. 360 meters. 20 watts. St. Cloud Daily Times. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAH, Hutchinson, Minn. 360 meters. 100 watts. Hutchinson Elec. Service Co. Slogan, "Gateway to the Ten Thousand Lakes of Minn., located in the Heart of the Great Butter Belt." Daily, 11:55 am-12:30 pm, program, news, time, weather. Tues, 8-10 pm, program. Special hours. Central.

WFAI, Cameron, Mo. 360 meters. 10 watts. Missouri Wesleyan College. Central.

WFAT, Sioux Falls, S. D. 258 meters. 50 watts. New Columbus College. Wed, Sun, 8-9 pm.

WFAV, Lincoln, Neb. 275 meters. 500 watts. Univ. of Neb. Slogan, "The Home of the Cornhuskers." Daily ex Sun, 10 am, 12:40 pm, weather, news, road reports, Wed, 3:30 pm, concert.

WFI, Philadelphia, Pa. 395 meters. 500 watts. Strawberry & Clothier. Daily ex Sun, 10:15 am, reports; 1 pm, orchestra; 1:50, reports; 3-4:30, concert; 6-6:30, children's hour; 6:30-7, orchestra. Tues, Thurs, Sat, 8 pm, concert. Tues, Sat, 10:10 pm, dance orchestra. Sun, 10:30 am, 7:30 pm, church services; 4:30, chapel service. Eastern.

WGL, Lancaster, Pa. 243 meters. 100 watts. Lancaster Elec. Supply & Construction Co. Slogan, "Garden Spot of S. A." Mon, Wed, Fri, 7:30-9 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAN, Pensacola, Fla. 360 meters. 50 watts. Cecil E. Lloyd.

WGAP, Shreveport, La. 252 meters. 150 watts. Glenwood Radio Corp. Daily ex Sun, 12:30-1:30 pm, 6:30, 7:30, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAW, Altoona, Pa. 261 meters. 100 watts. Ernest C. Alright. Slogan, "The Home of the world's largest railroad shops." Wed, 9 pm. Sun, 10:45 am; 7:30 pm. Eastern.

WGZ, South Bend, Ind. 360 meters. 500 watts. South Bend Tribune. Daily ex Sun, music. Mon, Wed, Fri, 7-8:30 pm, concert. Central.

WGI, Medford Hillside, Mass. 360 meters. 500 watts. Am. Radio & Research Corp. Slogan, "Amrad, the Voice of the Air." Daily ex Sat, Sun, 12 m-1 pm, concert. Tues, Thurs, 7-8:30 concert. Wed, Fri, Sat, 7:30-9:00, concert. Daily ex Sun, Mon, 6:30 pm, Big Brothers Club. Tues, Fri, 3 pm, Amrad Women's Club. Sun, 4-5 pm, 8:30, church services; 10, concert. Eastern.

WGL, Philadelphia, Pa. 360 meters. 500 watts. Thos. F. J. Howlett. Irregular schedule.

WGN, Chicago, Ill. 370 meters. 1000 watts. Chicago Tribune and Chicago Radio Lab. Daily ex Sun, 7-8 pm, 9-11 pm. Sun, 6-9 pm. Central.

WGR, Buffalo, N. Y. 319 meters. 750 watts. Federal Tel. & Reg. Co. Slogan, "Key City of Industry." Daily, 10-10:30 am, weather; 12 m reports; 12:30, organ music. Daily ex Sat, Sun, 12:30 pm, 4. Daily ex Sun, 2:30-4 pm, orchestra. Daily ex Sun, 6:30 music; 7:30, news. Mon, Wed, Fri, 9-11 pm, concert; 11-1 am, orchestra. Fri, 8:45, road reports. Sun, 3 pm, vesper services; 4, organ. Eastern.

WGV, New Orleans, La. 242 meters. 100 watts. Interstate Elec. Co. Slogan, "The Gateway to the World's Richest Valley." Tues, Fri, 9:30-12:30 am, dance music. Central.

WGY, Schenectady, N. Y. 380 meters. 1000 watts. General Elec. Co. Daily ex Sun, 12:30-1 pm, 6, reports, time, sports. Mon, Tues, Thurs, Fri, 2-2:30 pm, 7:45, concert. Fri, 10:30 pm, special. Sun,

10:30 am, 7:30 pm, church service; 3:30 pm, Symphony Orchestra. Eastern.

WHA, Madison, Wis. 360 meters. 1000 watts. Univ. of Wis. Mon, Wed, Fri, 7:30 pm, lectures, news, agriograms. Central.

WHAA, Iowa City, Ia. 484 meters. 500 watts. Univ. of Iowa. Tues, 8-9:30 pm, Sun, 9-9:30 pm; 4 pm, once each month. Occasionally Thurs, 8-9:30 pm; Sat, 7:30-9 pm. Central.

WHAB, Galveston, Tex. 360 meters. 200 watts. Clark W. Thompson Co. Slogan, "The Gateway to the Southwest and Treasure Island of America." Discontinued temporarily.

WHAD, Milwaukee, Wis. 280 meters. 100 watts. Marquette Univ. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAG, Cincinnati, O. 222 meters. 100 watts. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. 283 meters. 250 watts. Hafer Supply Co. Tues, Thurs, 9-11 pm; Sat, 10:30-11:30; Sun, 9-11 pm. Central.

WHAK, Clarkburg, W. Va. 258 meters. 15 watts. Roberts Hdwe. Co. No definite schedule.

WHAM, Rochester, N. Y. 283 meters. 100 watts. Univ. of Rochester. Rochester Times-Union, Democrat and Chronicle. Daily ex Sun, 3 pm, 4:15, 6:30, 7-7:30, 7:35-8:30. Sat, 10:45-12:30 am, dance music. Sun, 2:55 pm, Sunday school service; 3:15, Radio Chapel. Eastern.

WHAP, Decatur, Ill. 360 meters. 50 watts. Otto & Kuhns. No definite schedule.

WHAR, Atlantic City, N. J. 231 meters. 20 watts. Paramount Radio & Elec. Co. Daily, 2-3 pm, 7-9. Eastern.

WHAS, Louisville, Ky. 400 meters. 500 watts. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9, 9:57-10:45 am, 4-5 pm, church service. Mon night, silent. Central.

WHAV, Wilmington, Del. 360 meters. 50 watts. Wilmington Elec. Spec. Co. Slogan, "The First Broadcasting Station of the First City of the First State." Sun, 10-11 pm. Eastern.

WHAZ, Troy, N. Y. 380 meters. 500 watts. Rensselaer Polytechnic Inst. Slogan, "Transcontinental and International Broadcasting Station Located at the Oldest College of Engineering." Club, R. P. I. students. Mon, 9-11 pm, concert, educational talks, features. Transcontinental second Monday of each month, 12-1:30 am music. Eastern.

WHB, Kansas City, Mo. 411 meters. 500 watts. Sweeney Auto & Electric School. Slogan, "Heart of America." Daily ex Sun, 8:25 am, 9:25, 10:25, 11:25, 12:25 pm, 1:25, 3 reports. Daily, 12:30-1, 2-3, 7-7:45 pm, music. Tues, Thurs, Sun, 8-10 pm, concert; midnight program. Central.

WHK, Cleveland, O. 283 meters. 100 watts. Warren R. Cox. Slogan, "WHK Cleveland." Daily ex Sun, 12:30-1:00 pm, music; 6-6:30, news, music. Fri, 9-11 pm, dance program. Sun, 8-10:30 pm, concert. Eastern.

WHN, New York, N. Y. 360 meters. 500 watts. Loew's State Broadcasting Station. Slogan, "The Voice of the Great White Way." Daily ex Sun, 2:15-3:15, 3:45-5:30. Mon, Wed, Sat, 7:30-12 pm, Tues, Thurs, Fri, 9:30-12:00 pm, Sun, 3-6 pm, 9:30-12 pm. Eastern.

WIAB, Rockford, Ill. 252 meters. 50 watts. Joslyn Automobile Co. Mon, 9-10 pm, Fri, 8-9 pm, music. Central.

WIAC, Galveston, Tex. 360 meters. 100 watts. Galveston Tribune. Daily ex Sun, 12:35 pm, reports, occasional evening program. Central.

WIAO, Philadelphia, Pa. 254 meters. 100 watts. Howard R. Miller. Irregular schedule.

WIAF, New Orleans, La. 234 meters. 100 watts. G. A. DeCortin. Tues, 8-9:30 pm, Sun, 10-11:30 am. Central.

WIAL, Springfield, Mo. 252 meters. 100 watts. Heer Stores Co. Daily ex Sun, 10:30-11 am, reports, news, weather. Tues, 7:30-8:45 pm, Sat, 6:30-7:30 pm, music entertainment. Central.

WIAJ, Neenah, Wisc. 224 meters. 20 watts. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 278 meters. 200 watts. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 pm, 1:30 pm, 3:50, markets, weather. Central.

WIAQ, Milwaukee, Wis. 360 meters. 100 watts. School of Engineering of Milwaukee. Slogan, "In the Land of the Sky Blue Water." Mon, Tues, Thurs, Fri, 10-10:30 am, 11:30-12 m, music, news; 5-6 pm, music, news; 7-8, music, speeches. Central.

WIAQ, Marion, Ind. 226 meters. 10 watts. Chronicle Pub. Co. Temporarily discontinued.

WIAS, Burlington, Ia. 360 meters. 100 watts. Home Elec. Co. Slogan, "Burlington, On The Mississippi." Tues, 8-9 pm, concert. Thurs, 7:15-8:15 pm, concert. Central.

WIAU, Le Mars, Ia. 360 meters. 20 watts. Am. Trust & Savings Bank.

WIK, McKeesport, Pa. 234 meters. 100 watts. K & L Electric Co.

WIL, Washington, D. C. 360 meters. 10 watts. Continental Elec. Supply Co. Discontinued temporarily.

WIP, Philadelphia, Pa. 509 meters. 500 watts. Gimbel Bros. Slogan, "Watch His Progress." Daily ex Sun, 1-2 pm, 3-4:30, 6-6:45, music; 6:45, markets; 7-7:30 pm, bedtime stories. Tues, Thurs, 8-10 pm, concert. Tues, Sat, 10:10-12 pm, concert. Sun, 4-6 pm; 9:30-12, Eastern.

WIAD, Waco, Tex. 360 meters. 150 watts. Jackson's Radio Engineering Lab. Daily ex Sun, 4-4:30 pm, news, music. Mon, Fri, 8-9, concert. Sun, 11-12 am, church service. Sun, 7:30-8:30 pm. Central.

WIAG, Norfolk, Neb. 283 meters. 250 watts. Norfolk Daily News. Slogan, "The World's Greatest Country Daily." Daily ex Sun 12:15 pm, 5, 5:30, reports. Sun, 3:30-6 pm, music. Central.

WIAK, Greentown, Ind. 254 meters. 25 watts. Rev. Clifford L. White. Slogan, "The Radio Parson." Daily ex Sat, Sun, 6 pm; 6:30, children's hour. Thurs, 8 pm, music. Sat, 7 pm, sermonette music. Central.

WIAM, Cedar Rapids, Ia. 268 meters. 20 watts. D. M. England. Slogan, "The Gateway of the World." Daily ex Sun, 10 am, 11:30, 1:30 pm, markets, reports. Tues, Thurs, Sat, 6-6:30 pm, children's hour; 7-8, music. Sun, 2:45 pm, music. Central.

WIAN, Peoria, Ill. 280 meters. 100 watts. Peoria Star Slogan, "The Grandview City of Illinois." Daily ex Sun, 9 am, 9:15, 11:30, 1:30 pm, markets, weather agriograms. Tues, Thurs, 9:15-10:45 pm, concert. Sun, 11:30 am, 7:45 pm, church services. Central.

WIAQ, Topeka, Kan. 360 meters. 100 watts. Copper Publications. Irregular schedule.

WIAR, Providence, R. I. 360 meters. 500 watts. The Outlet Co. Slogan, "The Gateway of Southern New England." Daily ex Sun, 10-11 am, Housewives' talk; music. 1:05-2:15 pm, weather, reports, music; 7, weather. Tues, Wed, Fri, 7-8 pm, music. Wed, 10:30-12 midnight, dance. Fri, 8:15 pm, concert. Sun, 7:20-10:20 pm, concert. Eastern.

WIAS, Pittsburgh, Pa. 250 meters. 500 watts. Pittsburgh Radio Supply House. Daily ex Sun, 11:30-12 m, 2:30-3 pm, Mon, Wed, Fri, 7:45-9 pm. Eastern.

WIAT, Marshall, Mo. 360 meters. 10 watts. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:15-5:44 pm, concert. Central.

WIAX, Cleveland, O. 390 meters. 500 watts. Union Trust Co. Slogan, "The Wave From Lake Erie." Daily ex Sat, Sun, and Sun, 9-9:15 am, market review; 9:30-10, women's program; 10:05-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7:30-9:30 pm; Thurs, 8-10:30 pm, entertainment. Eastern.

WID, Granville, O. 229 meters. 50 watts. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Central.

WIH, Washington, D. C. 273 meters. 500 watts. Wm. F. Boyer Co. Sun, 9 pm, church services. Eastern.

WIJ, New York, N. Y. 360 meters. 500 watts. De Forest Radio Telephone & Telegraph Co.

WIY, New York City. 405 meters. 500 watts. R. C. A. Tues, Thurs, Fri, 7:30-11:30 pm, concert. Sun, 2:30-5 pm, 8-10:30. Eastern.

WIJ, New York, N. Y. 455 meters. 500 watts. R. C. A. Daily ex Sun, 3-6 pm, entertainment; 7-11:30 pm, special program. Sun, 11:00 am-1 pm, church service; 7-10:30 pm. Eastern.

WKA, Cedar Rapids, Ia. 268 meters. 100 watts. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 3:30, reports, agriograms; 6-7, music. Thurs, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAQ, East Providence, R. I. 240 meters. 100 watts. Charles Loff.

WKAF, Wichita Falls, Tex. 360 meters. 100 watts. W. S. Radio Supply Co.

WKAN, Montgomery, Ala. 226 meters. 15 watts. United Battery Service Co. Wed, Fri, 8:30-9:30 pm, music, news, Sun, program. Central.

WKAP, Cranston, R. I. 360 meters. 200 watts. Dutree Wilcox Flint.

WKAQ, San Juan, Porto Rico. 360 meters. 500 watts. Radio Corp. of Porto Rico. Slogan, "The Island of Enchantment, Where the World's Best Coffee Grows." Wed, 6-8 pm, band; Fri, 6-8 pm, music, talks, entertainment, inter-colonial.

WKAR, East Lansing, Mich. 280 meters. 500 watts. Mich. Agrl. College. Wed, 8 pm, college events. Central.

WKAV, Laconia, N. H. 254 meters. 50 watts. Laconia Radio Club.

WKAY, Gainesville, Ga. 280 meters. 10 watts. Brenan College. Thurs, 8:30 pm, concert, college activities. Eastern.

WKY, Oklahoma City, Okla. 360 meters. 150 watts. WKY Radio Shop. Mon, Thurs, 9-10:30 pm, concert. Thurs, 11:45-1:30 am, midnight frolic. Central.

WLAG, Minneapolis and St. Paul, Minn. 417 meters. 500 watts. Cutting & Wash. Radio Corp. Slogan, "The Twin City Radio Central in the land of Ten Thousand Lakes." Clubs, "Tooth Brush," "Postcard." Daily ex Sun, 9:30 am, 9:40, 10, 10:30, 10:45, 11:30, 11:35, 2 pm, 2:30, 2:40, 4, 4:30, 6, 7:30, 9:15, markets, lectures, music; 5:30-6 pm, children's program. Mon, Tues, Thurs, 6:15-7 pm, music. Wed, Fri, Sat, 9:30 pm, music. Sat, 11-12:30 am, music. Sun, 10:30 am, 3:30 pm, 7:45, church services. Central.

WLAH, Syracuse, N. Y. 234 meters. 100 watts. Samuel Woodworth. No regular schedule.

WLAK, Bellows Falls, Vt. 360 meters. 100 watts. Vermont Farm Machina Co. Daily, 9-11 pm. Eastern.

WLAL, Tulsa, Okla. 360 meters. 100 watts. Naylor Elec. Co. Wed, Fri, 8 pm, music. Sat, 6:45 pm, Bible class. Sun, 11 am, 7:30 pm, church services. Central.

WLAP, Louisville, Ky. 360 meters. 20 watts. W. V. Jordan. Tues, Fri, 9:20-10 pm. Central.

WLQA, Kalamazoo, Mich. 283 meters. 10 watts. Arthur E. Schilling. Daily ex Sun, 11:30-12:30 pm, Thurs, 10:30-12:30 pm, Sun, 2:30-5 pm. Central.

WLAV, Pensacola, Fla. 254 meters. 15 watts. Elec. Shop, Inc. Daily Mon, Tues, Fri, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. 360 meters. 500 watts. New York Police Dept.

WLAX, Greencastle, Ind. 231 meters. 100 watts. Greencastle Community Broadcasting Station. (Putnam Elec. Co.). Tues, 7:30 pm; Thurs, 7:30. Sun, 7:45 pm, church services. Central.

WLB, Minneapolis, Minn. 360 meters. 20 watts. U. of Minn. Dept. of Elec. Eng.

WLW, Cincinnati, O. 309 meters. 500 watts. Crosley Radio Corp. Daily ex Sun, 10:30 am, 1:30 pm; daily ex Sat, Sun, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music. Sun, 9:30 am, S. S. services; 11, 7:45 pm, church services. Central.

WMAQ, Cazenovia, N. Y. 261 meters. 200 watts. C. B. Meredith. No definite schedule.

WMAF, Dartmouth, Mass. 360 meters. 500 watts. Round Hills Radio Corp. Slogan, "The Voice from May Down East." Temporarily discontinued.

WMAL, Lincoln, Neb. 254 meters. 100 watts. General Supply Co. Club "Lincoln Hot Oris." Mon, Thurs, 9-10:30 pm, music. Sun, 7:30-9 pm, church services. Central.

WMAJ, Kansas City, Mo. 275 meters. 250 watts. Kansas City Daily Drocers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Sat, 8-9 pm, music. Central.

WMAK, Lockport, N. Y. 360 meters. 500 watts. Norton Labs. Daily ex Sun, 11 am, weather, farm reports. Tues, 8-9 pm, music. Eastern.

WMAJ, Trenton, N. J. 256 meters. 50 watts. Trenton Hdwe. Co. Slogan, "The Home of Good Music." Mon, Thurs, 7:30-9 pm, music, lectures. Eastern.

WMAN, Columbus, O. 256 meters. 100 watts. First Baptist Church. Sun, 10:30-12 m, 7:30-9 pm, church services. Eastern.

WMAP, Easton, Pa. 246 meters. 150 watts. Utility Battery Service Co. Irregular schedule. Eastern.

WMAQ, Chicago, Ill. 448 meters. 500 watts. The Chicago Daily News. Daily ex Sun, Mon, 7-8 pm, 9-10. Daily ex Sat, Sun, 4:30-5 pm, Wed, 1-2 pm, Ann. of Commerce Luncheon. Tues, Thurs, 2:35-3. Central.

WMAV, Auburn, Ala. 250 meters. 500 watts. Ala. Polytechnic Institute. Thursday, 8 pm, music; Sat, 8 pm, lectures. Central.

WMAW, Wahpeton, N. D. 254 meters. 50 watts. Wahpeton Elec. Co. Temporarily closed.

WMAV, St. Louis, Mo. 280 meters. 100 watts. Kingshighway Presbyterian Church. Slogan, "May Every By-Way Hear Kinghighway." Sun, 11 am, 8 pm, Tues, 7-8 pm, church services; Sun, 3 pm, Bible class. Central.

WMAZ, Macon, Ga. 268 meters. 50 watts. Mercer University.

WMC, Memphis, Tenn. 500 meters. 500 watts. The Commercial Appeal. Slogan, "Station WMC, Memphis." "Down in Dixie." Club, "Midnight Frolic." Daily ex Sun, 9:45 am, 12 m, 3 pm, weather, markets. Daily ex Sun, Wed, 8:30 pm, program. Tues, Fri, 11 pm, Midnight Frolic. Central.

WMU, Washington, D. C. 261 meters. 50 watts. Doubleday-Hill Elec. Co. Temporarily discontinued.

WMB, Boston, Mass. 273 meters. 100 watts. Shepard Stores, Inc. Slogan, "The Home of Good Music." Wed, Fri, 6-8 pm, Sun, 11-12 m, church services; 3-4 pm, concert; 7:30-9:30, church and concert. Eastern.

WNAO, Norman, Okla. 360 meters. 50 watts. Univ. of Okla. Daily ex Sat, Sun, 10-10:30, news. Mon, Wed, Sun, 9-10 pm, program. Central.

WNAL, Omaha, Neb. 266 meters. 20 watts. R. J. Rockwell. Temporarily off air.

WNAN, Syracuse, N. Y. 286 meters. 100 watts. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30 pm, concert, agriograms, etc. Eastern.

WNAP, Springfield, O. 275 meters. 100 watts. Wittenberg College. Fri, evenings, lectures by faculty, music.

WNAQ, Charleston, S. C. 360 meters. 10 watts. Charleston Radio Elec. Co.

WNAR, Butler, Mo. 231 meters. 20 watts. C. C. Rhodes. Fri, 9 pm; Sun, 11 am, 7:30 pm. Central.

WNAS, Austin, Tex. 360 meters. 100 watts. Tex. Radio Corp. (Austin Statesman).

WNAT, Philadelphia, Pa. 360 meters. 250 watts. Lenox Bros. Co. Irregular schedule. Eastern.

WNVA, Knoxville, Tenn. 236 meters. 500 watts. People's Tel. & Tel. Co. Temporarily discontinued.

WNAW, Fortness Monroe, Va. 360 meters. 5 watts. Henry Kunzmann. Sun, 2-4 pm, 7-9. Eastern.

WNAX, Yankton, S. D. 244 meters. 100 watts. Dakota Radio Apparatus Co. Daily, 11:30 am, reports; 4:30 pm, reports, music. Wed, Sat, 9-10 pm, music. Central.

WNI, Albany, N. Y. 380 meters. 55 watts. Shotton Radio Mfg. Co., Inc. Wed, 8:15 pm, concert. Eastern.

WOAC, Lima, O. 266 meters. 50 watts. Page Organ Co. (H. P. Maus).

WOAO, Skourney, Ia. 360 meters. 20 watts. Friday Battery & Elec. Corp. Friday evening program.

WOAE, Fremont, Neb. 360 meters. 20 watts. Midland College.

WOAF, Tyler, Tex. 360 meters. 100 watts. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 8 pm, weather, sports, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. 273 meters. 200 watts. Apollo Theater. Fri, 5:30-6:30 pm. Central.

WOAH, Charleston, S. C. 360 meters. 100 watts. Palmetto Radio Corp. Mon, Thurs, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAL, San Antonio, Tex. 385 meters. 500 watts. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 6:15, news, markets. Tues, 9:30-10:30 pm, concert, Thurs, 7:30-8:30 pm, concert. Sun, 11 am, church services; 9:30-10:30 pm, concert. Central.

WOAN, Lawrenceburg, Tenn. 360 meters. 200 watts. James D. Vaughan. Daily ex Sat, Sun, 8:30-9:30 pm. Eastern.

WOAO, Mishawaka, Ind. 360 meters. 50 watts. Lyra-dion Mfg. Co. Irregular schedule.

WOAP, Kalamazoo, Mich. 283 meters. 50 watts. Kal-

amazon Colleg., Slogan, "The Old College in the New." Tues, 7:30-8:15 pm. Central.

WOAR, Koshua, Wis. 253 meters. 100 watts. H. P. Lund-k w. Wed, 7 pm, 8:30, 6 pm. Central.

WOAT, Wilmington, D. I. 260 meters. 50 watts. Boyd Starrall Han P. Temporarily discontinued.

WOAV, Erie, Pa. 242 meters. 100 watts. Pennsylvania National Guard. Slogan, "Wayne Rangers. Club." "Never-sleep Club." Tues, 8-11 am, 8-9 pm, Sun, 9:30 pm, music. Sun, 1-4 am, 31-man's matinee. Sun, 10:30 am, 7:45 pm, church services. Eastern.

WOAW, Omaha, Neb. 526 meters. 500 watts. Woodmen of the World. Slogan, "Gateway to the West and to the East." Mon, Tues, Thurs, Fri, Sat, 6-7:30 pm, 9-11, concert. Sun, 9-11 am, 6-7 pm, 9-11. Central.

WOAX, Trenton, N. J. 240 meters. 500 watts. F. J. Wolff. Intermittent schedule.

WOC, Davenport, Ia. 484 meters. 500 watts. Palmer School of Chiropractic. Slogan, "Where the West Begins and in the State Where the Tail Corn Grows." Daily ex Sun, Tues night, 10 am, markets, 10:55, time; 11, weather; 12 m, chimes, 2 pm, markets; (Sat, 12:30), 2:30, talk; 5:45, chimes, ex Wed, 6:30, Sandman, 6:50, scores, weather. Mon, 10 pm, concert. Sat, 9 pm, concert. Thurs, 7 pm, orchestra. Mon, Wed, Fri, 8 pm, music. Sun 9 am, chimes; 1:30 pm, orchestra; 7, organ; 7:30, sports; 8, church services; 9, concert. Tues, silent. Central.

WOL, Ames, Ia. 360 meters. 100 watts. Iowa State College. Daily ex Sun, 9 am, 9:45, 10, 15, market, weather, reports; 12:45 pm, markets, weather, educational talks; 9:30, weather, music. Central.

WOO, Philadelphia, Pa. 509 meters. 500 watts. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 11:55, time, 12-1 pm, concert, 4:45 pm, organ recital; 5, sports, police reports; 9:55, time; 10:02, weather. Mon, Wed, Fri, 7:30-11 pm, music, concert. Eastern.

WOQ, Kansas City, Mo. 360 meters. 500 watts. West-ern Radio Co. Daily ex Sun, 11, music, time & news. Tues, Thurs, Sat, 8-9:30, music. Sun, 11 am-1, 15 pm, 7-7:45, church services. Central.

WOR, Newark, N. J. 405 meters. 500 watts. L. Ham-berger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks, Mon, Wed, Sat, 8-11 pm, music, entertainment, lectures. Eastern.

WOS, Jefferson City, Mo. 411 meters. 500 watts. Missouri State Marketing Bureau. Slogan, "Watch O State." Daily ex Sun, at least 15 min. of every hr. from 8 am-2 pm, markets. Daily ex Sat, Sun, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Sun, 7:30-8:30 pm, church service. Central.

WPAB, State College, Pa. 283 meters. 500 watts. 1 State College. Mon, Wed, Fri, 8-9:30 pm. Eastern.

WPAC, Okmulgee, Okla. 360 meters. 200 watts. Davidson Radio Co.

WPAJ, New Haven, Conn. 268 meters. 30 watts. D. Little Radio Corp.

WPAK, Fargo, N. Dak. 360 meters. 100 watts. Ne Dakota Agricultural College. Daily, 10 am, weather. Mon, Wed, Fri, 7:30-8:15 pm, music, lecture, dress. Central.

WPAL, Columbus, O. 286 meters. 100 watts. Avery Radio Co. Eastern.

WPAM, Topeka, Kan. 360 meters. 100 watts. A. bach & Guetell. Daily ex Sun, 1 pm, markets; V 9:30-10:30 pm; Sat, 8-9 pm, music. Central.

WPAQ, Frostburg, Md. 360 meters. 10 watts. Gen. Sales & Engineering Co.

WPAR, Beloit, Kansas. 236 meters. 100 watts. W. Battery & Radio Co. Sun, 8 am, 11 pm. Central.

WPAT, El Paso, Tex. 360 meters. 20 watts. S. Patrick's Cathedral. Temporarily discontinued.

WPAU, Moorhead, Minn. 360 meters. 20 watts. Moorhead College.

WPBZ, Chester, W. Va. 273 meters. 20 watts. Radio Shop. Mon, Wed, 7-8 pm, Fri, 7:30-8:30 pm. Sun, 3-4:15 pm. Eastern.

WQAA, Parkersburg, Pa. 360 meters. 500 watts. H. A. Beale, Jr. Temporarily discontinued.

WQAC, Amarillo, Tex. 234 meters. 100 watts. E. Gish. Irregular schedule.

WQAO, Waterbury, Conn. 242 meters. 50 watts. Whitall Elec. Co. Mon, Wed, Fri, 5:30-6:45 pm, music. See Scout news. Eastern.

WQAE, Springfield, Vt. 275 meters. 50 watts. J. Radio News Station. Slogan, "Among the Green Hills of Vermont." Sat, 7:30-8 pm, 11-1 am, 8-9, 8:40-9:30 pm, address. Eastern.

WQAF, Sandusky, O. 240 meters. 5 watts. Sand-sky Register. Daily, 10:30 pm, weather.

WQAL, Mtstoon, Ill. 265 meters. 10 watts. Colks County Tel. &

Radio

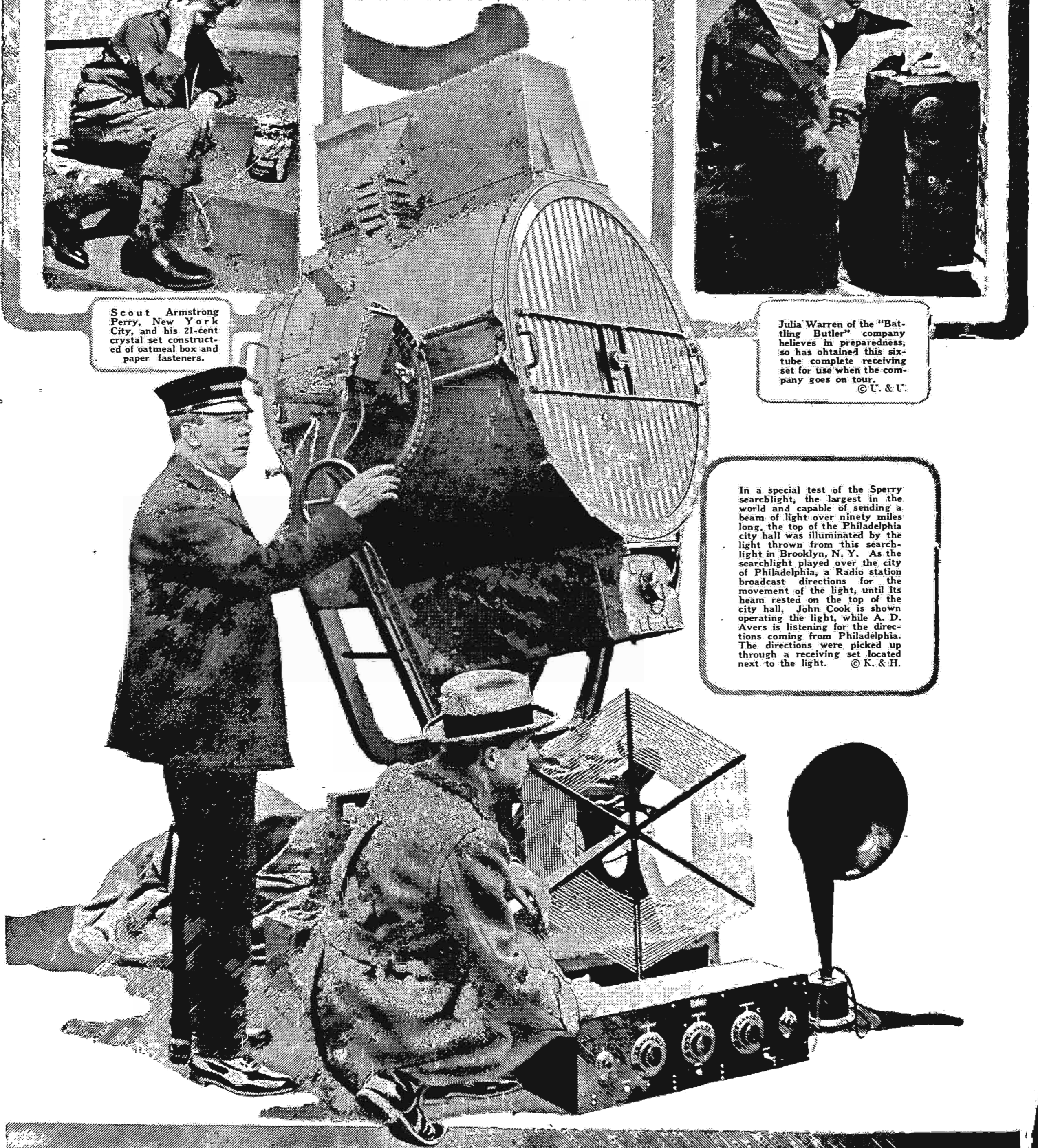
Illustrated



Scout Armstrong Perry, New York City, and his 21-cent crystal set constructed of oatmeal box and paper fasteners.



Julia Warren of the "Battling Butler" company believes in preparedness, so has obtained this six-tube complete receiving set for use when the company goes on tour. © U. & U.



In a special test of the Sperry searchlight, the largest in the world and capable of sending a beam of light over ninety miles long, the top of the Philadelphia city hall was illuminated by the light thrown from this searchlight in Brooklyn, N. Y. As the searchlight played over the city of Philadelphia, a Radio station broadcast directions for the movement of the light, until its beam rested on the top of the city hall. John Cook is shown operating the light, while A. D. Avers is listening for the directions coming from Philadelphia. The directions were picked up through a receiving set located next to the light. © K. & H.