

Radio Digest

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

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

Vol. VIII

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SATURDAY, MARCH 22, 1924

No. 11

HAIL "KING TELEPHONE"

SEPARATE CODES IN WAVE TANGLE

NEW INSTRUMENT ADDS TO SECURITY POSSIBILITIES

Receives Any Number of Lengths on
One Aerial and One
Receiver

BIRMINGHAM, ENGLAND.—One of the great outstanding problems of radio telephony appears to have been solved by a new device of which a demonstration was given recently near here.

The device is a new type of aerial and one of its features is that of lengths of different wavelengths, hitherto regarded as impossible, can be applied to any radio receiver. The demonstration was a perfect success in the presence of Mr. Lefroy of the air ministry, and Dr. Hoff, representing Dr. Braydon of the experimental signals department of the war office.

Use on Secret Messages Possible
London and Birmingham, London and Bournemouth and Bournemouth and Birmingham were heard simultaneously, and in various combinations, on a loud speaker. All the signals came through in perfect strength and distinctness. Individual stations were tuned out and in with the greatest ease.

(Continued on page 2)



A. T. & T. AIR GRAB CALLED MONOPOLISTIC

Attempt to Close "Unlicensed"
Stations Greeted by Storm
of Radiophan Contempt

Would Dictate Religious

Telephone and Telegraph company, control of the air are being brooked. Not content with holding a tin can to the public to pay for its program under the guise of the Radio-Music Fund



Peggy Joyce (top), who was heard recently from WJAX, Cleveland, when the entire first act from the "Vanities of 1924" was broadcast. The "Vanities" and Peggy were also heard some time ago from WOR, Newark. Amy Frank (left), is another charming member of the "Vanities" cast heard at WJAX.



The charming young lady (above) is conductor of the Whitcomb Hotel Orchestra, which was heard recently from Station KPO, Hale Bros., San Francisco. Bushnell Photo

R. C. A. Suits Ready for Trial This Summer

Charges, Almost Year Old, Involve
Neutrodyne

NEW YORK CITY.—Suit filed in August, 1923, by the Radio Corporation of America and others against F. A. D. Andrea, Inc., probably will be tried late in June, 1924, according to attorneys here for the defense, which holds a license in the Independent Radio Manufacturers, Inc., under Hazeline's patent and trademarks covering the neutrodyne receiver.

The suit involves two patents, that owned by the General Electric company, issued March 18, 1920, to C. W. Rice, and that owned by the American Telephone and Telegraph company, issued May 23, 1916, to Hartley.

—not satisfied with permission to use four times as much power as that allowed any other broadcasting station in the United States—this great commercial octopus now seeks to grasp competing stations in its legal tentacles and choke them off the air! "King Telephone" aspires, it is claimed, to control religion, education and politics via the ether, and unless a vehement public rises

(Continued on page 2)

RELIGION A LA "KING TELEPHONE"

(Continued from page 1)
in self defense, the A. T. & T. company will succeed in its aspirations.

The telephone company has begun action against Station WHN, whose "Voice of the Great White Way" has been putting Broadway's best into millions of homes nightly, while WEAJ rolled forth its talks and lectures, sopranos and baritones, most of which were but a thin layer of "editorial matter," designed to cover a program of advertising, bought and heavily paid for.

If the Bell company, here called "King Telephone," wins the legal action against WHN, there is nothing to prevent the "King" from closing down 484 other independent broadcasters.

"King Telephone" Admits His Goal
While awaiting further developments in the case, consider the statement of chief patent counsel for the A. T. & T. When asked if his company's action would not make for monopoly of the air, he replied: "Certainly. That's what patents are for."

So in a nutshell the story is told. "King Telephone" has acquired patents, eighteen of which are very important to broadcasting stations. How these patents were acquired will make interesting reading. But back to the point. Unless "licensed" by "King Telephone" to use these patents, a station is subject to suit. WHN was not licensed. Neither are 484 other stations.

What the "License" Is

What is this "license"? It is a form of permit to build and use a broadcasting station embodying one or all of the eighteen patents it lists. The "license" however reserves all important rights to "King Telephone."

Toll (revenue producing) broadcasting must not be touched; the power of licensed station must not be over 500 watts (the government allows 1,000 watts); replacement parts must be bought from "King Telephone"; the licensee must not use or permit the use of his station except for his own business (not even his friend's); reception or transmission of messages for the public is barred; the licensee cannot sell, lease or otherwise dispose of his station or any of its parts without first getting written permission from "King Telephone"; and to cap the climax, the licensee must agree never to allow any other station to interfere with the service of "King Telephone."

...broadcaster who is as ever been offered a license when he heard the terms, the phone company asks \$2,000 a year for a 500-watt station license, and gets but a nickel's worth of paper. Why buy one?

The rate expressed by this broadcaster is true. Sly and scheming old "King Telephone" demands \$2,000 a year for "licensing" a 500-watt plant. While President Thayer of the A. T. & T. didn't name the exact tribute, it is believed to be proportionate for all so-called "outlaw" stations, that is, \$4 each year for every antenna watt power of the equipment.

The conditions and reservations listed above as a part of the "license" are also a part of the sales contract made by "King Telephone" when he sells a 500-watt Western Electric broadcasting station. So his customers get not one inch more latitude.

Annual Tribute for "Outlaws"

The "King's" 500-watt transmitter sells for \$14,000, packed in boxes and ready to ship. Allowing ten percent as a fair profit on such manufacture, the profit should be \$1,400. The profit is made once, not every year.

The profit is what "King Telephone" loses when a broadcaster builds his own station. (However, he uses numerous of "King Telephone's" parts, bought from the "King" with the "King's" profit attached, of course.) So "King Telephone" has lost \$1,400; let us say, on an "outlaw" 500-watt station.

INVENT SECRET WAVES

(Continued from page 1)

est ease and facility, and the strength of reception was varied at will from almost a whisper to the maximum.

The adaptation of the discovery to the transmission of secret government or commercial messages is expected. If four different wave lengths were decided on the first word could be transmitted on a wave length of, say, 250 meters, the second on 450, the third on 650, and the fourth on 850.

Only a person in possession of an instrument fitted with this device could possibly interpret such a message. If by accident he hit on one wave length he could receive only such fractions of the message as happened to come through on that particular wave length.

Then, would it be fair to ask \$2,000 each year from the "outlaw" when an equivalent station built by the "King" pays less than this profit but once?

President Thayer of the A. T. & T. has made no statement regarding this part of the monopoly story.

Hoover Takes Stand on Question

Inasmuch as the latest suit indicates a complete monopoly of broadcasting information, and as the public is protected against such monopoly by the White Radio bill, now before Congress, and by the Federal Trade commission, empowered by the Sherman anti-trust law (once applied to the Standard Oil company), Secretary of Commerce Hoover was sought out. What was his view on the subject?

If Secretary of Commerce Herbert Hoover is held by the citizens of this country to his stand, given after several days consideration of "King Telephone's" latest, Hoover may be entitled to wear the crown of Czar of Radio which the White bill authorizes. If Secretary Hoover betrays or has betrayed the great army of Radiophans, he should not be given more power than he already has. His stand, given Radio Digest is:

Compares to Monopolized Press

"While it is impossible for me to express any opinion on any particular issues that are before the courts, or Federal Trade commission, I can state emphatically, that it would be most unfortunate for the people of this country to whom broadcasting has become an important incident of life, if its control should come into the hands of any single corporation.

individual or combination."

Secretary Hoover continued, "It would be in principle the same as though the entire press of the country was so controlled.

"The effect would be identical, whether this control arose under a patent monopoly, or under any form of combination, and from a standpoint of the people's interest, the question of whether or not the broadcasting is for profit, is immaterial.

Hoover Statement Shows Hope

"In the licensing system, put in force in this department (commerce), the life of broadcasting licenses is limited to three months, so that no vested right can be obtained either in a wave length or a license.

"I believe it is safe to say, irrespective of claims under patent rights on apparatus, that broadcasting will not cease and neither will our public policy allow it to become monopolized."

The high power (4,000 watts) employed by the station, WEAJ, of "King Telephone" remains to be explained by the Department of Commerce, however. Its use for experimental purposes when no one else was on the air, may be justified, but not when other New York broadcasters are on the air. Revenue need not be charged, either, for technical experimental purposes, although WEAJ violates both these ethics.

Who Authorized Class D and Why?

"King Telephone" is charged with having quietly gone to Washington and secured another special privilege, that of using high power to the exclusion of all other stations outside the combine. On May 1, 1923, this doministic company was

given the plun necessary to completely dominate and control the air.

The plun appeared in the form of an order from Secretary of Commerce Hoover which notified that after this date (May 1, 1923) there would be in existence Class D, or "broadcast improvement" class. The phraseology of this order is so subtle as to be worthy of quotation and remembrance by radiophans when they swelter, perhaps, under the oppression of "King Telephone":

"Class D Broadcast Improvement. Such stations are to be used for the development of and the improvement of broadcasting and to have adequate laboratories and manufacturing facilities and personnel with sufficient training and experience to insure the best obtainable qualities in broadcasting."

The Secretary of Commerce signed the order. Independent leaders are wondering whether he was hoodwinked or—

"King Telephone" Would Guide Our Religion

A statement by George Shubel, Station WHN, charges "King Telephone" with having taken over the divine right of dictating whether Catholic, Jewish, Protestant or other faith shall be the creed of broadcasting. His statement asks:

"Is the Telephone Trust or one of its officials to have a like say in regard to the political, educational and musical life of our country?"

"Are the people ready to let their spiritual welfare as well as their education and politics become gradually controlled in its expression by one gigantic Radio Trust?"

Mr. Shubel continues, "The Telephone Monopoly has already made its first move for the elimination of independent broadcasting stations not under THE CONTROL."

The attempt which the American Telephone and Telegraph monopoly has now started in the courts to close down independent broadcasting stations is an issue directed not against independent broadcasting stations, not against business as business, but involves the inviolate right of the American people to control the medium for its religious, educational and political expression."

How A. T. & T. Refuses Leases on Lines

Grover Whalen, commissioner of plants and

to acquire a m. is ready to "fight to the end" of aldermen and the support him in his fight and have an expenditure of \$50,000 for

Commissioner Whalen is to be acclaimed for his painstaking survey of the situation, fairness and judgment in fighting what he foresaw. He says:

"A successful broadcasting station must employ at times the use of telephone lines to broadcast from points distant from the transmitting station. This is technically known as remote control. The Telephone company has adopted the broad policy of saying 'You may lease our telephone lines if you use our station for toll or hire, but if you use any other broadcasting station, you cannot lease our lines.' Thus this doministic member of this combine by these special concessions of toll service, advertising, increased power and remote control is enabled to control and maintain a monopoly of the air, dictating that no other station shall collect toll, shall advertise, shall use high power or shall augment their service by the use of telephone lines.

"King Telephone" Self-Appointed Ruler

"If this is not a monopoly in Radio broadcasting, governed by a self-appointed private corporation, acting and ruling in lieu of the government, even more menacing and more detrimental in its effects on the public and future Radio development than the monopoly of commercial Radio communication and the restraint in the manufacture and distribution of Radio apparatus, then we say, wherein lies the element of free and unrestrained competition?"

"There is no question that this new field is being exploited for the personal gain of the Telephone company. If we can take as a criterion the past methods and tactics pursued by this company thus far, and apply them to the future, the Radio industry will be regulated, controlled and hamstringing in its very infancy."

And in the meanwhile, what is said by President Thayer of the American Telephone and Telegraph company, owner of 98 percent of the Western Electric company, owner of the National System of long distance lines, stockholder in The Associated Telephone companies serving 10,400,000 telephone stations, stockholder in The Bell Telephone company of Canada, 50 percent stockholder of the company which operates telephone cables between Florida and Cuba, and owner of all the stock of the Bell Telephone Securities company? Yes, what is said?

President Thayer says, "We have no desire for a monopoly of the air."

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Looking Ahead

"What's Wrong with Your Receiving Set" by Peter J. M. Clute is being commended by thousands of fans as a real helping hand. Mr. Clute will tell next week's readers how to tune a set to cut out interference. His diagnosis of set troubles is so clear we are tempted to call him "Doc."

Everyday Terms for Radio Energy will be the next of the "Thirty-Minute A-B-C Lessons for Radio Beginners" by P. E. Edelman. We need say nothing, if you but turn to page 11 and read his first article: You won't need a glossary of technical terms to learn Radio from Mr. Edelman.

Super-Heterodynes on One Hand, and More "Super-Hets" on Another—There are many different varieties. H. J. Marx is considering each of the late designs, placing emphasis on their respective advantages and disadvantages. Next week he will show two more "Super-hets."

More Wave Traps by the Mystery Man—BUILT one yet? When built and operated according to the instructions of the inventor of King Mileplex, you can cut out interference when it's as thick as smoke from a Pittsburgh stogie. Read the informative data to be given next issue.

Reflex Set Builders and Owners will like M. W. Thompson's next contribution. He will consider the various popular and more common reflex hook-ups.

A Flewelling Super Using a Split Variometer—The Higgins adaption of the popular Flivver Super will attract many Flewelling fans. Read about it next issue.

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WHITE'S BILL GETS CONGRESS HEARING

GIVES COMMERCE CHIEF EXCESSIVE POWER

Issue, if Passed, Repeals 1912 Law—Sponsor Explains "Trust" at Monopolies

WASHINGTON, D. C.—After months of conferences with government officials, Representative White of Maine has introduced his revised Radio bill. The bill confers upon the Secretary of Commerce what many Radio leaders believe is entirely too great a control over the Radio industry in general, and is said to be drawn to take care of the Radio situation as it exists today.

The bill has been referred to the house committee on merchant marine and fisheries and will be in direct charge of Representative White, who is chairman of the sub-committee on Radio. Mr. White planned first hearings on the bill March 11. In connection with the introduction of the bill Mr. White issued a very complete statement explaining the purposes and details of the bill.

White Explains Bill

"The need for legislation has been long recognized by all familiar with Radio communication," said Mr. White. "The bill introduced in the last congress by me was sponsored by a Radio conference called by Secretary Hoover, and was generally approved by the fans. It was unanimously reported by the merchant that body, but was not considered in the senate.

"The bill just introduced has had most careful consideration and is believed to fully meet the present needs for legislation. If passed it will repeal the existing 1912 law and will become the basic legislation on this subject.

"The bill confers upon the Secretary of Commerce broad and general powers of regulation and control over transmitting stations, all to be exercised for the primary purpose of reducing interference to a minimum and for the development of an orderly system of communication.

Improvement in Law Cited

"It is believed the bill just introduced clarifies certain ambiguities in the existing 1912 law and it adds a number of provisions of importance. The new sections assert jurisdiction of the government over Radio stations in the District of Columbia as well as in the United States, between the states and foreign countries, and they require all transmitting stations operating in the District of Columbia or any territory of the United States, or between the states or between any state and any foreign country, to be licensed by the Secretary of Commerce.

"The sections also authorize the classification of licensed stations, control over the nature of the service to be rendered by them, the allocation of wave lengths to such stations, and the imposing of restrictions and conditions designed to prevent interference; they declare the right of the President to close or to take over any stations in time of war or other disaster; they provide that station licenses shall not be issued to aliens; they provide for the licensing of operators and for the suspension and revocation of licenses of both operators and of station.

"It is specifically provided the licenses shall not be required of government stations, or of operators therein.

Sets Time Limit on Licenses

"The bill fixes the time for which a license may be granted. Under existing law there is no limitation upon the authority of the Secretary of Commerce in this regard. If so disposed he might grant a license for a thousand years.

"The bill also provides for an advisory committee of fifteen members, to whom the Secretary of Commerce may refer for examination and report problems arising in Radio and relating to the laws and treaties of the United States and regulations thereunder.

(Continued on page 6)

FRENCH STAR HERE HAILS U. S. BY RADIO

NEWARK, N. J.—Mme. Georgette Leblanc, French actress, singer and cinema star, whose work has been coupled with that of the immortal Sarah Bernhardt, made her American Radio debut at WOR here recently. The celebrated artist had previously broadcast in Paris. Mme. Leblanc's concert included a talk on her professional work and the rendition of several songs which have been lauded by American critics.

550,000 NEW FANS IN BRITAIN IN YEAR

LONDON.—Great Britain has about 680,000 licensed listeners in, compared with only 30,000 a year ago. This year manufacturers expect a large increase in their business. About 255,000 individuals who first took out temporary licenses were later given constructor's licenses, which are permits to build sets. This type of license seems popular, as between 32,000 and 75,000 per month were issued toward the close of 1923.

BARGAIN COUNTER SET WORKS



Does she look tickled? She does, and she has some reason to be. A crystal bought for ten cents, a condenser that cost five, and three cents' worth of safety pins and cardboard compose the set, and—she made it herself. The clever lady is Mrs. Helen Frey of Washington, D. C. Photo by United.

Moving Auto Amplifies Concert for Pedestrians

CINCINNATI.—Broadcast reception from a moving automobile was a feature of the recent automobile show held in this

city. Music of the great new pipe organ in Music Hall, where the auto show was held, was broadcast by Station WLW, the Crosley Radio corporation, and was made audible to the public through the medium of automobiles equipped with receiving sets and special amplifiers.

AIRWAVE SETS IN TUBERCULAR FIGHT

RADIO PROGRAMS SERVE AS THERAPEUTIC AGENT

Doctor Claims Ether Entertainment Valuable as Recreational Measure

SAN DIEGO, CALIF.—Radio has been adopted here as a specific treatment for bed-ridden tubercular patients and convalescents.

Acting Army Surgeon D. O. N. Lunberg at Camp Kearney is authority for the following statement as to its healing powers:

"A regular schedule of hours was arranged according to what was available on the air, as well as according to hours that best fitted in with the regime of the patients. The schedule since its inauguration has not failed in a single instance of being carried out in accordance with the same as published. Radio in a hospital of this sort should prove to be a therapeutic agent under the class of occupational therapy or as a simple recreational measure."

Radio Program Therapeutic Agent

"In tuberculosis we have to diminish the fatigue point to the lowest possible minimum while undergoing treatment. Under proper medical restrictions our central station can be counted upon to be of great value to the patient from many angles. The medical staff of this hospital is glad to have Radio at this hospital serve such a useful purpose."

"This practical application of the therapeutic properties of Radio was made possible through a unique installation by an electric company of this city. The community service, an organization which looks after the recreational needs of the army men at Camp Kearney, financed the project with money raised by a benefit performance of "Iolanthe."

All Patients May Plug In

Over 9,000 feet of wire was required to equip the various wards in the hospital. The connections are made so that anyone or all of the patients may plug in headphones and listen to broadcasts as picked up and amplified by the master receiving station.

"This powerful receiver makes audible to the 140 or more patients, programs from major broadcasting stations in the west, and—sometimes—Chicago stations nearly 2,000 miles away. Two army electricians, acting as operators, give freely of their "off duty" time in the interests of the maintenance of the Radio schedule."

Gives R.C.A. 30 Days More for "Trust" Reply

Federal Trade Board Grants Request for Additional Time

WASHINGTON, D. C.—The Federal Trade commission has granted the petition of the Radio Corporation of America and other respondents in the commission's case in connection with an alleged monopoly for a thirty-day extension in which to answer the trade commission's complaint.

As the matter now stands the Radio Corporation, the American Telephone and Telegraph company and the other respondents must have their answers in the hands of the trade commission not later than March 26.

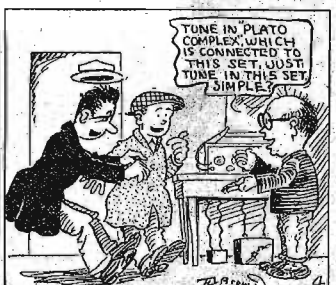
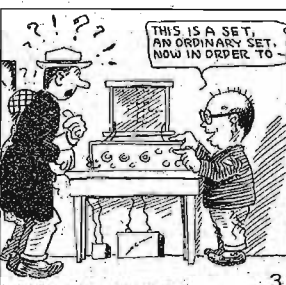
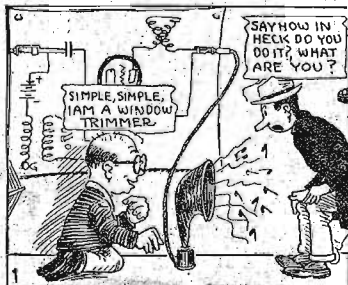
High School Typists Pick Their Lessons Out of Air

KANSAS CITY.—Radio is being used to an advantage by the typewriting classes of Central high school here. It has become an integral part of the course in typewriting. Each night students in typing are required to listen in at home and copy in shorthand the addresses from WDAF, the Kansas City Star. They then transcribe them the following day at school.

THE ANTENNA BROTHERS

Spir L. and Lew P.

No. 3—Easy If You Know How



CHIEF WHALEN CHARGES USE OF BIG STICK

Gotham Commissioner Alleges
Monopoly of Air Over
Manhattan Isle

Rips Into A. T. & T. Plant

Hoover May Be Called In to Explain Peculiarities of New York Situation

NEW YORK.—That Station WEAF, the American Telephone and Telegraph company's broadcasting station here, had taken complete control of the air around Manhattan Island, was the sweeping charge made recently by Commissioner of Plant and Structures Grover A. Whalen when he appeared before the Board of Estimate in connection with the proposed New York city broadcasting plant.

Other charges made by the commissioner were that the Bell company had constantly attempted to embarrass the city officials in their efforts to get on the air, that WEAF tried to tell city officials what and how they could broadcast and, finally, that WEAF drew up the country's Radio rules for Washington to "approve."

Commissioner Whalen was angry—in fact, he radiated anger—and when he outlined his difficulties in getting Gotham a first-class Radio plant his soreness on this point is readily understood.

Blames Phone Company for Blocking Station

"Two years ago we planned to place a broadcasting station on the Municipal building," he stated, "and arranged with the Western Electric company for its installation, but ever since the initial negotiations were started the telephone company has constantly attempted to embarrass us in our efforts to get on the air."

"The American Telephone and Telegraph company and its associates, through their ownership of certain Radio patents, are a constant danger to the public interest."

"So complete is the telephone company's monopoly that public officials are not permitted to broadcast talks or lectures until they have been submitted to the company for censorship."

Just why the New York Tuberculosis association should be brought in or have anything to say on what a city commissioner may broadcast is not quite clear, nor does the following statement by a WEAF official make this any easier to understand.

WEAF Leaves Charges Unanswered

William E. Harkness, vice-president in charge of the Radio activities of the A. T. & T. company, declined to discuss some of Mr. Whalen's statements or to answer the commissioner's charges because he, Mr. Harkness, is not a member of his company's legal department. On the Dr. Monaghan incident, Mr. Harkness did have this much to say:

"On all medical subjects we are cooperating with the American Red Cross and the Tuberculosis association. We are getting their suggestions and advice as to subject matter. We ask them to pass on matter to be broadcast. We reserve the right to reject or accept subject matter for broadcasting."

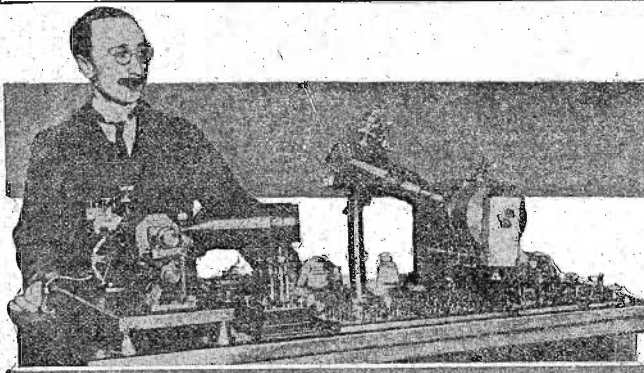
Insists WEAF Rules Government

One part of the commissioner's statement that aroused much comment on the part of those who heard his speech was, "Regulations governing Radio broadcasting are drawn by WEAF officials and invariably are approved by the federal authorities."

Speculations were plentiful around the city as to just what Commissioner Whalen had in mind, and it has been suggested that WEAF's high power was referred to. The A. T. & T. company's plant is licensed as a Class B station and under that license is limited to an antenna output of but 1,000 watts. Yet recently that station has been putting as high as 4,000 watts into its antenna.

True, it has also a Class D experimental

BELINOGRAPH AIDS NEWSPAPER MEN



This photo shows the Belinograph, a device that sends dispatches in facsimile over telephone wires. It is the invention of M. Belin, noted French engineer, who also made the first successful apparatus for transmitting photographs by wire. The apparatus shown is that used by a correspondent in Strasbourg recently to send a news dispatch to Paris. The device is also employed by banks for sending money orders with the authentic signature of the sender. The inventor is standing beside the instrument.

license for experimental work to im-
prove broadcasting. But, does that per-
mit WEAF to transmit its \$400-an-hour
programs with over 1,000 watts in the

air? That seems to give WEAF a
rather unfair advantage over other New
York stations in the fierce competition
for programs now going on.

Jailed Editor Takes His Phones With Him

Ralph King Believes in Listening-
in on World

WAUKEGAN, ILL.—Ralph L. King, as-
sistant city editor of the Daily Sun, who
was sentenced to jail for thirty days for
contempt of court here, when he refused
to tell a grand jury the source of informa-
tion concerning rumors of graft in North
Chicago, which he used in a story, went
to jail to begin serving his sentence with
a Radio set, his typewriter and a doubled
salary while imprisoned.

He declared that he would continue
"business as usual while in jail."

Class of Youngsters Put Outfit in Kewpie Doll

CINCINNATI.—Perhaps the youngest
class in Radio construction in the Middle
West, if not in the United States, is that
of the Lafayette Bloom Junior High
School, this city. Its members, some sixty
boys between the ages of ten and four-
teen years, have built almost every kind
of Radio receiver, from the simplest to the
most complicated, under the direction of
Rankin Jones, Jr., instructor in electricity
at the school.

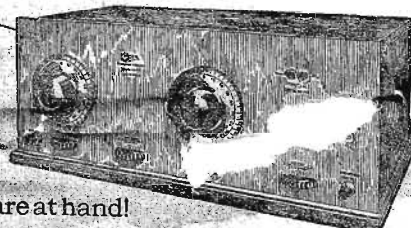
Among the novelties recently produced
by certain members of the class is a crystal
set incorporated in a Kewpie doll. In
this the cat whisker is attached to one of
the doll's hands and the crystal is an or-
nament worn as a pendant hanging about
its neck.

The Ideal Radio Instrument for Your Home



"He who is content,
always has enough."
—Lao Tzu

A Grebe Receiver in
your home will
make your content-
ment complete.



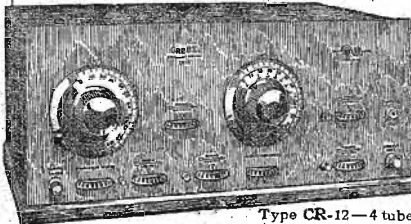
Type CR-14—A 3-tube dry
cell Regenerative
Receiver . . . \$110.00
(Accessories extra)

THE long winter evenings are at hand!
There's an ever-changing program
in the air to gladden each leisure hour.
Tune in on this world of entertainment
with a

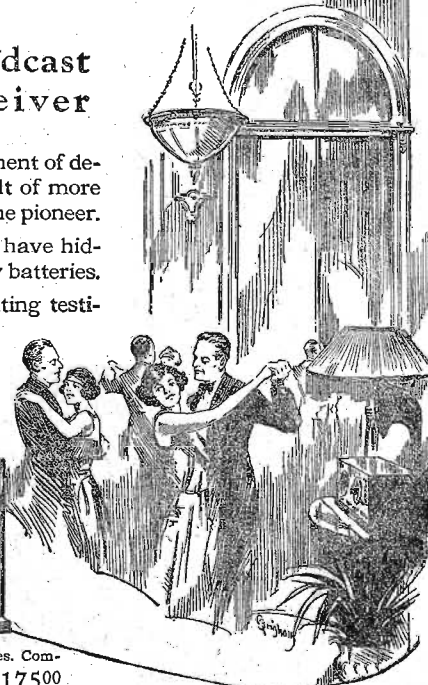
GREBE Broadcast Receiver

Built in two types, each an Instrument of de-
pendability and beauty—the result of more
than ten years of development by the pioneer.
The walnut cabinets, of rich finish, have hid-
den compartments for all necessary batteries.
Each detail of craftsmanship is fitting testi-
mony of the efficiency of these Re-
ceivers. Ask your Dealer—today!

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and Tuned R. F.
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U. S. Pat. No. 1,113,149

BEFORE THEY THOUGHT OF "MIKES"



At the extreme right is Eleanor Poehler, managing director, and above, Paul Johnson, announcer at WLAG, Twin City Radio Central. They were last week's babies. Did you guess right? Right photo Int.



"Coming Events Cast Their Shadow Before." The above coquettish youngster is no other than your old friend—guess! Of course this picture was taken some years before the day of sheiks and we don't know just why reference was made to coming events in connection with sheiks, for the young man was just about four years old when he borrowed the sunbonnet and was snugged. His name? Next week!



The youngster below was born in a state famous for a saying. When? August 24, 1897, but he's married now and has a fine baby girl, Frances Newton. We'll fill the blank next week. Here's another tip. He was overseas in the A. E. F.

Eleanor Poehler, WLAG
IT WAS about the year of After the Ball that a thoughtful providence began preparing for the handling of WLAG by causing Eleanor Poehler to be born Eleanor Nesbitt somewhere within the broadcasting radius of what is now the Twin City Radio Central.
Scarcely had she begun going to school in Minneapolis when she began exercising her talent as managing director of the children on the playground.
On her marriage to W. Poehler she took up the business of managing director to a happy home, a boy who has grown to a feet 4

inches without giving any indication of halting in his mad career.
She took up singing. Somebody told her she would never be a singer and that was what roused her Irish and caused her to become one of the most appealing soprano singers in the Northwest.
It was not, however, until she became program director of WLAG, then "the Call of the North" that Mrs. Poehler learned that she had a true "Radio voice" and could talk to the far corners of the North American continent with the help of a few of the able modulators of the WLAG technical staff and the kindly assistance of some vacuum tubes the size of a quart milk bottle.

Paul Johnson, WLAG
AT THE time Paul Johnson was born all the pianos in the world were playing Hiawatha and the small boys and girls were singing "Oh the lady of the house Had a mouse in her blouse Did she holler, well I guess she did." He was once called James Herbert Paul Johnson and used to write it that way, but has been cutting it off from the front end for several years until now it is plain Paul Johnson.
A discovery was made recently, however, that explains how he comes to have such a voice. When it came to broadcast-

ing football games WLAG looked around for a sport expert with a clear voice and found him in a newspaper man of Minneapolis. The quality of his voice caused comment until it was found that his name was Herbert Paul and now there is a strong school leaning to the theory that any child will have a fine voice if named Herbert Paul.
Johnson himself determined that he would be a medical missionary to the Fiji Islands or somewhere and has been studying medicine at the University of Minnesota in intervals between announcing for WLAG and dealing out shirts in a haberdashery.

Prison Band Wins Sympathy for Men Behind Bleak Gray Walls in Missouri

Seven Thousand Letters of Praise Follow Appearance of Penitentiary Musicians at WOS—Gifts and Even Offers of Jobs Sent to Convicts as Result of Interest Attracted by Orchestra

By E. S. Turner
JEFFERSON CITY, MO.—Much has been told of the joy and innumerable benefits brought countless thousands of persons in all quarters of the earth by the harnessing of the ether; of the loneliness of persons in the far north melted by Radio reception, but even these mighty endowments cannot compare with the effect Radio has had on the lives of men who never see beyond the gray walls of the Missouri state penitentiary here.
A kind-hearted warden and secretary of the prison board have made possible the organization of a prison Radio band, which is permitted to go to the state capitol twice a month to broadcast its selections, many of which are of its own composition, over Station WOS.
Band Pulls 7,000 Letters in Week
As an indication of the popularity of the Missouri prison band is cited the 7,000 letters and postal cards received in a single week following an appearance of the musicians on WOS.
Hundreds of persons throughout the country have become interested in the welfare of prisoners through listening in on the band and as a result have sent numerous gifts in the form of candy, cigars and cigarettes. Others have communicated offers of employment to the various members on their release from prison.
Of course prison rules forbid acknowledgment of the gifts and messages of appreciation, but just the same the enthusiasm that is generated by the interest

shown by the public in their efforts fairly sparkles, prison authorities say.
Asks Pardon for "King of the Ivories"
Henry M. Snodgrass, a St. Louis youth serving four years for robbery, has been crowned "King of the Ivories" by the band members. Snodgrass is pianist of the prison orchestra and is known to thousands of Radiophans by his playing.
The owner of a large, popular summer resort only a few days ago came to Jefferson City to attempt to obtain a parole for the gifted pianist, presenting to the parole board an offer to personally be responsible for Snodgrass. He declared a position awaited the prisoner in the resort orchestra, which would net Snodgrass a handsome salary, but the parole board refused to listen to the plea, contending that prison discipline prevents giving any one class of prisoners special privileges.
Combs Makes Band Easy to Hear
Virgil Combs is leader of the prison band. (Snodgrass is in charge of the orchestra. Credit for making the band the polished organization it is today goes to Combs, all prisoners agree. Before Combs took the band under his tutelage its music was often the target of jeers and taunts because it was not always up to the quality known as pleasing to the ear. Certain prisoners even considered petitioning the prison board to stop the "torment."
Now the band is an entirely different organization, as is indicated by the popularity it has earned through WOS appearances.
Band Prisoners Look to Music
An interview with the members of the band and orchestra disclosed that a majority were looking forward to a musical career when they are released. Not so, however, with Combs, who is to go free in July.
"I'm going back to the farm and spend the rest of my days with the cows and chickens. No bright lights for me," he said.
Sentences of the musicians range from two years to life, and for crimes from larceny to murder.

Doctor Finds His Car, Stolen, In 90 Minutes

CLEVELAND.—Radio was given the credit by Dr. Jesse W. Doubrava, 1380 E. 71st street, for finding his car 90 minutes after it was stolen. He telephoned his loss to Station WTAM. Shortly afterward he was informed a Radiophan had seen his machine where a man had rammed it into a telephone pole. The physician recovered the car.

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The Most Ingenious Variable Air Condenser Ever Conceived
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NEW YORK CITY

WHITE'S BILL GETS CONGRESS HEARING

GIVES COMMERCE CHIEF
EXCESSIVE POWER

Issue, if Passed, Repeals 1912 Law—
Sponsor Explains "Thrust"
at Monopolies

(Continued from page 3)

(It is here to be noted that the advisory committee has no power and need NOT be called into conference unless the Secretary of Commerce so desires. Why Mr. White should provide for such a "John" advisory committee is open to conjecture.—Editor's Note.)

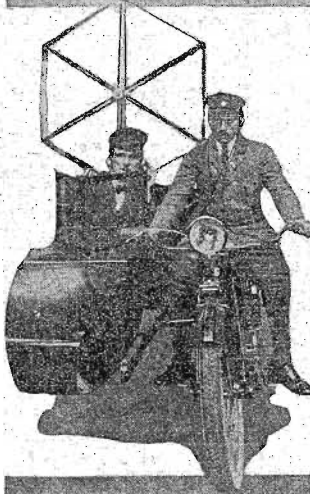
The bill does not require licenses for receiving sets, nor does it attempt to exercise control over them. It does not deal in terms with transmitting amateurs, except that the limitation upon wave lengths and power which can be used by amateurs carried in the 1912 act, is eliminated. Under his general power to allocate wave lengths, the Secretary, freed from the limitation of the old law, may assign to amateurs such wave lengths as the importance of their work may make advisable.

White Gunning for Radio Trust?

The situation developed by the report of the Federal Trade commission made to congress in response to a resolution introduced in the last session by me, is dealt with in various provisions in the new bill. The secretary is directed to refuse a license to any applicant who, in his judgment, is unlawfully monopolizing, or seeking to monopolize Radio communication, either through control of the manufacture, or sale of Radio apparatus, through exclusive traffic arrangements or by other means.

The bill also provides that all laws of the United States relating to monopolies shall apply to the manufacture and sale of, and to trade in Radio apparatus and devices, and to interstate or foreign Radio communication, and that whenever in any proceedings brought under the anti-trust statutes, or before the Federal Trade commission, or any other governmental agency, a licensee shall be found guilty of violation of any provisions of law, that in addition to all other penalties authorized by law, the revocation of the license may be decreed.

SIDECAR RECEIVERS FOR GERMAN POLICE



Germany may be down and out, but she is not behind in Radio and motor equipment. Above is a Berlin cop on his sidecar motorcycle with an operator listening in for orders from headquarters. Photo by Int.

India's Business Men Back High-Powered Broadcaster

BOMBAY, INDIA.—A company with an authorized capital of 30,000,000 rupees has been registered here under the name of the Indian Radio Telegraph company. The board of directors includes some of the most prominent Indian business men. The object of the company is to erect a high-powered Radio telegraph and phone station, with the right of carrying on from such a station commercial telegraph and telephone service with the United Kingdom and other parts of the world.

RADIO TALKS

Every vacuum tube has certain characteristics as shown by its curve called the "Characteristic Curve". This curve shows three points of interest generally showing in this way—low filament or high filament will bring out the points of best detection, and the third point of medium filament will show the best point for maximum amplification. A very rough sketch to be sure but a simple way to keep an idea of the action in ones mind.

E. J. Flewelling

Genuine— E. J. Flewelling Radio Apparatus De Luxe

Have you experimented with reception of KDKA, WGY and KFKX on their 100 meter wavelength? You will be surprised at the volume with which these stations can be received on a three foot rod or an aerial consisting of 10 to 12 feet of wire at the most. At this wavelength you have absolutely no interference from reradiating sets. The Flewelling Tuner has such high efficiency that with proper size coils, it will bring in these stations with astounding clarity when used in conjunction with the Flewelling Condenser or other condenser of equal efficiency.

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BRISTOL SINGLE CONTROL RADIO RECEIVER

(NON REGENERATIVE)

Using Grimes Inverse
Duplex System

ONE CONTROL ONLY Makes It Most Simple to Operate.

SIMPLICITY OF OPERATION is the outstanding feature of this Receiving Set. One Control Dial includes every adjustment. To tune in, turn this Dial. A station once located can always be brought in again at the same setting.

NOT CONFINED TO LOCAL BROADCASTING—this four-tube set has power equal to six. Because the Grimes Inverse Duplex System utilizes the first two tubes for both Radio and Audio Amplification.

ANTENNA OR LOOP—either may be used to suit conditions.

SOLID MAHOGANY CASE with walnut finish encloses the complete Receiving Set. It is a beautiful piece of furniture fully in keeping with the most luxurious room.

—The Price—

Bristol Single Control Radio Receiver

\$190.00

Ask for copy of Bulletin AY-3013 describing this set.

THE BRISTOL CO.
Waterbury, Connecticut

FARMER PROGRAMS, PLAN AT CHICAGO

EVEN ENTERTAINERS TO BE RURAL TALENT

Agricultural Association Official Chosen
as Director for Sears-Roe-
buck Station

CHICAGO.—Edgar L. Bill, director of information of the Illinois Agricultural Association, has been appointed program director of the Sears-Roebuck Agricultural Foundation Radio broadcasting station, which is expected will be opened here for service April 1. The Loop branch of the broadcasting station will be located in the Hotel Sherman, from which the entertainment features of the programs will be broadcast. The Hotel Sherman studio will be on the mezzanine floor, adjoining a reception room for those who will take part in the program. Glass windows will permit the interested public to watch the broadcasters at work.

Outlines Different Program Plan

The program plan upon which Mr. Bill has started to work will be made up of features different from anything of the kind now being broadcast in the United States. Even weather and market reports will be especially interpreted in the terms of dollars and cents, rather than in the usual statistical form.

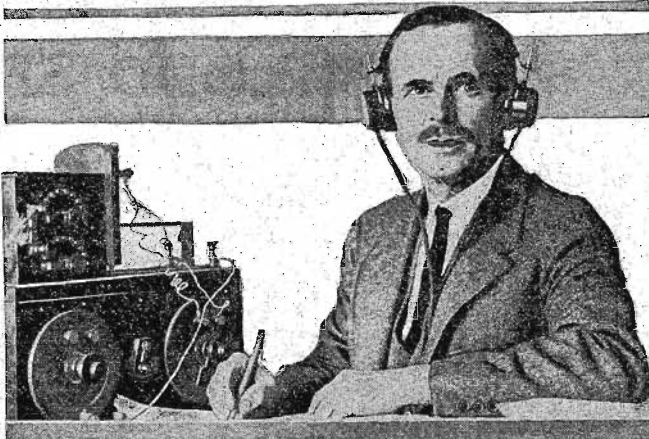
Farmers will be asked to tell their particular community in the field of co-operative marketing and livestock breeding and feeding. Farmers from the cheese region of Tillamook, Ore., will swap tales with the potato growers of Maine. Several special features new in the field of broadcasting will be ready by the opening date of the new station.

"We are going to give the farmer a real program from music to understandable statistics," Mr. Bill declared. "A large part of the entertainment will be given by farm talent, the best to be obtained."

WBAV Installs New Works

COLUMBUS, O.—Station WBAV, the Erner and Hopkins company here, is installing considerable new equipment. When the work is completed its studio will rank with leading Class B stations.

HELPS RID AIR OF SHIP SPARKS



William D. Terrell is Uncle Sam's chief Radio supervisor. In that capacity he has probably been subjected to all the trials and troubles of every Radiophan in the country. At least his correspondence would so indicate. Now, as a new feather in his hat, Mr. Terrell has been successful in his efforts to have the commercial Radio traffic removed from the 450-meter wave band. Hundreds of thousands of dial twisters will thank him for this. © U. & U.

Spokane Plans Great Radio Station by Popular Funds

SPOKANE.—Plans for building and maintaining a mammoth Radio broadcasting station in Spokane were discussed recently by a committee who were in charge of the first Radio show in this city. The station will cost about \$30,000; the funds will be raised by popular subscription.

Money for You If You Have Any

WASHINGTON, D. C.—The customs service of the treasury department has announced the return of the import duties collected on sockets and bases for Radio tubes manufactured by the Kurz-Kasch company of Dayton, Ohio, with the use of imported parts.

KFNF ADDS LAURELS TO STORAGE BATTERY

Shenandoah, Ia., Plant Wins Praise
All Over Land

SHENANDOAH, IA.—This town is now listed among those of the country clamoring for air room. Station KFNF, conducted by the Henry Field Seed company, operating on 266 meters, claims attention because of the fact that it is another to operate on storage batteries alone.

Reports as to test programs indicate that KFNF covers the whole country under fair conditions and that it is exceptionally clear.

DAVIS ELIMINATES 450-METER CODES

MARINE HIT BY ORDER OF COMMERCE DEPARTMENT

Acting Secretary, After Meeting in New
York, Bars Merchant Ships
from Interference.

WASHINGTON, D. C.—Acting Secretary of Commerce S. B. Davis has signed an order discontinuing immediately the use of the wave length of 450 meters by United States merchant vessels and land stations in the United States open to public marine service. The 450-meter wave length adjustment has been retained for Radio compass work with foreign countries or for permissible traffic with foreign stations.

The signing of the order by Davis is of considerable interest to Radiophans of this country inasmuch as the 450-meter wave lengths have interfered greatly in the past with general broadcasting.

The situation was originally brought to the attention of the department of commerce by Radiophans who insisted that they could not hear broadcasting because of ship signals. At the request of the department a conference was held in New York city recently which suggested the elimination of the 450 meter wave length for vessels.

Navy Radio Depth Finder at First Annual Exhibit

Show in Washington Features
Government's Work

WASHINGTON, D. C.—Radio depth sounding apparatus, invaluable to vessels navigating crowded waters in relation to the location of light vessels by means of sound, formed the navy department's exhibit at Washington's recent first annual Radio show.

The department had originally planned to exhibit the Radio transmitting and receiving sets designed for the dirigible Shenandoah, for its projected flight to the north pole, as well as other late developments in the field of Radio.

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BAD BLOOD FLOWS IN R. C. A. VEINS

INNER WAR MAY SPELL END
OF "TRUST"

Corporation Fights Two of Own Members
Over Charges of
Infringement

NEW YORK.—Bad blood between the members of the Radio Corporation of America and the corporation itself was brought to light recently, when Judge Martin T. Manton in the district court of appeals here reversed a decision of a lower court, which had dismissed an infringement suit brought by the R. C. A. and De Forest Telephone and Telegraph Company against the Independent Wireless Telegraph and the American Telephone and Telegraph companies.

The lower court (federal district court) had dismissed the infringement suits as illogical because it considered that the Radio Corporation was not sole licensee to the two tube patents owned by the De Forest company.

May Be Beginning of End of Trust

In reversing the decision of the lower court, which had thrown out the infringement suit, the district court of appeals called attention to the fact that the United States circuit court of appeals had last January, in a similar infringement suit filed by the R. C. A., ruled that the Radio Corporation was the sole licensee of the two three-element tube patents.

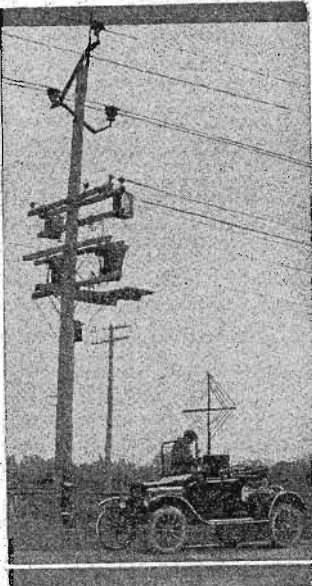
The legal battle is interesting to Radiophans in general, showing as it does how the R. C. A. is fighting two of its own member companies, the Independent Wireless Telegraph and the A. T. & T. companies. Close followers of the tangled situation claim the legal antagonism may be the beginning of the end of the alleged Radio trust.

Health Chief Says Medical

Service by Air Is Success

WASHINGTON, D. C.—The service of medical advice by Radio to ships at sea has proved a success, according to Surgeon General Hugh S. Cumming, chief of the United States Public Health Service. Doctor Cumming favors the adoption of a standard medicine chest for all American vessels not carrying physicians.

LOOP RECEIVING SET NEW AID TO LINEMEN



Here is a portable Radio set with which it is possible to detect broken insulators on transmission lines or electrical leakage without climbing the poles or even topping the car. The apparatus was designed by George W. Hammill, superintendent of a southern power company, and is being adopted universally. Keystone Photo

Basketball Games on Air

WICHITA, KAS.—Basketball games are in the air now. Complying with numerous requests, Station WEAH has consented to broadcast all remaining important games played on the Fairmount College court here. The first game to be sent play by play into the ether was the recent Fairmount-Ottawa U. contest.

THE "FORD" OF LOUD SPEAKERS

TRADE MARK
Fultone
Loud Speaker

Special
Built
Unit
Standard
Cord
Ready
To Use
on Your
Set

\$9.50

BRINGS IN CLEARLY ALL MUSICAL TONES

THE Fultone Loud Speaker is full throated and brings in, in volume, both music and voice in their natural, full, rich tones, with no distortion or metallic noises. Its performance is matchless and unequalled at any price. Dark black in color with a full rounded symmetry, it is worthy a place in the finest home.

Fultone is constructed of a non-metallic composition, in one piece, and is equipped with a special built unit, together with standard cord all ready for attachment to the finest Radio set. It is fully guaranteed and will match the performance of any loud speaker on the market at any price. It represents

Quality at a Low Price

Facilities for immense production have enabled us to quote you this moderate low price on the quality Fultone loud speaker. No longer need your family miss the concert or speech because you need a good loud speaker. Fultone enables every set owner to make his set talk or sing out loud for the enjoyment of all. Every one can enjoy the luxury of a completed set by attaching Fultone, the quality speaker at a low price. Fultone can be found at

All good dealers or

sent direct postpaid upon receipt of price

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JOBBERS We have a money-making proposition on Fultone for you. This loud speaker, because of its quality at such a low price, is destined to be the biggest seller in Radio. Better wire today. Prompt and immediate delivery assured.



IF it's the outdoor antenna that's been holding you off, you want D-7-A or D-10 Portable, the De Forest Radiophones that use an indoor loop aerial the size of a small picture frame—and bring in the broadcast of half the American Continent.

Authorized agents everywhere.



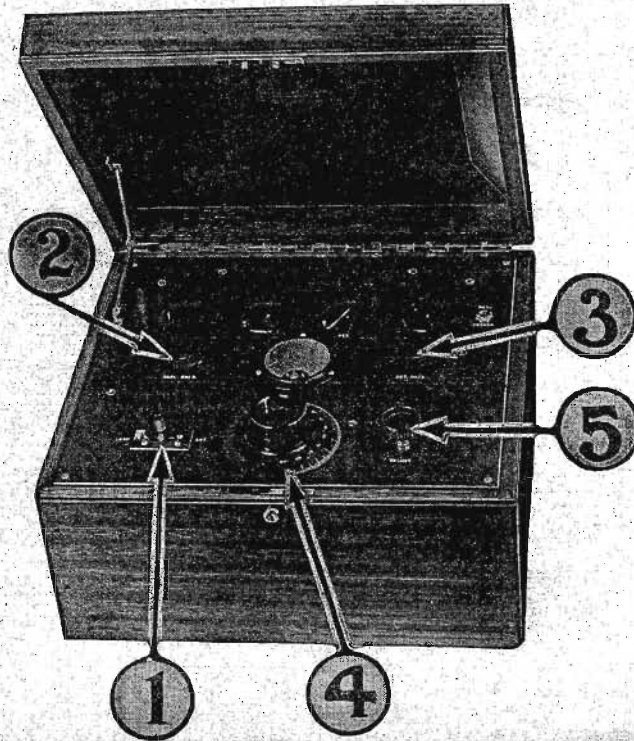
DE FOREST RADIO TEL. & TEL. CO.
Dept. R. D. 7 JERSEY CITY, N. J.

OPERATING AND TROUBLE SHOOTING

For the Owner of a
BRISTOL
Single Control Radio
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 9 and 10 this week the Bristol Single Control Receiver is described. Radiophans with other sets will also find these articles worth reading, particularly the notes on trouble finding.

THE Bristol single control receiving set uses the Grimes Inverse Duplex System and requires only four tubes to do the work equivalent to six. The reason for this is, that the first two tubes are utilized for both Radio and audio amplification. The system includes two stages of Radio frequency, a detector, and three stages of audio amplification. With these are used a rheostat for the detector, a rheostat for the amplifier tubes, and a voltmeter to show the correct voltages at which the



amplifier tubes are operated. This equipment is mounted as a complete unit in a solid mahogany case with walnut finish. The case provides complete protection for the working parts from dust, dirt and mechanical injury. It is portable and can be carried about from place to place as desired. It is very

handsome in appearance and makes a beautiful piece of furniture, entirely in keeping with even the most luxurious homes.

Loop or Aerial

Satisfactory operation of the set can be secured by the use of long antenna or loop, and in most cases short antenna. By long antenna is meant an outside aerial varying in length from 75 to 100 feet. A short antenna 25 feet long can be used indoors; ordinary electric light cord is suitable and may be strung on the floor or permanently concealed back of the molding. There are separate connections on the instrument for long antenna, short antenna and for loop. A certain amount of experimenting will be necessary to find the arrangement best suited to local conditions.

It is the most simple instrument to operate. There is only one control dial, and it is equipped with a vernier button in the center which provides very close adjustment. Every adjustment is on this one dial, and by slowly turning it is an easy matter to find the station wanted. Once having located the station, it may be charted and it is always possible to bring in that station at the same point.

Installation

When used with a loud speaker and a long or short antenna, all connections are made to jacks on the back of the wood case. Ten 4-foot cords with proper plugs are furnished with the set. Before making any connections, place the switch-lever on the face of the set in the neutral or vertical position.

The Batteries

Six 22½-volt or three 45-volt B batteries should be connected in series and to the receiving set, as shown, giving about 135 volts to start with. The jack marked 66 to 90 volts is connected into the B batteries, as shown, so that two 45-volt or four 22½-volt batteries are between this jack and the B jack. A 22½-volt battery for the detector is connected to the 16 to 22½-volt jack and the B battery, as shown. The best voltage for the detector may be anywhere from 16 to 22½ volts. A standard 8-volt A battery is connected to the A+ and A- jacks. The loud speaker, ground and antenna are connected, as shown. Use the Jack (Continued on page 10)

**SEND NO MONEY
WE SHIP
C. O. D.**

The RADIO-SHACK

55 Vesey Street - New York City
Goods shipped C.O.D.
Just pay the postman
EVERY ARTICLE SOLD ON WRITTEN MONEY-BACK GUARANTEE

????? IS IT ?

Be sure your name is on our mailing list for weekly specials. No cost to you.

SEND FOR IT AT ONCE.

SUPERTRON TUBES
Just received a new shipment. Oh, boy, what an amplifier! Better than ever. At this price they'll go fast. The 201 A's are 6 volt, dry cell or storage battery operated, and the W. D. 12 type uses 1½ volt dry cell. Better get your order in now. Both types. Reg., \$6.50. Special..... **\$3.43**

VARIABLE CONDENSERS
Just get these points! 1. Heavy moulded end plates. 2. Phosphor-bronze contacts to heavy binding posts. 3. Processed aluminum plates that retain their alignment. 4. And the list price is double what we ask.
11 plate\$1.05
23 plate 1.35
43 plate 1.95
VERNIER CONDENSER with dial. Same as above.
11 plate vernier.....\$2.65
23 plate vernier..... 3.00
43 plate vernier..... 3.50

VARIOMETER
Let's tell you about the new variometer! First of all, it's moulded. Of course, it has pigtail connections for efficiency. And a positive stop. Split? Oh, yes. Can be split for any circuit. Green silk windings and takes 600 meters. Reg., \$5.90. Special..... **\$3.59**

SOCKETS
A new process enables us to offer an unheard of value. By this new method a nickel tube is forced into a moulded base under heavy pressure. This assures perfect contact with the phosphor bronze springs. **45c**
Easily worth 75c each.

PHONES
For this sale we are going to let you have **TURNEY** 3,000 ohms phones for a very low figure. **\$3.45**

DIALS
Mahogany colored dials with exceptionally heavy brass bushing. Will dress up your set. Change your dials and make your friends think you have a new set. List, \$1.00. **50c**

OTHER SPECIALS
This Week Only

Magnavox, New Type.....\$2.50	Dictogrand Talkers.....\$16.95
10% Deposit with Order	Erln Transformers..... 4.25
Brandes Talker..... 8.98	Brandes Phones..... 5.19
Hilco Couplers..... 6.25	Baldwin Phones..... 8.95

THE DE LUXE
LICENSED BY INDEPENDENT RADIO MANUFACTURERS INC.
NEUTRODYNE
HAZELTINE PATENT INDEPENDENT UNDER OTHER TRADE NAMES. REG. U.S. PAT. OFF.

A five tube assembly kit which includes everything necessary to build a genuine Hazeltine 5 tube set. Just picture this:

- 1 A drilled and fully engraved Panel
- 2 4" Black Grobe Type Dial
- 3 Genuine Hazeltine Neutroformers, mounted for you on 3 Moulded End Quality Condensers.
- 5 Bakelite Brunswick Sockets
- 1 60 Ohm Shackton Rheostat
- 1 30 Ohm Shackton Rheostat
- 2 Genuine Hagbog or Fitzgerald Transformers
- 20 Feet Bus Bar
- 7 Engraved Binding Posts
- 1 Filament Control Jack
- 1 Single Closed Jack
- 1 Freshman .004 Condenser
- 1 Freshman Grid Leak and Condenser
- 1 Base Board for Mounting

All Parts Guaranteed Perfect
\$27.75

ADDITIONAL ACCESSORIES
These accessories, added to the above list of parts are **ABSOLUTELY ALL THE PARTS NECESSARY FOR A COMPLETE SET IN OPERATING CONDITION.**

5 Tubes (Type 201A).....	\$17.25
2 45 Volt "B" Batteries.....	6.00
1 60 Ampere "A" Battery.....	10.95
1 Pair Phones, 3,000 Ohms.....	3.75
1 Antenna Outfit.....	1.50
1 7x24 Cabinet, Mahogany Finish.....	4.95

\$44.40

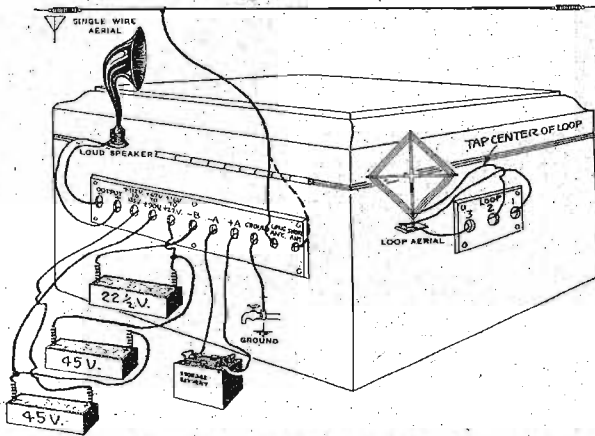
GOLD BUS BAR Most Efficient. Allows high frequency currents least resistance. Used in finest sets. Reg. 15c. 8c	HYDROMETERS Very Accurate. Packed in wooden moisture proof box. Reg. 75c. 39c
TUBE PROTECTORS Impossible to blow your tubes if you attach these to end of socket for ¼ or 1 amp. tubes. 29c	TRANSFORMERS Audio Frequency, well known standard make. Ratio 4-1. Reg. \$5.50. \$2.89
VERNIER CONTROL For any Dial. Makes a Vernier out of any make condenser. Very efficient. Reg. 75c. 29c	JACKS Single or Double Heavy Springs—German Silver Contacts. Nickel finish. Reg. 90c. 39c
AERIAL WIRE 7 strand tinned copper wire gives excellent results on DX work. Reg. \$1.00. 55c per 100 Feet	LITZ WIRE Most efficient. A double silk covered wire with 37 strands of No. 38 wire, each strand enameled. Wonderful for Coils, Loops, etc. 3c per Foot
PANELS Beautiful high finish panels made by the American Hard Rubber Co. 7x10.....\$0.85 7x12..... 1.10 7x14..... 1.20 7x18..... 1.50 7x21..... 1.75 7x24..... 2.00 7x26..... 2.35	RADIO CORPORATION PHONOGRAPH UNITS Complete with cord and plug, they make a truly wonderful showing in both volume and clarity. List, \$18.00. Special. \$8.50

OPERATION, TROUBLES

(Continued from page 9)

"long antenna" or the one marked "short antenna," as the case may be.

the volume is not satisfactory, adjust by means of the volume knob number 5 until the best combination of volume and quality is obtained. The detector rheostat may also help in



Headphones may be plugged in on the jack on the face of set. A standard loop may be connected to the jacks on the left side of the box, as shown. The number 1 jack connects to outside of the loop and the number 3 to the inside. Number 2 connects to a switch, permitting three, four or five turns from the outside to be placed in circuit.

Insert three UV-201A or C-301A tubes in the amplifier sockets, and one UV-200 or C-300 tube in the detector socket.

Operation

Throw the switch-lever number 1 over to antenna or loop, as the case may be. Turn up detector rheostat number 3 until the detector tube shows a bright light. Turn the amplifier rheostat number 2 up until the voltmeter shows about 4 1/2 volts. Then turn the detector rheostat number 1 up or down until the detector tube is just below the "hissing point." Now turn the tuning dial number 4 slowly from zero up until you come to the station desired. If obtaining proper volume and quality.

When finished with the set for the time-being, simply place lever number 1 into vertical or neutral position, thereby opening all circuits. (ANOTHER SET NEXT WEEK)

Cause for Trouble

Many Radiophans have searched for hours trying to locate the trouble that is preventing them from hearing long-distance stations. Sets have been torn to pieces. Batteries have been tested until they have been worn out. But there is one item that is generally overlooked—the lightning arrester.

The arrester sometimes becomes short-circuited to a certain degree and permits a great loss of energy. Constant exposure to the weather may cause corrosion and a breakdown of the insulation.

The best way to test the arrester is to connect a B battery and voltmeter in series with the arrester. If the voltmeter shows a reading the arrester is faulty and should be removed from the aerial.

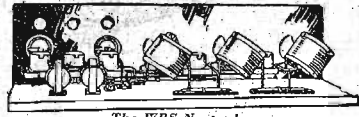


WHOLESALE RADIO SERVICE COMPANY

9 Church Street
New York City

Formerly at 39-41 Cortlandt St., New York City.

5 TUBE NEUTRODYNE SET



The WRS Neutrodyne

It All Depends Upon the Parts!

The Neutrodyne is the most remarkable distance-getting set so far devised. It is a winner everywhere. But it all depends upon the parts!

With WRS Neutrodyne Parts you can build a set that will bring in real distance without trouble and without squeal! The WRS Neutrodyne Parts will fit together easily. They are designed to work together. They are guaranteed and we will replace at our own expense any part found defective! **\$32.50**

The WRS NEUTRODYNE completely built in a beautiful mahogany cabinet, ready to operate (without tubes or batteries). **\$59.50**

FADA 5 TUBE Neutrodyne in a real mahogany cabinet, ready to operate (without tubes or batteries), only **\$85.00**

20% We'll give you a discount of 20% on all merchandise not listed in this adv. It will pay you to write us!

- COCKADAY 3 TUBE SET**
- 1 Cockaday Coil
 - 2 Jefferson Audio Transformers
 - 17-Plate Condensers
 - 2 Switch Arms
 - 1 7x18 Panel
 - 2 Double Circuit Jacks
 - 1 Single Circuit Jack
 - 3 National Sockets
 - 3 Rheostats with Dials
 - 4 Switch Stops
 - 1 .0025 Mica Condenser
 - 1 2 Meg. Grid Leak
 - 16 Ft. Bus Bar
 - 8 Binding Posts
 - 1 1001 Mica Cond.
 - 2 3" Bakelite Dials
 - 1 7x18 Base Board
 - Blue Prints and Instructions
- \$19.50**

CROSLY XJ 4 Tube Set
Reg. Price \$65; Our Price **\$45**

FADA NEUTRODYNE MODEL 160
Reg. Price \$120; Our Price **\$105**

FREED-EISEMANN NEUTRODYNE Model N. R. 3
Reg. Price \$150; Our Price **\$129.50**

Mail orders promptly filled and sent C. O. D. if you wish; we can pay postage on all orders over \$5.00. In dealing with the Wholesale Radio Service remember that you are buying **RETAIL AT WHOLESALE PRICES**

The Radio Corporation's NEW RADIOLA III 2 TUBE SET

The Radio Corporation unconditionally guarantees this two-tube set to receive from broadcasting stations 2,000 miles distant on the loud speaker. This receiver complete with 3 W.D.B. Tubes, Phono and "A," "B" and "C" Batteries **\$39.75** for only

These sets are difficult to get, but we have a limited number, so act at once!

Freed Eismann Knockdown 5 Tube Neutrodyne Receiver
Reg. Price \$80; Our Price **\$65**

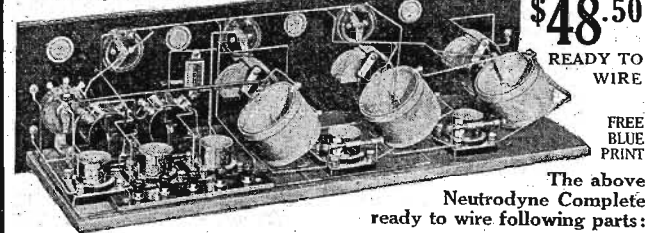
Fada 5 Tube Knockdown Set. **\$52.50**
Freed-Eismann Neutrodyne Kit—3 Neutrodyne and 2 Neutrodynes. **\$25.00**
Fada Neutrodyne Kit—3 Neutrodyne and 2 Neutrodynes. **\$27.75**
Columbia Neutrodyne Kit—3 Neutrodyne and 2 Neutrodynes. **\$15.50**

WRS 3 TUBE COCKADAY
A real value! WRS 3 Tube Cockaday Set built into a handsome mahogany cabinet for only **\$39.50**

BRINGS IN EVERYTHING

BEAUTIFUL MAHOGANY NEUTRODYNE

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. Panel drilled, all parts mounted on panel and baseboard ready for wiring **PAY NO MONEY** Only **\$48.50** **READY TO WIRE** **FREE BLUE PRINT**



The above Neutrodyne Complete ready to wire following parts:

5 Tubes	\$25.00	2 22 1/2 Volt B Batteries	\$6.00
1 110 Ampere Storage Battery	18.00		
1 Delco Rheostat	18.00		
1 Headset	12.00	Loud Speaker	\$26.00
1 Complete Aerial Equipment	1.50		12.50
1 45 Volt B Battery	5.50		
		TOTAL	\$98.50

The above parts and equipment complete would cost you \$147.00! **Our Price \$125.00**

It Works—NEUTRODYNE—All Standard Parts

- | | | | |
|--|---------|------------------------------|----------------|
| 2 Rheostats, 50 ohms | \$ 2.00 | 2 Transformers, All American | \$ 9.50 |
| 1 Rheostat, 6 ohms | .50 | 9 Readym Binding Posts | .85 |
| 3 Air Core R. F. Transformers, mounted on condensers, and 2 balancing condensers | 20.00 | 1 8x26 Mahogany Panel | 3.64 |
| 1 Potentiometer, 1850 ohms | 1.85 | 4 Dials | .80 |
| 3 Jacks, Carter | 2.70 | 1 Baseboard | 4.50 |
| 1 Condenser | .40 | 24 ft. Square Bus Wire | .50 |
| 1 Grid Leak | .85 | | |
| 5 Sockets, Kellogg's | 5.00 | | |
| | | Total | \$53.69 |
- Panel not mounted or drilled, only \$45.50 with blueprints FREE

CABINET FOR YOUR REFLEX NEUTRODYNE

Same Cabinet as shown on page 26, Radio Digest, March 8th issue
With Baseboard, High Mahogany Finish—Fine Cabinets 9x14x8. **\$5.98**
List \$12.00. Only **\$5.98**
7x16 1/2—Same quality. **\$5.98**

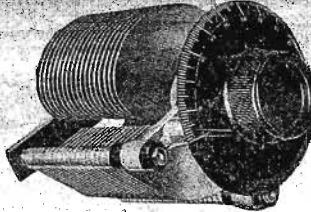
A Few Left—BALDWIN UNITS

Genuine Baldwin Type C unit with mica diaphragm, list, \$5.00. Only **\$3.19**
ONLY TWO TO A CUSTOMER

Neutrodyne Cabinets **ONLY \$12.50**
8x26x8 Mahogany Walnut Oak WITH PIANO HINGES

Special Sale Webster Condensers—Fine for Super Heterodyne

None Better Made
Variable condenser, .0005 (Same as 23 plate, list, \$5.50). **BARGAIN AT \$2.98**
While They Last
Variable Condenser, .001 (Same as 45 plate) list, \$6.00. **BIG BUY AT \$2.98**



TRI-COIL RADIO FREQUENCY TRANSFORMER FOR REFLEX CIRCUITS
Type 9, Dry Tubes. List \$2.00
Type A, 6 Volt **Our Price, \$1.85**

Complete Parts—MILOPLEX—2-Step Amplifier

Mounted on baseboard and panel.

1 Panel 7x8 1/2"	\$1.25
2 Webster's 4-1 Transformers	9.50
2 30 Ohm Rheostats	2.00
2 Sockets	2.00
2 Double Circuit Jacks	1.80
1 Set Readym Engraved Binding Posts	.75
1 Baseboard	.25
1 Cabinet Mahogany Finish	3.50

The above mentioned parts will include any Ohm Rheostat and All-American Transformers if desired.
List—\$21.06
OUR PRICE
Only \$16.50

Complete Parts—MILOPLEX—Cabinet FREE

1 .0005 Variable Condenser, Vernier	\$6.00	1 Socket Bakelite Base	\$0.90
1 Extra Variometer	5.00	1 Bakelite Panel, 8x14x8	2.50
1 .00025 Variable Condenser	2.00	1 W-D Tube	6.50
1 Variable Grid Leak	.75	1 B Battery, large, 22 1/2 volt	3.00
1 .00025 Mica Fixed Condenser	.40	3 Dry Cells	1.85
2 .002 Phone Condensers	.60	12 ft. sq. brass Bus Wire	.30
3 3/4-inch Dials, each 75	2.25	1 Set Readym Binding Posts	.75
1 Potentiometer, 1850 ohms	2.20		
1 Rheostat	1.00	TOTAL	\$35.70

ONLY \$28.50
Blue print FREE only with order for complete parts

WAVE TRAP **ONLY \$6.50**

You can now enjoy the comfort of selecting any station that you desire by hooking up one of our SPECIAL Wave Traps with your Set. Mounted in Mahogany Cabinet with the highest grade material. Regular List Price \$7.50. **OUR PRICE \$6.50**

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

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

Everything in Radio Write Us
We Personally Guarantee All Goods

30 Minute A-B-C Lessons for Radio Beginners

Chapter I—A Radio Night's Entertainment

By P. H. Edelman

IN this series of articles the story of Radio will be 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 will consist of twenty-four additional chapters, of which the five next will be:
Chapter II—Radio Energy in Everyday Terms.
Chapter III—How Radio is Broadcast.
Chapter IV—What Radio Inductances Do.
Chapter V—What Condensers Are Good For.
Chapter VI—Uses of Resistance in Radio.

portantly. A pause, and then—"It has to be that way."
Everybody knows that Radio is essentially a means of communication or carrying intelligence, and that broadcasting stations near and far are collecting and sending out information, entertainment, music, sports, lectures, instructions, in fact anything which can be conveyed in interesting manner via sound waves which in turn are converted into and carried by Radio waves.
Anyone at reasonably small expense

What is This They Call "Radio"?

A LOGICAL question for every new fan is the above, but not alone will the new fan, but the broadcast listener who has been interested one, two or three years, will find much of interest in Mr. Edelman's explanations of the intricacies of the ether art. This week we learn by simple analogy and picture just what is meant by modulation, what Radio is, how programs are "put on the air," and what things are needed in order to hear these programs.
"Condensers are packages to hold electricity," says Mr. Edelman. And so on, through A.C., D.C., Magnetic fields, thermionics and electrons, his weekly contribution will blaze the way to clearer understanding of the

so-called mystery of Radio.
"Radio's Cast of Characters" tells intimately the roles the various terms play in Radiophony and is the title of one of the articles. "The Key to Radio Circuits" is another title. This article shows how to "open up" Radio diagrams which seem to try to entangle readers with their maze of lines and complex symbols. "The Shorthand of Radio" considers diagram reading as explained by picture parts together with the corresponding diagram characters, thus identifying manufactured parts with circuits in general.
But, that's only part of all there is coming. The good points are too numerous to mention.

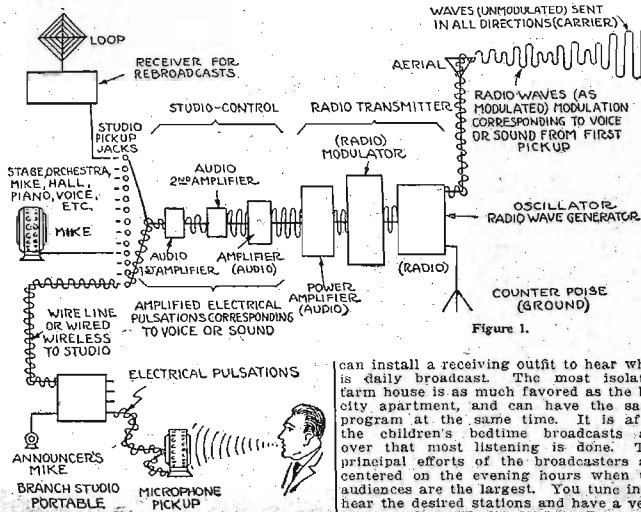


Figure 1.

can install a receiving outfit to hear what is daily broadcast. The most isolated farm house is as much favored as the big city apartment, and can have the same program at the same time. It is after the children's bedtime broadcasts are over that most listening is done. The principal efforts of the broadcasters are centered on the evening hours when the audiences are the largest. You tune in to hear the desired stations and have a veritable modern "Radio Night's Entertainment."

What the Listener Finds Out

But after the first novelty of listening

in has been digested, the broadcast listener finds out other things. There are new stations to be heard, new kinks of operation to be learned, interferences to get rid of and repairs to be made. The first amazement at Radio achievements is followed by puzzles of variable range, performance, and faithfulness of reproduction. In the first place, one finds that the main programs come from stations located in the centers of population, and that only what is transmitted by a broadcast sender within the range of the receiving apparatus can be heard.

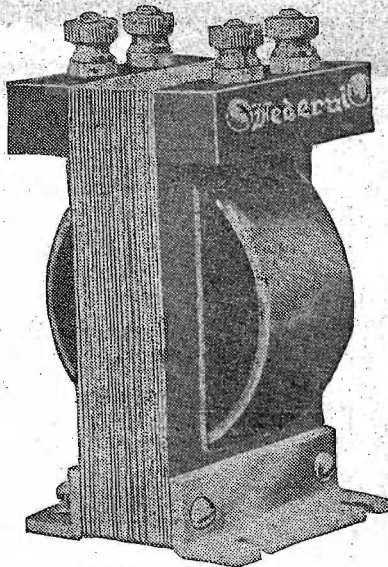
How Broadcasting Is Done

Such a broadcasting station is an establishment for converting sound waves to be carried and transmitted by Radio waves. It will have a studio with one or more rooms fitted with musical equipment, much as in an upper middle class home,

except that drapery coverings or other means to stop sound echoes and outside noises are used. Also one or up to a dozen or more "pickups" are distributed advantageously to serve as an electrical ear for the air waves of the respective instruments or voices.

These pick-ups may be microphones, called "mikes," much like those that are used in the ordinary telephone transmitter, or various special forms which can convert air waves into a corresponding electrical pulsating current. The laboratory, or works, of the broadcasting station is usually housed in a separate room and has the apparatus for generating Radio waves; amplifiers to increase the electrical pulsations from the pick-ups and modulators to cause this electrical pulsating current to mold the radiated Radio waves to correspond to the original sounds or air waves. A speaker, by the mechanism thus provided, may control a power of a horsepower or more in the form of radiating Radio waves, capable of eventually reaching a million or more receiving outfits and listeners.

The operation of a typical broadcasting (Continued on page 12)



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

"Guess what I got on the Radio last night!"

HOW often, nowadays, one hears that exclamation from a gleeful enthusiast! Everyone, it would seem, lives with his radio set.

Federal lives with its radio work. For over a quarter century this eager spirit, together with tremendous facilities for experiment and research, have placed Federal's achievements in the front rank of success.

Federal Telephone and Telegraph Company

Factory: BUFFALO, N. Y.

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



\$7.00

Federal

Standard RADIO Products



The Sign of Reliable Radio Dealers

THIRTY MINUTE A-B-C

(Continued from page 11)

station is diagrammed in Figure 1. The main studio may have a branch or portable pick-up station, and jacks are provided for connecting in any or several pick-ups. Thus in churches, several pick-up mikes are used to get every detail of the services. Or again, a studio may receive a program broadcast from another station and re-transmit the same with its own apparatus.

How Sounds Control Radio Waves

Following through an example, a lecturer at a branch of the studio is talking. As he talks, little puffs of air or sound come from his mouth and are picked up by the microphone. This microphone has a diaphragm and device to change the air puffs of sound into electrical pulsations. The announcer has a separate "mike" to cut in. An ordinary telephone line, or possibly a wired wireless line, will bring these electrical pulsations into the studio of the broadcasting station. Here the studio control will amplify these electrical pulsations until they are strong enough to work a modulator.

When the broadcast station is on the air, it has a Radio power unit or oscillator transmitting a continuous series of waves. The function of the modulator is to shape the intensity of these emitted waves to correspond with the electrical pulsations set up by the original sound to be broad-

cast. Modulation means much the same as sculpturing, but instead of cut marble, the Radio waves are formed so as to carry the sound or voice waves. The Radio waves are sometimes called "carrier waves" and serve as a medium for conveying the original intelligence.

How Radio Waves Travel

Now the broadcast waves travel out in all directions from the sending station. In Figure 2, a section of the earth is pictured, illustrating how the Radio waves can spread out instantly. There is a conducting layer or upper stratum enveloping the earth which is also thought to have influence in reflecting the waves, which waves can be thought of as an expanding disturbance in space. The energy of the radiated waves becomes dissipated with distance, so that only a very small fraction of the original broadcast energy reaches a receiving station or listening in apparatus.

The thing to remember is that Radio is energy and that a broadcasting station sends out a small amount of energy much as the sun radiates light to the earth.

To receive the broadcast, then, an apparatus is required to absorb a minute fraction of the original broadcast Radio energy and convert it back into sound waves which can be heard through the receivers or loud speaker.

How Waves Are Received

Figure 3 shows the incoming Radio (Continued on page 22)

POLYDYNE
REGISTERED
TESTED AND GUARANTEED
RADIO FREQUENCY APPARATUS

POLYFORMER
REGISTERED
POLYDON
REGISTERED
POLYMER
REGISTERED

STANDARDS OF EFFICIENCY,
WORKMANSHIP AND MATERIALS

The Name is the GUARANTEE!

POLYDYNE CORP., 16 W. 46th Street, New York

The Stamp of Approval
the World Over



FRESHMAN
Variable Grid Leak

The Standard Unit for Every Tube Set

EVERY tube and every circuit require a different grid leak resistance. The method employed in the Freshman Variable Grid Leak permits you to adjust your circuit to any resistance you wish, from 0 to 10 megohms in an unbroken range of 180 degrees.

The Freshman Variable Grid Leak and Condenser combined, takes the place of a grid condenser, leak mounting and grid leak—and, in addition, permits an adjustment to the correct amount of resistance.

The Freshman Variable Grid Leak is the most compact, the most perfect, the most efficient, the most readily adapted to all grid circuits—and the only one which is entirely sealed and always remains unaffected by any climatic conditions. It is the

ORIGINAL
VARIABLE GRID LEAK

Either Base or Panel Type Complete with .00025 or .0005 mf. Freshman Condenser \$1
Either type without Condenser 75c

Ask your dealer or write for our free diagrams of Neutrodyne, Tri-Flex, Kaufman and other good circuits.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 Seventh Ave., New York, N. Y.

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

SUPER VALUES

WHAT'S NEW IN RADIO?

Hazeltines Neutrodyne

The ultimate receiver for local and long distance Radio concert reception

THE MOST TALKED ABOUT SET OF TODAY

1. SIMPLICITY (A child can operate it)
2. SELECTIVITY (You can tune out local stations)
3. STABILITY (Always ready to entertain)
4. DISTANCE (Average range about 2000 miles)
5. NOISELESS (No squeals, no howls, no whistles)

Complete Parts for Building This Master Receiver \$49.65
AS LISTED BELOW, ONLY

Stock No.	Qty	Description	Price
201 A.	1	Bakelite panel, 24x7 1/2, drilled and engraved	\$ 6.50
202 A.	1	Baseboard, 23x6	.75
203 A.	3	Standard sockets	.95
204 A.	3	Neutrodyne	15.00
205 A.	2	Neutrodyne	1.50
206 A.	2	High ratio transformers	11.00
207 A.	1	A battery switch	.75
208 A.	3	4" Pathé dials, taper knob	2.10
209 A.	1	Plate rheostat	1.00
210 A.	1	Fada type 150 A. vernier rheostat	1.25
211 A.	7	City engraved binding posts	1.40
212 A.	1	Closed circuit jack	\$.80
213 A.	1	2 spring automatic jack	1.00
214 A.	27 ft.	Spaghetti tubing	2.10
215 A.	27 ft.	Bus bar	.25
216 A.	2	Condensers, .006 mfd	1.00
217 A.	1	Grid leak, 2 meshes	.50
218 A.	1	Grid leak and condenser, .00025	.80
219 A.	1	Package screws, nuts, terminals, etc.	.10
220 A.	1	Fada instruction book	
			\$49.65

Accessories Necessary to Complete Set for Operation

Stock No.	Qty	Description	Price
221 A.	5	Bonded tubes	\$22.00
222 A.	1	Loud speaker, genuine Hanes-Zener type C unit	12.75
223 A.	4	Columbia or Red Seal A battery	1.60
224 A.	2	45 volt B batteries	\$ 9.00
225 A.	1	Set complete aerial equipment	2.00
			\$47.35

OUR SPECIAL COMBINATION OFFER

To each purchaser of the parts and accessories for the HAZELTINE NEUTRODYNE RECEIVER at the low price of \$97.00 we will, without cost to you, ship a Genuine HANES-ZENER special hand rubbed solid mahogany cabinet. Value \$10.00. Each of the above parts are of the highest standard grade, and carry the HANES-ZENER guarantee and can be purchased separately at our special prices.

Special for This Week Only
WESTERN ELECTRIC 10A LOUD SPEAKERS \$105.00
List Price, \$161.00. Our Price

RESISTANCES—Genuine P. L. Original Lavite
48,000 OHMS \$1.00 100,000 OHMS \$1.00
We Are Prepared to Supply Dealers. Write for Our Proposition.

REINARTZ CIRCUIT Complete

Reinartz Coll.	List Price	OUR Price	Reinartz Coll.	List Price	OUR Price
One 7x10" Radium Panel	\$2.50	\$2.00	3 Switch Levers with Knobs	\$0.75	\$0.35
National Bakelite Socket	1.00	.40	One Baseboard for Mounting	.75	.40
Vernier Rheostat	1.50	1.00	One Fixed Phone Condenser	.40	.25
Two 23" Plate Rheostats	\$3 each	6.00	One Single Jack	1.00	.25
Switch Points and Nuts	.80	.40	Blue Prints with complete instructions for assembly and mounting	.50	.50
Six Switch Stop Points and Nuts	.40	.20	Regular Price \$10.05		
Freshman Grid Leak and Condenser	1.00	.65	OUR PRICE \$11.05		
Seven Binding Posts	.70	.35	All the necessary screws, nuts and miscellaneous small parts which are necessary to complete the set are included in the above prices. Any part in either of these circuits may be purchased independently at the advertised cut prices.		
25 Ft. Tinned Bus Bar	.50	.30			

COCKADAY Four-Circuit Receiver 3000 MILES

Parts as specified by Mr. Cockaday

- 1-Cockaday Coil
- 2-Amsco 26-Plate Condensers
- 2-Amplex Grid-Densers
- 1-Bradley Leak, 1/4 to 10 meg.
- 2-Mico Sockets
- 1-Amsco 6 ohm Rheostat
- 3-Amsco 20 ohm Rheostats
- 1-Pacent Single Jack
- 2-Pacent Double Jacks
- 2-Amertran Transformers
- 1-Como Push-Pull Transformer—Input
- 1-Como Push-Pull Transformer—Output
- 2-Switch Levers
- 11-Switch Points
- 2-Switch Stops
- 1-Dublier Condenser—.0005
- 1-Durham Variable Grid Leak
- 1-Durham Variable Grid Leak
- 3-Lavite Resistances—48,000 ohms
- 1-7x24 Panel
- 1-Amsco 400 ohm Potentiometer
- 1-7x24 Panel
- 1-3"x2 1/4" Sub Panel
- 1-12"x12" Panel

Our Price \$59.00

Erla Two Tube Reflex

All Parts for This Circuit

\$40.70

Including Mahogany Cabinet

Parts are Genuine and same as specified by Erla

Power Amplifier FOR \$19.00

INCLUDING

- 1 Panel 7x10
- 1 Cabinet
- 2 Sockets
- 1 Rheostat
- 7 Ely Engraved B Posts
- 2 Fahnestock Clips
- 1 Pair Como Push-Pull Transformers

List Price, \$23.90

We will wire this amplifier for you for an additional charge of \$4.00.

We Have Just Received a New Shipment of
THE NEW MODEL D. N. K. & K. PHONES \$6.50
MADE IN GERMANY

WE GIVE A 20% DISCOUNT on All Standard Radio Apparatus Not Listed Above

All Mail Orders Shipped Promptly Send Money Order, Including Postage
The Radio Mail Order House—Known for Low Prices

WRITE FOR OUR CATALOG "B"

HANES-ZENER
1480 Broadway, Corner 42nd St., New York City

What's Wrong with Your Receiving Set?

Chapter IV—Locating and Remedying Trouble in Receiving Sets

By Peter J. M. Clute

RECEIVING sets, like other apparatus, are subject to many ills, but a little patient search on the part of the listener will generally lead to the root of the trouble. While it is difficult to definitely point out or cover every kind of trouble, it is the aim of this discussion to present sufficient information to enable the Radiophan to eliminate in part or entirely, some of the more common troubles.

Most of these troubles manifest themselves in definite symptoms which result in some characteristic noises. Many of the faults which users of Radio equipment find are imaginary, and in a great many cases earnest endeavor to locate the fault in his method of operating his set rather than in the equipment itself, will remedy the situation.

Loose Connections

Perhaps the most disconcerting trouble is dead silence, inasmuch as it gives the operator no definite clue as to its location. In this case, it is advisable to first look over the external connections, such as those to the antenna, the ground, the telephone receivers, and the batteries, for poor contact. If after this preliminary inspection an indication of the trouble is found, the interior of the set should be examined to see if the vacuum tube is making good contact in the socket, the batteries run down, the phones defective, or the phone condenser, if one is used, is short circuited.

When the springs on the socket do not make good contact with the tube prongs, it is advisable either to bend the springs or sandpaper the prongs, as they may have become corroded. The breaking of the braided tinsel cord in the phone leads presents an unwise difficulty. This is due either to a sudden strain or to the continual twisting that the phone leads are subject to.

Weak Signals

If only weak signals are received so that the set is not working at its highest efficiency, it is probable that the A or B battery voltage may be below normal; the polarity of the plate battery reversed; the grid condenser short-circuited; the grid circuit open, or the set is of the regenerative type the tickler coil connections may be reversed.

Weak signals in the detector circuit may also result from incorrect regulation of the tube filament temperature and plate potential, or the tube may be forced to work below its critical filament temperature, due to an excess of tickler coil inductance. In this case, reducing the tickler coil or cutting down the plate voltage may remedy the situation.

If the signals weaken considerably when switching on the amplifying stages, the

trouble might be traced to too low battery potential to operate both amplifier and detector tubes. Poor tube contact in sockets, open-circuited or burnt-out amplifying transformers, or faulty jack contact might also be investigated.

Unusual Noises

When any scraping or scratching noises of unusual character are heard the operator should first look for loose connections. However, for the sake of convenience, such noises may be grouped into two classes, namely, those affected and those not affected by tuning. In the first group, such noises may result from too much feedback inductance, dust between condenser plates, excessive plate or filament potential, or too low an antenna capacity, thus causing the set to oscillate and make it hard to control. An excessive grid charge will cause howling and knocking, which may be eliminated by either decreasing the feedback coupling, cutting down the tickler inductance, or by lowering the value of grid leak resistance.

If tuning the set does not change or affect the character of the noise, the filament control rheostat may be defective or making poor contact; there may be loose connections on the apparatus; the grid leak resistance may be excessive, or the plate battery run down.

Unsteady operation, accompanied by crackling noises, might be traced to faulty filament circuit connections. Poor contact of the arm of the rheostat on the resistance wire can be remedied by loosening the arm and bending the contact spring. However, it is advisable, before working behind the panel, to remove the tubes to prevent any possible damage.

Crackling noises, heard when dialing the condenser, are generally caused by dust lodging in and bridging the space between the condenser plates. This accumulation may be either blown out or removed with a pipe cleaner. Adjustment of the plates will be imperative, if they touch each other as they are revolved.

Atmospheric Discharges

Atmospheric discharges cause crackling, scratching and rumbling sounds in the receivers. Such static noises are more pronounced in warm weather, but even in winter when a change of weather is about to take place, these disturbances are common. If it is sometimes possible to hear them quite a distance away, no method of eliminating such disturbances has as yet been devised.

To distinguish between noises caused by trouble within the set and those external to it, disconnect the antenna and ground leads. If the noises continue, it is a positive indication that they are caused by internal trouble.

Some types of soft or gassy vacuum

tubes produce noises similar to static, unless the filament battery potential is properly adjusted. The proper brilliancy to burn the filament of a vacuum tube is the lowest at which signals are distinctly heard. Increasing the filament current beyond that point does not increase the signal strength, but lessens the life of the tube considerably. A good rule to follow is to keep the filament at as low a temperature as possible, consistent with good reception. Certain varieties of vacuum tubes operate at very low filament temperatures and it is advisable to follow closely the directions furnished with each.

A steady whistling may be caused either by two stations operating on about the same wave length, or heterodyning, or the reradiating of a neighboring regenerative receiver. This sort of trouble differs from the whistling accompanying feedback effect within the set, because the latter may be varied by adjusting the tuning control. Howling and whistling within the set may be due to excessive regeneration caused by too much tickler inductance. Excessive plate battery potential; too high a value of grid leak resistance; excessive filament potential, or too much grid charge can sometimes be blamed for noises of this character.

Trouble in Amplifying Circuits

A frequent source of trouble in audio-amplifying circuits is the magnetic interaction between the cores of the transformers, which manifests itself in the production of howls and in signal distortion. To reduce this effect to a minimum, mount the transformers with cores at right angles to each other and as far apart as possible. Transformers enclosed in a steel case should be grounded as a precautionary measure.

A high-pitched tone is often heard in amplifier circuits, in many cases high enough to blot out the signal. This is due to the voltage variations on the output side of a tube being fed back to the input side. This produces voltage variations on the grid, which are further amplified and fed back, resulting in serious disturbances.

Howling may be traced to grid and plate leads running closely parallel to each other. Separating these leads as much as

possible will produce a marked improvement. The proper location of the various pieces of apparatus in the amplifier circuits will cut down the howling. All leads, especially those from transformers to the grid terminals of the vacuum tubes, should be made as short as possible.

Fading

Variation of signal strength without making any tuning adjustments may be attributed to fading effects. Such unsteady signals may be caused by the antenna or lead-in wire swaying to and from objects near it, or the lead-in and ground wires swinging toward and away from each other. Such conditions produce capacity variations in the antenna circuit, at times large enough to cause a fading signal, especially so when receiving from distant stations. Very often, during high wind storms, the antenna may swing and touch a conductor or partial conductor, and cause a cessation or partial interruption of signals.

Installation of Antenna

Receiver installations should be located away from electric lights or power wires, as they will induce humming or buzzing noises in the receiver. It is advisable to support the antenna system at right angles to any light or power wires nearby. Antennas should not be erected over or under such wires nor so located that a failure of either antenna or electric light and power lines can result in contact between them. Neither should the antenna be located as to allow accidental contact with light and power wires by sagging or swinging.

Besides trouble caused by improper adjustments or arrangement of parts, there also exists a multitude of outside disturbing factors, some of which can be eliminated by corrective measures and others which will have to be tolerated. Static or atmospheric discharges are perhaps the worst offenders of this type. Other disturbances practically beyond the control of the listener include trolley line or third-rail flashings, electric generators or motors with high commutator bars or chattering brushes, electric arc welding apparatus, electric arc lamps, (Continued on page 14)

Thrills from Radio

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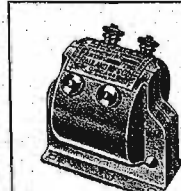
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ally good results" that has made All-American Transformers the most popular and most widely used of all transformers.

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SPECIAL—DETECTOR

The ideal "Detector" Tube for any set, Model S 200, 6 volt 1/4 amp. super detector. A very sensitive gas filled tube, consuming only 1/4 amp. plate voltage, 22-45... \$5.00

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THE NEW RADIO FREQUENCY TUBE

Model S 500, 6 volt, consuming only 1/4 ampere. The first tube ever made especially for radio frequency use. Requires 90 to 150 plate voltage. A wonderful tube \$6.00

Ideal for Neutrodyne, Atwater-Kent, Superheterodyne, Grebe, Kennedy, Zenith, Crosley, Freed-Eisenman and all other good sets.

MODEL S 700 \$7
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6 Volt 1/4 Ampere

For loud speakers of any make. No set worth while is complete without this remarkable power tube, consuming only 1/4 amp.

MODEL S 300 \$5
1 1/2-volt Dry Cell Tube, 1/4 amp.

For use dry cell use. Fine detector on 22 to 45 volts and amplifies on 45 to 90 volts.



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6 Volt 1/4 Ampere

Exceptional volume. Amplifies at 45 to 90 volts. Fine detector on 22 to 45 volts.

MODEL S 400 \$5
3-volt Dry Cell Tube, 1-18 amp.

Works well on two dry cells. Detector and amplifier 22 to 90 volts.

All Schicklerling Tubes have standard bases. Look for trade-mark: Signature of Conrad Schicklerling etched on tubes.

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The newly invented Schicklerling Triangle Plate Vacuum Tubes mark a new departure in Radio progress. Sonorous, of magnificent volume, liquidly flexible, of splendid range, it lends itself with consummate grace, to the greatest operatic arias, the simplest ballads or the passionate entreaty and faith of religious song. Free of distortion, a perfect revelation—and as you listen the richness of tone, the velvety smoothness of outpouring melody, will bring the singers themselves in all their magnetism and charming personality before you.

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

Table with columns for Station and City, and rows for days of the week (Monday through Sunday) listing broadcast times for various stations across the country.

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.

FIXING WHAT'S WRONG

(Continued from page 13) x-ray equipment, vibrating types of battery charges and other similar electrical apparatus. The flashing which occurs on trolley lines, due to the continual making and breaking of contacts, will produce steady

flashes in the phones. To lessen these disturbances, the antenna should be located at right angles to the trolley lines. In the case of electrical machines, with one or more high commutator bars or with chattering or sparking brushes, the disturbance generally assumes the form of a vigorous humming. While it may be difficult to locate the trouble exactly, it will well repay the operator to shift the

position of the antenna system until the point of minimum disturbance is obtained. If the source of the trouble is too close to the receiver, the changing of the antenna will not remedy the situation. In this case, an indoor directional loop may be used to advantage, provided the set is powerful enough to operate with such an antenna. Disturbances emanating from electric welding apparatus, electric arc lamps, and x-ray machines are very persistent offend-

ers, which generally defy correction. Fortunately, welding apparatus and x-ray machines do not operate for any great length of time, and the harsh ripping sounds must be borne in patience while they last. Shielding and grounding may alleviate conditions somewhat in the case of x-ray machine disturbances. (Mr. Clute will continue "What's Wrong With Your Receiving Set" next week with another helping article, telling how properly to tune a receiving set.—Editor's Note.)

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.

Advertisement for Peerless Radio featuring various electronic components like Loud Speakers, Radios, Condensers, and Transformers, with detailed pricing and descriptions.

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.

RADIO AT N.Y. PRICES Daily Parcel Post

The Prices Quoted Below Deliver Goods to Your Door HOW TO ORDER—Write your order plainly; state number, description and price. Articles not wanted. Send Post Office or Express Money Order, personal check or bank draft. REFERENCES: R. G. Dun, Bradstreet, or Corn Exchange Bank, New York City.

Advertisement for Dictogrand Loud Speaker, featuring a large image of the speaker and descriptive text about its rich ebony finish and adjustable volume.

FORMERLY \$28.50 OUR PRICE \$19.95 Post Paid

Advertisement for Modells Radio Soldering Iron, featuring a large image of the iron and a detailed list of various electronic components and their prices.

Saturday, March 22

(Continued from page 17)

WIJZ, Chicago, Ill. (Central, 448), 10:00 p. m., North Star Conservatory of Music, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 459), 9:30 p. m., Special Saturday Luncheon, National Democratic Club; 3:00, Radio Cheshin, violinist; Sylvia Krida, pianist; 3:30, Radio Cheshin, violinist; Sylvia Krida, pianist; 4:00, Hotel Belmont Stripped Ensemble; 5:00, Red and Gray Melody Boys; 7:00, "Uncle Wiggly Stories"; 7:15, Chalkie Summers, radio actor; 7:30, "The King's Men"; 7:45, Second Radio Debate, "The Virgin Birth"; Dr. Charles Folger, Dr. John Joseph Starnes.

WMAJ, Chicago, Ill. (Central, 447.5), 7:30 p. m., Group of songs, "Bible Stories"; 7:45, "The Cross"; Dr. Greer; 8:00, Ball concert, St. John's Military Academy; 9:00, Balacon & Katz Chicago Theater series.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Borean Radio Church of Jackson.

WOW, Omaha, Neb. (Central, 526), 6:30 p. m., Parke-Kramer Orchestra; 9:00 p. m., Popular musical program, auspices Omaha Ladies, No. 24, Elm; Omaha Elks Band; Council Bluffs, Ia., Elks' Quartet; Advers, Herbert Daniel, sax exalted ruler.

WOC, Davenport, Iowa (Central, 448), 12:00 p. m., Chimes; 3:30 p. m., "Soft Religion and Composition"; 5:00, "The International Order of the King's Daughters and Sons"; Mrs. J. E. Clarkson; 9:00 p. m., S. C. Orchestra; V. B. Kocite, harpist; Wendell Hall.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital; 12:00, Church service under the auspices of the Crestwood Baptist Church; Rev. Dr. R. F. Corvino, pastor; organist, Mrs. R. W. Mims; choir director, 4:00-5:00 p. m., Sacred concert by the Presbyterian Seminary Male Quartet; M. B. Green, 1st tenor; E. G. Tucker, 2nd tenor; J. H. Sweeney, baritone; B. Green, pianist for musical reading of stories of old lyrics.

WIK, Cleveland, Ohio (Eastern, 283), 8:00 p. m., Omegat, International Dance Program; WHK Cleveland Orchestra; Vocal numbers, Ruth Spomeller, soloist.

WHN, New York, N. Y. (Eastern, 360), 3:00-3:30 p. m., Christian Endeavor program; 5:30-6:00, WEIN Radio Fire.

WIP, Philadelphia, Pa. (Eastern, 509), 7:30 p. m., Services from Holy Trinity Church; 9:30, Synchonic Concert, directed by Ned Stud and Karl Benowitz.

WIJZ, Chicago, Ill. (Central, 448), 6:30-9:00 p. m., North Star Conservatory of Music, Oriole Orchestra.

WLW, Cincinnati, Ohio (Central, 309), 9:30 a. m., School, Editorial Staff of Sunday School Publication of the Methodist Book Concern; 11:00, Services, Church of the Covenant; Dr. Frank Stevenson, minister; 8:00, Special program.

WUA, Omaha, Neb. (Central, 526), 8:00 p. m., Radio concert, 12:00, Church service under the auspices of the Crestwood Baptist Church; Rev. Dr. R. F. Corvino, pastor; organist, Mrs. R. W. Mims; choir director, 4:00-5:00 p. m., Sacred concert by the Presbyterian Seminary Male Quartet; M. B. Green, 1st tenor; E. G. Tucker, 2nd tenor; J. H. Sweeney, baritone; B. Green, pianist for musical reading of stories of old lyrics.

WGC, Davenport, Iowa (Central, 454), 9:30 a. m., Sacred Chimes; 12:00, Church service under the auspices of the Crestwood Baptist Church; Rev. Dr. R. F. Corvino, pastor; organist, Mrs. R. W. Mims; choir director, 4:00-5:00 p. m., Sacred concert by the Presbyterian Seminary Male Quartet; M. B. Green, 1st tenor; E. G. Tucker, 2nd tenor; J. H. Sweeney, baritone; B. Green, pianist for musical reading of stories of old lyrics.

WWS, Atlanta, Ga. (Central, 429), 11:00 a. m., First Presbyterian Church service; 5:00-6:00 p. m., Men's Chorus, Westport; 7:30, Wesley Memorial Service.

WVJ, Detroit, Mich. (Central, 517), 9:00 p. m., News Orchestra; 3:30 p. m., Weather forecast; 3:35 p. m., Music; 9:00 p. m., News Orchestra.

9:15, Blake II. Wilson, baritone, and Drako Concert Ensemble.

WDAF, Philadelphia, Pa. (Eastern, 395), 9:00-9:40, Special Areadia Cafe Concert, direction, Peri Szabo; 9:30, Stanley Theater organ recital.

WZAF, New York, N. Y. (Eastern, 492), 9:00-9:45, Jewish Philanthropic Society; 2:15-3:45, N. Y. Federation of Churches; 3:45-4:45, Dr. S. S. Raskin, rabbi; 9:00-10:00, Skinner organ recital.

WJAA, Dallas, Texas (Central, 479), 8:00-7:00 p. m., Services, City Temple Presbyterian Church, Dr. L. D. Young, pastor; Jack Davis, pianist; 9:00-9:30, Address, Dr. Wallace Bassett; 9:30-11:00, Adolphus Hotel Orchestra, Lawrence Morrall, director.

WGL, Westford Hills, Mass. (Eastern, 360), 4:00 p. m., "Twilight program," "Adventure Hour"; Bible classes, Dr. William M. Anderson; 9:00-9:30, Musician; 8:30, "World Unity," auspices of the Greater Boston Federation of Churches; Concert, Central Band.

WGR, Buffalo, N. Y. (Eastern, 319), 3:00 p. m., Vesper service, the Rev. John Reig, Emanuel Reformed Church.

WGY, Schenectady, N. Y. (Eastern, 360), 10:30 a. m., Services, Albany Street Methodist Episcopal Church; 12:00, Church service under the auspices of the Crestwood Baptist Church; Rev. Dr. R. F. Corvino, pastor; organist, Mrs. R. W. Mims; choir director, 4:00-5:00 p. m., Sacred concert by the Presbyterian Seminary Male Quartet; M. B. Green, 1st tenor; E. G. Tucker, 2nd tenor; J. H. Sweeney, baritone; B. Green, pianist for musical reading of stories of old lyrics.

WHB, Kansas City, Mo. (Central, 411), 8:00 p. m., Church service and sacred musical numbers from "Sweeney's Sacred Music"; 12:00, Church service of musical numbers; Sweeney Orchestra for listeners-in in the West.

WHAS, Louisville, Ky. (Central, 440), 9:57 a. m., Organ music; 12:00, Church service under the auspices of the Crestwood Baptist Church; Rev. Dr. R. F. Corvino, pastor; organist, Mrs. R. W. Mims; choir director, 4:00-5:00 p. m., Sacred concert by the Presbyterian Seminary Male Quartet; M. B. Green, 1st tenor; E. G. Tucker, 2nd tenor; J. H. Sweeney, baritone; B. Green, pianist for musical reading of stories of old lyrics.

WHK, Cleveland, Ohio (Eastern, 283), 8:00 p. m., Omegat, International Dance Program; WHK Cleveland Orchestra; Vocal numbers, Ruth Spomeller, soloist.

WHN, New York, N. Y. (Eastern, 360), 3:00-3:30 p. m., Christian Endeavor program; 5:30-6:00, WEIN Radio Fire.

WIP, Philadelphia, Pa. (Eastern, 509), 7:30 p. m., Services from Holy Trinity Church; 9:30, Synchonic Concert, directed by Ned Stud and Karl Benowitz.

WIJZ, Chicago, Ill. (Central, 448), 6:30-9:00 p. m., North Star Conservatory of Music, Oriole Orchestra.

WLW, Cincinnati, Ohio (Central, 309), 9:30 a. m., School, Editorial Staff of Sunday School Publication of the Methodist Book Concern; 11:00, Services, Church of the Covenant; Dr. Frank Stevenson, minister; 8:00, Special program.

WUA, Omaha, Neb. (Central, 526), 8:00 p. m., Radio concert, 12:00, Church service under the auspices of the Crestwood Baptist Church; Rev. Dr. R. F. Corvino, pastor; organist, Mrs. R. W. Mims; choir director, 4:00-5:00 p. m., Sacred concert by the Presbyterian Seminary Male Quartet; M. B. Green, 1st tenor; E. G. Tucker, 2nd tenor; J. H. Sweeney, baritone; B. Green, pianist for musical reading of stories of old lyrics.

WGC, Davenport, Iowa (Central, 454), 9:30 a. m., Sacred Chimes; 12:00, Church service under the auspices of the Crestwood Baptist Church; Rev. Dr. R. F. Corvino, pastor; organist, Mrs. R. W. Mims; choir director, 4:00-5:00 p. m., Sacred concert by the Presbyterian Seminary Male Quartet; M. B. Green, 1st tenor; E. G. Tucker, 2nd tenor; J. H. Sweeney, baritone; B. Green, pianist for musical reading of stories of old lyrics.

WWS, Atlanta, Ga. (Central, 429), 11:00 a. m., First Presbyterian Church service; 5:00-6:00 p. m., Men's Chorus, Westport; 7:30, Wesley Memorial Service.

WVJ, Detroit, Mich. (Central, 517), 9:00 p. m., News Orchestra; 3:30 p. m., Weather forecast; 3:35 p. m., Music; 9:00 p. m., News Orchestra.

Flies; 9:00-9:30, Continuation Program by Nelson Rogers; WAAJ Dance Orchestra; 9:30-9:45, Jack Sherman and Ruth Conner, soprano; 9:45-10:00, Pendleton, Olympic and American champion wrestler on "Wrestle You a Way to Strength"; 10:00-10:15, Fred Austin and Jack Boyers; 10:15-10:30, Maurice Snoch, Belgian lyric tenor; 10:30-10:45, Frank Hesser, tenor; 10:45-11:00, Dan Givens, tenor; 11:00-11:15, Vincent Powell Striano, pianist and composer.

WJAF, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert by the Sweeney band of the John Tarleton Agricultural College, Stephenville; 9:30-10:45, Concert by Peacock's Fiddo Band of Columbia, Texas.

WBAY, Columbus, O. (Central, 390), 12:00 p. m., Piano recital, Mrs. H. Lorch; 3:00-10:00 p. m., WBAY Orchestra, Francis Handshou, director.

WDAF, Kansas City, Mo. (Central, 411), 3:30 p. m., Musical matinee by Milo Fidler's Concert Orchestra; 6:00, School of the Air program; Speaker from University of Kansas; Children's story and information man; Fritz Hanlein's Trio; 8:00, Concert by Davis Orchestra and songs by Kansas City Star; Fritz Hanlein; 11:15, Valentine Froin of "Merry Old Chief" and Oon-Sanders' Hotel Melodious orchestra.

WDAF, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Stanley Theater; 12:30 p. m., Areadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 8:30, Weekly Opera Talk by Samuel Lee; 9:00, Secret of Labor Days; 9:30, Russian Gypsy String Ensemble.

WDF, New York, N. Y. (Eastern, 492), 4:00 p. m., Mrs. Pison, pianist; 7:00, Edgar Fairchild, pianist; 8:00, Lawyers' Mortgage Concert; 8:15, Prof. Howard Briggs; 8:30, Sales Literature Talk; 8:40, Alfred Shaw, tenor; 8:50, Secret of Labor Days; 9:30, Russian Gypsy String Ensemble.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Mover Davis Belliere Stratford Concert Orchestra; 2:00, WPI Male Quartet; 6:00, "Sunny Jim, the Sittler's Pal"; 6:30, Mover Davis Belliere Stratford Concert Orchestra.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Radio Doctor; 5:00, Concert Orchestra; 6:00-11:00, Vincent Lopez Hotel Statler Orchestra; 7:30, Digest of the Day's news; 9:00, Concert, produced by Whose's Lectur; 10:10, Howard Lanier's Areadia Cafe Dance Concert Orchestra.

WGY, Schenectady, N. Y. (Eastern, 360), 2:00 p. m., Gordon Talk; 7:45, Musical program.

WIJZ, Chicago, Ill. (Central, 448), 6:30-9:00 p. m., North Star Conservatory of Music, Oriole Orchestra.

WLW, Cincinnati, Ohio (Central, 309), 9:30 a. m., School, Editorial Staff of Sunday School Publication of the Methodist Book Concern; 11:00, Services, Church of the Covenant; Dr. Frank Stevenson, minister; 8:00, Special program.

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WVJ, Detroit, Mich. (Central, 517), 9:00 p. m., News Orchestra; 3:30 p. m., Weather forecast; 3:35 p. m., Music; 9:00 p. m., News Orchestra.

WHAS, Louisville, Ky. (Central, 440), 4:00-5:00, Selection, Walnut Theater Orchestra, Walter Davison, conductor; Selections, Grand Theater Orchestra; Harry S. Currie, conductor; Special weekly article: "The Labor Aspect of World Affairs," prepared for WHAS by International Interpress.

WHN, New York, N. Y. (Eastern, 360), 2:15-3:15 p. m., Jerome T. H. Remick Music Co.; 3:30-3:45, Dorothy Bruns, soprano; 7:30-8:00, Mrs. Hollett's Rose-land Dance Orchestra; 8:15-8:45, Duquesne Altona and His Capitol Palace Jazz Orchestra; 9:00-9:15, Duquesne Altona and His Capitol Palace Jazz Orchestra; 9:15-10:00, Jack Hirsch, baritone; 10:00-10:15, Broadway Musical Agency, John J. Dixon, leader; 10:15-11:00, Jimmie Doyle and Geo. Roberts; 11:15-12:00, Ted Berner's Orchestra.

WIP, Philadelphia, Pa. (Eastern, 509), 1:30 p. m., Luncheon, must, Gimble Brothers Tea Room Orchestra; Ray Steen, director; 4:00 p. m., Mah Jong Lesson; 6:00 p. m., St. James Hotel Dinner Dance Orchestra; 7:00 p. m., Uncle Wip's bedtime stories.

WLW, Cincinnati, Ohio (Central, 309), 8:00 p. m., Concert, Stiles Mabo Chorus and Male Quartet of the First Baptist Church; Cornet solo, John Phillips, baritone; Elyone Erb, cornetist; Mrs. J. E. Morrison, pianist; E. E. Morrison, tenor; S. H. Entertainment, weekly Woagley's Cincinnati Orchestra.

WMO, Memphis, Tenn. (Central, 609), 8:30 p. m., Program, Guyoso Hotel Orchestra, Gaspar Pappalardo, director.

WOW, Omaha, Neb. (Central, 526), 6:30 p. m., Randall's Royal Orchestra; 8:00, Omaha midget concert quartet, Leticia Jansen Wydo, soprano; Murray Spaulding Strures, contralto; Lawrence Dodd, tenor; Alfred S. Coopershaw, bass; Vernon C. Bennett, accompanist.

WOD, Davenport, Iowa (Central, 448), 12:00 p. m., Chimes; 3:30 p. m., Educational Lecture; 5:15, Chimes; 8:30, Sunday's visit; 8:00, Musical program, Erwin Swindell, musical director; 10:00, Musical program.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt, 12:30 p. m., Vocal maker's Crystal Tea Room Orchestra; 4:45, Organ recital, Mrs. E. H. F. Barrett; 7:30, Hotel Statler Concert Orchestra; 9:15 p. m., For Theater Grand Orchestra; Erno Rango, director; 10:03 p. m., Organ recital, Mary E. Vogt; 10:30 p. m., Havana Casino Orchestra from Hotel Statler.

WOR, Newark, N. J. (Eastern, 405), 2:30-2:45 p. m., Marion Lados, sopr.; 3:30-3:45, Marion Lados, sopr.; 6:15-7:30, "Musio While You Dine," Harry Currie and His Hotel Tabor Treat Orchestra; 8:00-8:15, "Hollywood," Current Motion Pictures; 8:30-8:45, "Jolly Bill Steinke," Radio Cartooning; 9:00-9:15, James W. Barrett, N. Y. World; 9:15-10:00, South Side High School Orchestra; 10:00-11:00, Frank Dalley's Meadowbrook Dance Orchestra.

WOS, Jefferson City, Mo. (Central, 440), 8:00 p. m., Musical program by the Missouri State Prison Dance Orchestra, Bush O. French, Director, extraordinary piano solos by Harry M. Snodgrass, the "King of the Keys."

WBS, Atlanta, Ga. (Central, 429), 8:00-9:00 p. m., Harp, Mandolin, Guitar Ensemble, Griffith School of Music; 10:15, John Garner, guitar; Backwoods Musicians in Oldstyle program in honor of Governor Alf Taylor of Tennessee.

Sunday, March 23

OKA, Montreal, Can. (Eastern, 425), 1:45 p. m., Organ concert, Instrumental recital.

Los Angeles, Calif. (Pacific, 469), 10:30-10:55 a. m., Service by L. A. Church Federation; 4:00-5:00 p. m., Vesper service by L. A. Church Federation; Musicians; 8:45-9:30, Concert; 8:00-9:00, Concert from Ambassador Hotel; 9:00-10:00, Examiner Concert; 10:00-11:00, Concert.

KNF, Shenandoah, Va. (Central, 265), Sacred song service; 8:30-9:00, Radio recital.

KFSG, Los Angeles, Calif. (Pacific, 278), Full church service and radio concert; 10:00-11:00 p. m., Examination.

KHJ, Los Angeles, Calif. (Pacific, 395), 10:00 a. m., Examination; 10:30 a. m., Examination; 11:00 a. m., Examination; 11:30 a. m., Examination; 12:00 p. m., Examination; 12:30 p. m., Examination; 1:00 p. m., Examination; 1:30 p. m., Examination; 2:00 p. m., Examination; 2:30 p. m., Examination; 3:00 p. m., Examination; 3:30 p. m., Examination; 4:00 p. m., Examination; 4:30 p. m., Examination; 5:00 p. m., Examination; 5:30 p. m., Examination; 6:00 p. m., Examination; 6:30 p. m., Examination; 7:00 p. m., Examination; 7:30 p. m., Examination; 8:00 p. m., Examination; 8:30 p. m., Examination; 9:00 p. m., Examination; 9:30 p. m., Examination; 10:00 p. m., Examination; 10:30 p. m., Examination; 11:00 p. m., Examination; 11:30 p. m., Examination; 12:00 p. m., Examination; 12:30 p. m., Examination; 1:00 p. m., Examination; 1:30 p. m., Examination; 2:00 p. m., Examination; 2:30 p. m., Examination; 3:00 p. m., Examination; 3:30 p. m., Examination; 4:00 p. m., Examination; 4:30 p. m., Examination; 5:00 p. m., Examination; 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Meditations by the Inventor of King Miloplex

Part XXIV—Spider Web Coil and Variometer Wave Traps

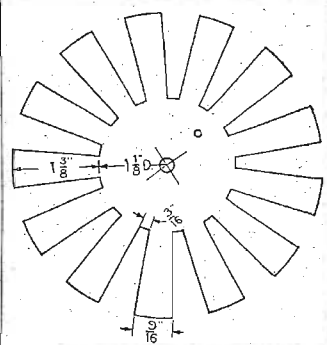
By the Mystery Man

HI! Don't rush me; how can I tell who was on the air at eight bells in Des Moines, Iowa, with a spark set that you couldn't filter. You see, Mr. Brockett, there are approximately 15,000 hams sea going now and then and while I have been able to watch 12,706 of them, I rather doubt that I can keep track of the balance because too many B. C. L.'s have their tubes oskulatin and the whistle bothers my reception, which is but a prelude to a straight from the shoulder talk to you B. C. L.'s who are jamming the air with whistles and shrieks to the extent that the first thing you know Uncle Sam will be having you pass an examination on "How Not to Tune Your Radio."

Eliminating Reradiation

I don't care how much you cuss or discuss the terrible amateur spark interference, but before you do so—Be Yourself—Be yourself by thinking it over—perhaps when you get on the air—your set is jamming—whistling—doing a lot of little dodgy tricks that is absolutely preventing the neighbors within a half a mile from getting any reception whatever. "What's fair for the goose is fair for the gander" and you have no more right to

with ordinary care there is little if any necessity for those owning such receivers, causing their neighbors annoyance—the big jam comes primarily through our not



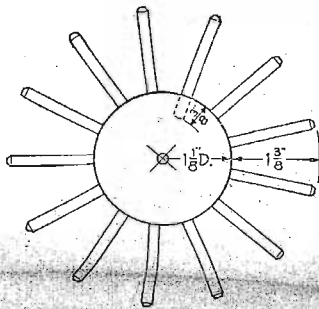
having any consideration for others.

Three Circuit Sets

Loose coupled two or three circuit sets are not only much more selective but at the same time greatly assist in the elimination of reradiation, while the two circuit loose coupled Radio frequency receiver—void of regeneration most closely approaches the ideal.

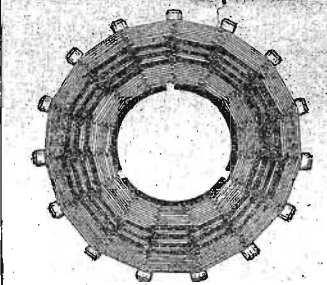
Wave Filters

Which all brings to my mind the inside story of my experiences with variometers (Yes—split) and spider web coils as wave filters both of which can be arranged so as to make dandy wave traps. Of the two the spider web stunt is my pet as it is not only very compact and efficient but is easily tucked away in a corner of your set out of the way or can readily be mounted upon a condenser. One manufacturer thought so well of this spider web idea he built up a law to my specifications an artist's drawing of the scheme is shown in the figure, while



shoot a lot of whistles into your antenna, thereby putting on the best little interference act in Radio—than the spark amateur has when on the air after spark time. If you sincerely want to enjoy Radio reception, then every man of you should organize in your locality a No Whistle Club, making yourself a charter member by sincerely promising yourself that you will try your goldardedly not to let your set whistle—that when it does you will say "That boy, now I am keeping my neighbors from hearing anything"—Don't do it, Bill!—When you run the dial into a whistle—hustle out of it and the first thing you know everyone will get this bigger idea of playing fair while the result can only be better Radio for all concerned.

It is quite generally understood that single circuit receivers, particularly if of the regenerative type, are the worst offenders as they most easily transmit to the antenna—yet it is often true that



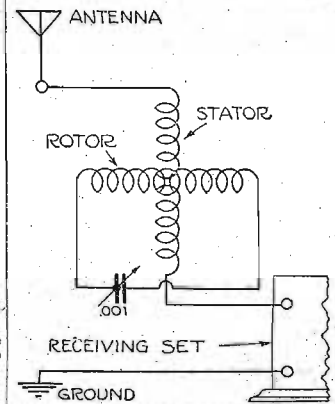
the trick of making it in case you care to "roll your own" follows.

Winding Spider Web Coil

The form for winding should follow the illustration and should be of the dimensions shown—or if you elect, an odd number of round pegs may be used on a spool. Number 22 dcc. or des. may be used for the 60 turns required, while number 18 or number 20 should be used for the 8 primary turns. Start your winding, using the number 22, by beginning at the center or inside circle of the spider web form and wind outward, each turn to be woven under one arm or pin and over the next, then under the third and over the fourth and so on until you have completed the turn, then as you begin each additional turn advance the beginning of your winding or weaving two pegs or arms—for illustration suppose you are to use a form as in figure 2 which has 13 arms—then your first turn would follow thus—under 1 over 2, under 3 over 4, under 5, over 6 under 7, over 8, under 9, over 10, under 11, over 12 and over 13. Now for the second turn we would advance under 1 and 2 and start over on 3 under 4 and so on, advancing two numbers for each turn, the reason for this is to distribute the voltage between turns and to neutralize the condenser per adjacent turn effect.

But stop—on—with the trap, continue the weave winding of the number 22 until you have a total of 30 turns then slightly space the next ten windings or those from the 30th to the 40th, leaving a space between each turn approximately the diameter of number 18, from the 40th turn wind or weave as you did the first 30 turns until you have a total of sixty turns which finishes this winding.

Our next step is the winding or weaving of the No. 18—eight turns are used, tapped at the 3rd and 5th and 7th—this winding



being wound or interweaved between the 31st and 40th turn of our first winding, for which we previously provided a space. Another and better method is when you have reached your 30th winding on the first coil to start the 31st turn through (Continued on page 26)

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\$ 5.00 Turner, 3000 ohms.....	2.75	\$55.00
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8.00 Western Superior.....	2.50	8" Amco Babelite.....
12.00 Bellows Type C.....	7.00	4" Amco Babelite.....
7.00 Federal.....	4.85	Reel Socket.....
6.00 Foster Precision.....	4.15	Meico Socket.....
5.30 Stromberg-Carlson.....	4.50	Triple Socket.....
3.75 Patent 3000 ohms.....	3.35	Radio Socket.....
12.00 Dr. Scholl's 6000 ohms.....	5.75	Chelton Socket.....
RHEOSTATS		TRANSFORMERS
1.00 Fada 30 ohm.....	.85	7.00 Federal No. 65.....
1.00 Federal 25 ohm.....	1.25	5.00 Acme.....
1.00 Amco 6 ohm.....	.50	5.00 All-American.....
1.25 Amco 20 ohm.....	1.10	7.00 Amertran.....
1.25 Amco 30 ohm.....	1.15	4.50 Thornderson.....
1.50 Cutler Hammer 6 ohm.....	1.40	12.50 Como Duplex.....
1.50 Cutler Hammer 30 ohm.....	1.15	15.00 Modern Push-Pull.....
.80 Klinger 6 or 30 ohm.....	.69	15.00 Kira.....
1.00 Patent 6, 20 or 30 ohm.....	.90	12.00 All American E. F.....
2.00 Kilostat.....	1.85	4.00 Hasle B. F.....
1.80 Bradley-Stat.....	1.70	5.00 Durastat R. F.....
1.80 Bradlostat.....	1.70	5.00 General Radio.....
2.00 Elmcostat.....	1.70	POTENTIOMETERS
LOUD SPEAKERS		1.25 Patent.....
\$30.00 Music Master.....	\$24.00	1.50 Amco.....
35.00 Magnavox.....	29.00	1.50 Cutler Hammer.....
20.00 Irtalid.....	28.00	1.50 General.....
15.00 Bruvies.....	3.50	MISCELLANEOUS
10.00 Pathé.....	16.00	Pathé Transformers.....
Baldwin Unit.....	4.85	Cockaday Collis, Precision.....
Amer. Radiodyne.....	3.95	Cockaday Collis, Easton.....
Genaco Music Master Unit.....	6.00	Amplex Quid Denser.....
JACKS AND PLUGS		Lavite Resistances, 48,000 ohms.....
Patent Double Jack.....	.70	\$2.00 Bartz's Cold Amco.....
Patent Single Jack.....	.60	Eria Crystals.....
Federal Single Jack.....	.65	Brach Lightning Arrestors.....
Danstrom 4 Way Plug.....	1.20	
Cox 2 Way Plug.....	.55	
Western Plug.....	.90	
VARIABLE CONDENSERS		
\$2.00 Signal.....	\$1.40	
2.50 U. S. Tool.....	1.75	
1.80 Amco.....	1.30	
2.50 Signal.....	1.60	
2.75 Comco.....	1.65	
2.30 17-Pl. Amco.....	1.65	
2.50 Signal.....	1.85	
2.50 Amco.....	1.85	
2.75 Signal.....	1.95	
3.25 U. S. J.....	2.85	
3.50 Comco.....	2.85	
3.50 Amco.....	2.75	
VERNIER CONDENSERS		
6.00 Hammarlund.....	4.95	
6.50 U. S. Tool.....	3.50	
3.50 Sexton.....	2.85	
5.00 Sexton.....	4.25	
1.50 U. S. L.....	3.10	
4.00 Amco.....	2.85	
IS-PLATE		
6.50 Hammarlund.....	5.05	
5.00 U. S. Tool.....	3.60	
4.50 Comco.....	3.75	
6.50 Sexton.....	4.50	
5.00 U. S. L.....	3.45	
4.50 Amco.....	3.35	
H-PLATE		
6.50 Hammarlund.....	6.25	
5.50 Sexton.....	4.75	
6.50 Sexton.....	5.40	
6.50 Amco.....	5.45	
5.00 Amco.....	3.95	
4.50 Amco 17-Pl.....	3.35	
5.50 Amco 48-Pl.....	4.10	
3.00 Compensating Con- denser.....	2.65	

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The Octopus—A Warning

An Open Letter to a Contemporary Editor

GEORGE Washington was lauded because he saved the American public from TAXATION WITHOUT REPRESENTATION. Arthur Brisbane points out the same body of public is suffering from TAXATION WITHOUT REPRESENTATION to a greater degree, now at the hands of trusts, than the people of this country did under the rule of King George.

George Schubel, secretary of the Radio Broadcasting Society of America, calls the attention of Mr. Brisbane to a tax UPON THE SOUL of men. Mr. Schubel's letter is open. Read it:

"But, my dear sir, you have not covered a taxation which is worse than the taxation upon our everyday needs, that is a tax UPON THE SOUL OF MEN.

"Do you know that the American Telephone and Telegraph company is reaching out its mighty tentacles for the exclusive control of the greatest blessing so far conferred on mankind? This gigantic octopus has already bought up every Radio broadcasting patent necessary to its monopoly, so that we have now the American Telephone and Telegraph company absolutely controlling the broadcasting situation.

"This means that one powerful company is coming into control of the MUSICAL, RELIGIOUS and LITERARY output of the entire American people.

"Radio broadcasting is mightier than the press. It can reach six or more million American people at the present time with one message simultaneously. Recently the Christian Endeavor society approached the American Telephone company for the privilege of broadcasting a ten minute religious service. The president of this society was told that it would cost him \$100 for ten minutes. Several hundred dollars per hour is now being paid by the Young Men's Christian Association for the broadcasting of Dr. Cadman's talks on Sunday afternoon.

"The Telephone company in a very short time, when it has litigated the various independent broadcasting stations, steps for which have already been taken, WILL BE ABLE TO SAY THAT RELIGIOUS SERVICES, dramatic production, literary, news and EDUCATIONAL matter SHALL OR SHALL NOT BE BROADCAST TO THE American public."

Controlling Direction

Little by Little the Science Takes Strides

A REPORT comes from Guglielmo Marconi that he has succeeded in sending messages in any given direction. He claims that he has harnessed Radio so that messages are projected as a beam to be turned in any desired course. We are all aware of the fact that the waves now spread in all directions. By the beam method communications have been transmitted 2,250 miles.

The method is kept a secret. When this thing has reached perfection, it will revolutionize Radio. This system would enable messages to be sent, and broadcasting stations could transmit, in different directions without interfering with each other.

In the new method only a fraction of the electrical energy is used in comparison with the power commonly required. This would bring about a radical change in the industry.

It is quite evident that Radio will have a brilliant future and that it is still an infant. Some day the trains, trolley cars and automobiles will take their current from the air. Only recently experiments abroad have been effective in stopping automobiles by Radio, the waves acting on the magnetos. This has been accomplished within a certain radius of the broadcasting station. Radio is but a toy, but a big one at that; the practical invention will come later.

Hands across the Sea

An Exchange of Programs from Country to Country

A BRAND new version of "hands across the sea" has come to us through Radio. The possibilities of future convenience and human progress can hardly be estimated. Canada and the United States are bound already in these invisible Radio bonds, sending and receiving instructive and entertaining programs every day. There is no reason why other countries should not be so connected.

RADIO INDI-GEST

So They Took the Ether and Sold a License to St. Peter at the Pearly Gates

By Indi Himself

"WHAT'S all this muss about the Ameri-ashean telefunny company grabbing the ether away from us?" asked Chief Whoosis of Walla Walla as he turned off his monopolized tube and quit listening to "music trust" songs being played at a "drama trust" show at an independent broadcasting station un-"licensed" by the S. P. U. G., the S. P. U. G., the Y. M. C. A., etc., but still, thank God, the station WAS licensed by the U. S. government.

"Well I'll tell you how it is," said I, adjusting my patent automatic bow tie, licensed by the General Electorate Co., of Shingonocaddy, New York. "It's a long story, beginning at the depth of despondency but culminating even higher than Paradise. . . . Yes, yes, the Ameri-ashean telefunny company has even patented improvements on Heaven and intends to prosecute St. Peter for infringement if he doesn't kick in and get a license. And so we may truthfully say that the Ameri-ashean telefunny company's aims are much higher than Heaven itself.

"YOU see during the war a bird by the name of Commander Hou-purr, of the navy, saw his chance to be in good with the General Electorate and purrod to the boss director of the G. E. 'Boss, now's your chance to grab a lot of important patents while the people are busy fighting for democracy. I'll show you how and they'll never get wise. Before long Radio's going to mean a lot of jack to somebody. Why not us?"

"So the General Electorate got busy getting patents. Not to be out-done, the Ameri-ashean telefunny company nailed a few patents themselves, having good and reliable connections with the place they give out patents. And the West-inhouse company saw their two playmates active, and bought the degenerative patent from a Madyur Strongarm, who, by mistake, had already given away a lot of licenses on his set. So he got his half-million in bribes.

"But the Radio Chlorination of America had a lot of genu-winely value-bull rights and patents, one of which was the Phleming Valve which Mr. Phleming accidentally noticed when working for Thomas Edison's laboratories in 1883 and suddenly developed as a new brainchild of HIS own in 1904, after residing in England numerous years. But the Radio Chlorination inherited the Phleming antique from the old Macaroni Co., so the British patent became respectable and was used to keep Doc De Forest, an American, from getting any real money out of his basic invention, which is the triode or three-element tube we pay five bucks or more for today, but not to Doc, of course.

"SO THE 'powers that be' saw one another getting a lot of nice money, and decided that if they'd trade cards, they could all beat the Public, who was in on the deal but out of the swapping of cards. They swapped cards, but each one of them saved the best for himself, thinking he'd beat the other guy.

"The cards were patents, nothing else but. The trio told the Public, who held the fourth hand, that they were just playing a friendly little game for fun, and that he, the Public, was to get all the benefits. Yes, yes. . . . hah, hah. My, yes. What a good job! He would give to listen to all their stuff, their interests, their style of religion, their ideas on education, child labor, pay, labor unions, etc. In fact, they would be so liberal as to SELL him sets so he could listen in.

"BUT the Ameri-ashean telefunny charity society didn't get in on the profits on the receiving sets of tubes, and therefore got peeved (so it appears on the surface) at the General Electorate of Skinnynectedly and the West-inhouse of Smokicety, Pa., who were scooping in oodles of coin from right and left, top and bottom, front and back. "The telefunny crowd said, 'We want a cut-in those profits, and if we don't get it, we'll shut down broadcasting stations, because we 'have obtained by VARIOUS METHODS' patents controlling it, and if there isn't any propaganda on the air nobody will listen to it, and if there is, we'll control it, and will MAKE THE PUBLIC PAY for it."

"But the West-inhouse and General Electorate refused to give the Ameri-ashean telefunny gang any of their hard-earned profits, and so the telefunny gang said, 'Here goes. Watch our smoke. We're going to sue an independent broadcaster first, because really you two other gangsters are sisters of ours under the skin, and besides you DID manipulate to get a broadcasting license from us, and in addition to those two things, the little independent has been showing up our big paid-start station."

So ended my story, but I was interrupted. "BUT, asked Chief Whoosis of Walla Walla, "How come the patent infringement suit against Heaven?"

"Oh, yes," said I, nearly forgetting what I had promised to explain to the Chief. "The Ameri-ashean telefunny company claims souls are transmitted to Heaven on electromagnetic ether waves and that they control the patent on the system. That's what they're going to sue St. Peter about if he doesn't get a license. But that brings up a very interesting point."

"What is that?" asked Chief Whoosis. "St. Peter," I replied, "told the Ameri-ashean telefunny company that they'd first better go to Hell."

Mrs. Partington Speaks Out

Dear Indi: Mrs. Partington says, "This Radio casting and deception is wonderful." She is going to get one of these Soup-Heater-Diners with a whole block of street lights in it, as soon as she can learn the code to tell who WDAP is at Chicago, and what some of the other folks initials stand for. She thinks the pronouncers at WCAL, KSD, WSB and KFKX would make a fine mixed quartette. She knows how many meters make a mile, so she says DX won't puzzle her a bit. She is intrigued by the prizes, too, since she learned that she can get hams at WLW, and eggs from WBBM, and she does hope that 9XM will tell MacM. to bring her home a seal skin or two.



STENOGRAPH.

Uncle Sam Will Show Him How



Condensed

By DIELECTRIC

Mail order houses play a most important part in the life of farmers all over this country. Go into a majority of their homes and you will find articles of every description which have been purchased from one of these establishments. It is no wonder then that the first exclusively agricultural broadcasting station in the United States is to be owned by the Sears-Roebuck company. All that pertains to the welfare of the farmer may be expected to feature their programs. Much of interest to this class of citizens is a part of the programs now being given by other stations, but Mr. Dryden will no doubt provide far more than has been available from that source.

Future broadcasting of purely educational features will expand far beyond its present scope, though that is by no means small. I have repeatedly stated here that our colleges would recognize the vast field for service opened to them by Radiophony. At present there are twenty-one broadcasting stations owned by these higher schools of learning. The poems of Robert Browning are not regarded as popular reading, yet the response from listeners to the course of lectures on this subject were sufficient to justify Columbia University in offering another series under the title of "Practical Politics," through WEAF.

Debates, in which "mike" plays an unobtrusive part, are becoming more numerous. The character of debates put on the air range over many subjects and include among the speakers men of prominence in everyday affairs, as well as students in our universities. One evening a debate was heard which took place at the University of Pennsylvania; another evening two preachers in the city of New York debated and the decision of the majority of Radiophans was opposed to that rendered by the judges present in the hall; other debates have received careful consideration on the part of listeners in, showing a wide-spread interest in this particular feature. These are informative and helpful.

When explorers leave our centers of civilization for remote unknown, or little known, sections of the globe they carry along Radio sets with them, thus increasing our knowledge of the science while maintaining communication with folks at home. MacMillan is near to the North Pole, yet hears the world's news through his receiving set. Doctor Rice plans an expedition into the Brazilian tropics where his Radio apparatus will be put to the test of overcoming powerful static conditions. Everyone interested in Radio will follow closely the reports which he will give, aided in the research by John H. Swanson, Radio expert.

Midnight broadcasting—yes, or no? It is for you to advise those stations putting out these programs. Your letters will receive consideration. I am informed by one listener in Chicago that there is entirely too much broadcasting at present. What is your opinion? It's the mass of listeners in whose interests are to be served and the stations can know the "mass" decision only through your letters, so I repeat, indicate your preferences—if you have any—and await results.

Listeners in England regard the programs from KDKA as a regular part of their evening's entertainment, thanks to local London stations relaying them. Now comes the news from Calcutta, India, of the relayed program being heard for a period of thirty-two minutes on the night of Feb. 23. That is something hard to visualize: music from Pittsburgh reaching London, then sent out again for dial-swingers in India to receive! Suppose they heard Judge Allen outlaw war?

The Latest in Super-Heterodyne Hook-Ups

Part II—How the Circuit Operates

By H. J. Marx

IT IS peculiar how many fans are trying to construct and operate super-heterodyne circuits without any real knowledge of the functions of the various controls. This is not an assumption but a statement of a fact that the numerous letters received daily from troubled fans clearly prove. For example, a typical question asked is: "Why is it that the condenser in the oscillator circuit has two points of reception for each wavelength and then the setting is not critical?"

Circuit Explanation

Instead of furnishing a real scientific analysis let us make it as simple as possible. The super-heterodyne circuit basically is a receiving set with numerous stages of Radio frequency amplification. In order to get better amplifying efficiency, the transformers or intertube coupling apparatus is designed to operate at a higher wavelength (greater amplification), which corresponds to saying lower frequency. Obviously this intertube coupling apparatus will not pass through the reception at its original wavelength. There is then an accessory circuit which serves the purpose of changing the wavelength of the original signal to that value at which the transformers or coupling apparatus gives maximum amplification and efficiency with least distortion.

Accessory Circuit

This accessory circuit is the oscillator and is controlled by means of a variable condenser.

The main circuit is tuned in the usual manner. The oscillator condenser tunes

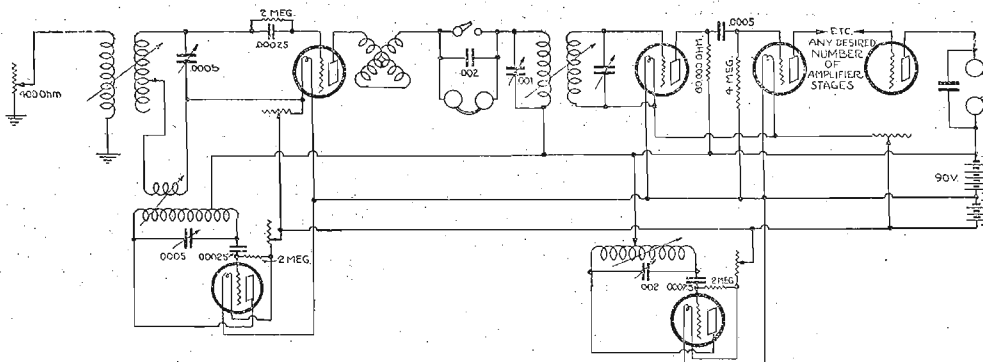


Figure 4.

cycles or 970,000 cycles. Naturally then, we have two condenser settings at which the incoming wave will pass through the long wave Radio frequency amplifiers.

Broadness in Tuning

Now for the question of broadness in tuning. Although the circuit may be designed for 10,000 meters or 30,000 cycles, it is an efficient job when the peak of the amplification curve will be fairly flat over

amateur who was one of the most successful in getting American stations during the recent Trans-Atlantic tests. His super-heterodyne was constructed especially for this long distance work and is presented in Figure 2.

The main tuning unit is a variocoupler with twenty turns in the primary and eighteen in the secondary.

The oscillator coil has thirty-four turns on a 2 1/2-inch tube and is tapped at the twentieth turn from the left for the B battery connection.

The amplification stages are resistance coupled with values as shown in the illustration.

The first detector has a variometer in the plate circuit for regeneration and is

coupled to the first long wave amplifier tube by means of an air core transformer in which both the primary and secondary is tuned by means of .001 variable condensers.

The circuit as shown was designed for wavelength of about 200 meters but by substituting coils of higher inductance in the oscillator, and using more turns on the variocoupler and the first transformer, the range is increased.

The Circuit has too many controls to operate and is a little beyond the fan but it's features are of interest for those who want to get better acquainted with foreign super-heterodyne circuits.

(Continued on page 24)

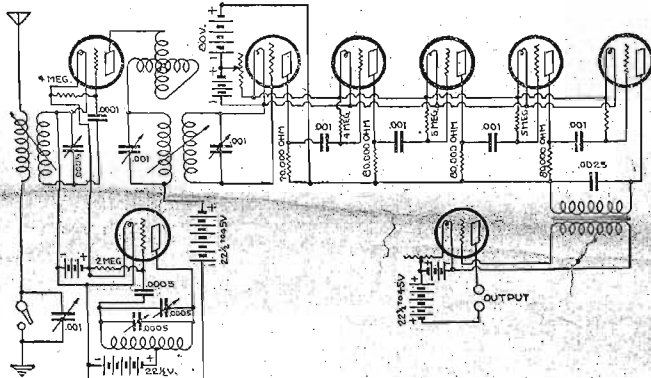


Figure 3.

the accessory circuit so that when it combines with the incoming signal the wavelength is altered to that for which the transformers are designed.

For instance, the broadcasting station which is received has a wavelength of 300 meters and is the same as saying a frequency of 1,000,000 cycles. The transformers, let us assume, are designed for a wavelength of 10,000 meters or 30,000 cycles. Then the oscillator has two possible adjustment values, either 1,030,000

a limited range. The oscillator circuit can actually have a certain amount of variation without an apparent effect. If the oscillator is not adjusted for the center of this curve, the reception will be distorted on very high or very low notes.

Therefore, when your oscillator condenser appears to be broad, set it at an approximate center of one of the two bands at which you get clear reception.

The Contant Circuit

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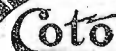
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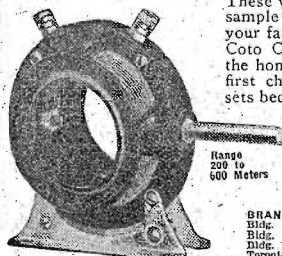
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THIRTY MINUTE A-B-C

(Continued from page 12)
waves setting up a feeble Radio current in a receiving aerial. A tuner, or selector, is then used to offer an electrical path of the proper shape and size for the particular Radio waves. The Radio waves have a certain size and the Radio current in the aerial has a certain dimension, and the purpose of the tuner is to adjust a package of the corresponding form to hold this Radio current. After the Radio waves out the receiving aerial, the received energy is an electrical current and the receiving apparatus now has to change this electrical current into sound waves. Neither the human ear nor a telephone receiver can be directly affected by the Radio current, so a device called a detector is used to change the Radio current into another electrical current which is of the right size, or slow enough to be able to set up motion in a diaphragm.

of energy conversions from one form to another and back again, much as one would change U. S. money into pounds sterling, then into lire, marks, etc., losing some at each change, or supplying new amounts to be influenced by the oid.

Essentials for Receiving Apparatus

For receiving broadcast programs then, one needs apparatus to intercept the radiated waves, means to tune to particular waves, a device to detect or change the received energy into a form which can operate a loud speaker or headset; also preferably, an amplifier and a reproducing device or loud speaker. There are various forms of these devices and combinations.

Types of Apparatus

Some standard types of receiving outfits are here listed:

1. Simple sets using crystal detector and outside aerial. These operate clearly with headset reproduction on broadcasts

THIS STRATUM IS THOUGHT ALSO TO REFLECT WAVES

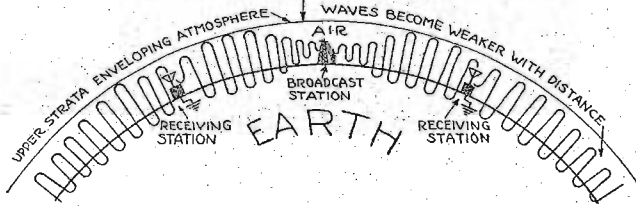


Figure 2.

The detector is thus an electrical converter and the new form of electrical current continuing in the receiving outfit is termed an audio current, because it can cause a diaphragm to move and set up air waves in a suitable apparatus.

What the Amplifier Does

Owing to the small amount of received energy, a receiving outfit usually needs an amplifier to build up the audio electrical currents to sufficient power to operate a loud speaker, and this is accomplished by supplying local energy from a battery which is merely controlled by the converted incoming energy. Finally the diaphragm of the loud speaker is set in motion and reproduces the original puffs of air so that they can be heard. The entire process thus comprises a series

from stations within a 25-mile range, occasionally much farther, and reliably, up to four miles. Cost \$5.00 to \$20.00.

2. Simple sets using one vacuum tube detector and outside aerial. Reliable range, usually 50 miles; average up to 500 miles, and occasionally 1,000 miles or more. Most such sets can be used within 5-mile range reliably with indoor aerial or substitute. This is for telephone reproduction. Cost \$25.00 to \$100.00.

3. Loud speaker operates on two stage amplifier with above sets, extra cost, \$30.00 to \$100.00.

4. Indoor loop, or portable sets, amplifying Radio energy before detection; reliable range usually 100 miles, average up to 500 miles, and occasionally 1,000 or more miles. \$100.00 to \$300.00 in cost.

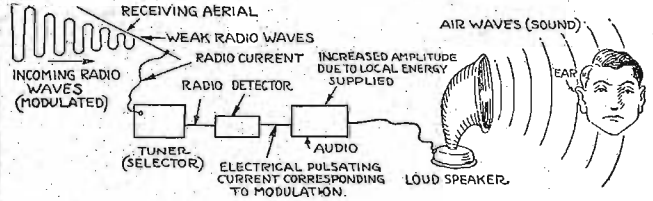
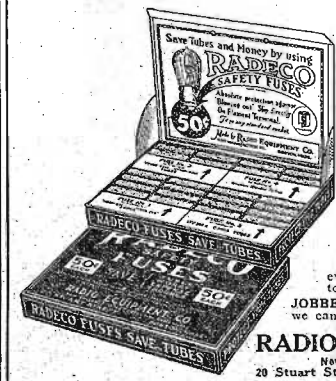


Figure 3.

5. Furniture Radio and cabinet combinations, including speakers; reliable range usually 100 miles, average 500 miles, and occasionally 1,000 miles or more; \$100 to \$400 in cost.

tions and permitting cutting through locals. The broadcast listener usually gets much information on such outfits from trade advertising, catalogs and instruction sheets. There is a big difference between operation close to local broadcasting sta-

91 1/2% of All Radio Tubes Are Needlessly Destroyed



Accurate estimates show that less than 9 out of every 100 tubes give their full normal service and 91 are destroyed—usually burnt out from excess current. The chances are 10-1 against you unless you use Radeco Safety Fuses

These tube savers are now saving thousands of tubes. They are endorsed by the leading Radio Publications. They slip on the filament terminals of the tube and in no way interfere with the operation of the set.

Price \$0.50 each (The cheapest insurance)

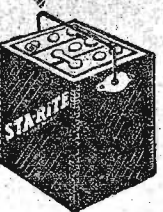
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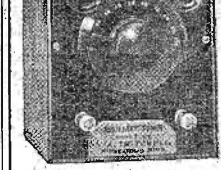
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A **TWITCHELL AUXILIARY TUNER** connected to any make of tube receiving set will positively cut out any local broadcasting or code stations so you may tune in all long distance stations any time regardless of local conditions.



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, \$3.00. 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

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HUNDREDS OF FANS

HAVE BUILT NEUTRODYNES UNDER OUR INSTRUCTIONS

Complete Parts for a

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5 TUBE NEUTRODYNE SET CONSISTING OF

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- 1 Set Freed-Eisemann Neutrodons
- 1 Drilled, Polished, Engraved, Beveled Bakelite, 9x28x1 1/2
- 5 Bakelite Sockets
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Complete instructions and prints and free testing of the set after you complete it.

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ALL FOR \$72.50

NEW JERSEY RADIO SUPPLY COMPANY
76 Springfield Ave., Newark, N. J. Dept. D

Simple Explanation of Radio for Everybody

Chapter XIII—The Neutrodyne Receiver

By M. W. Thompson

THE receiver whose popularity is now sweeping the country and which is known as the Neutrodyne, is one of the few new hook-ups or methods of reception which has gained fame through

without uncontrolled oscillations. The amplification and selectivity are remarkably increased without unduly increasing the number of controls. The reason the circuits cannot be

following explanation of the neutrodyne. **First American Neutrodyne**
The first American neutrodyne receivers were connected as shown in Figure 106.

the condition at the moment signals are being received on a 375-meter wave length. Signals are collected by the aerial and ground, and voltage is built up in the in-

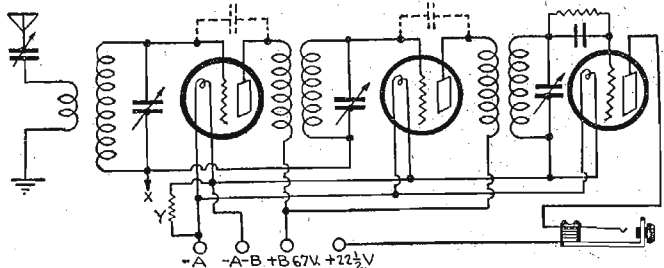


Figure 104.

genuine merit. Far too many are put over by clever publicity. Neutrodyne, however, is not merely a new method of connecting well-known parts nor just a name to exploit a single unit, but is a principle. If new units, or special uses for old ones are brought in with it, this is because they are necessary to effectively and completely carry out the principle.

Years ago it was realized that if all the circuits in a Radio frequency amplifier of from one to four tubes could be brought into resonance, amplification of a quantity and quality hitherto undreamed of would result. Selectivity also would be increased and the long wished for loud speaker reception on distant stations would be realized. Unfortunately the construction of present day vacuum tubes makes such circuits possible in theory only. When designed and con-

brought into resonance will be understood by reference to Figure 104. Apparently there is no electromagnetic or capacity feedback between the plate and grid circuits of any tube and therefore no means for regeneration to occur. If you will examine a tube you will see that the grid and its connection to the base form one plate of a condenser, while the plate of the tube and its connection form the other plate of a condenser, with vacuum acting as the dielectric or insulating material between. This is indicated by the dotted lines. Small though this capacity is, it is sufficient to pass energy back from the plate circuit into the grid circuit; when the circuits are brought to resonance regeneration occurs and the tube "spills," causing howls.

French Solution of Problem
The French have, for some time, had a circuit utilizing a nullifying capacity

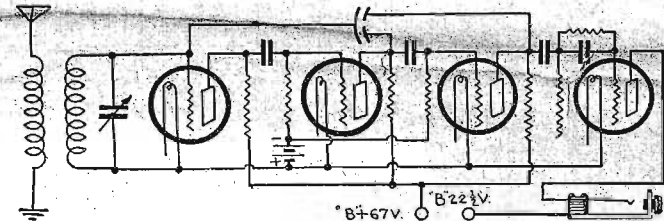


Figure 105.

neated, the circuits howled, squealed, oscillated and radiated like demons possessed, and compromises (Figure 104) between theory and actual practice had to be effected. The results were circuits that, while they worked, gave nothing like the amplification per tube that engineers knew should be obtained.

The Hazeltine Neutrodyne
Professor Louis A. Hazeltine helped solve half of the difficulty and brought us much nearer the ultimate goal by his neutrodyne principle which enables us to bring the grid circuits into resonance

which they term a "regeneration control." This is shown in Figure 105 and is used in connection with a "resistance-coupled" amplifier. As the capacity between the grid of the first tube and the plate of the third tube is increased, regeneration is increased and the amplifier used for the reception of unmodulated continuous wave signals. Reversing the condenser and increasing the capacity between the first grid and the second plate reduces the regeneration and tends to neutralize any undesirable oscillation. Why this is so will be clear after you have read the

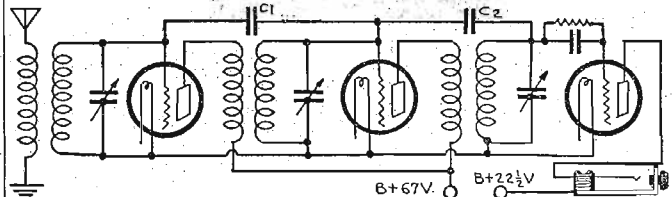


Figure 106.

It was found that minute condensers connected from grid to grid and properly adjusted, would offset the undesirable capacity existing in the tubes. These were so small that they were difficult to

ductance A. By induction, this energy builds up a voltage in the inductance 1-2. The inductance 1-2, the grid and the filament of the tube form a circuit; the inductance 3-4, the plate and the filament

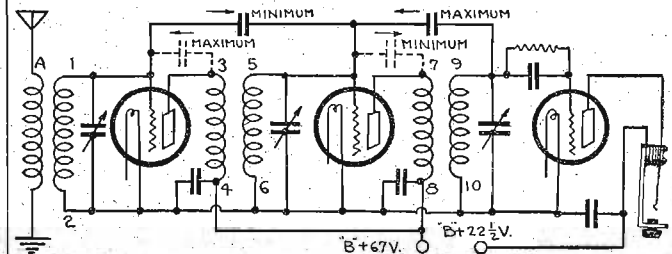


Figure 107.

construct and adjust. Their capacity was around .0001 mfd.

Theory of Neutralization
Why these condensers neutrodyne is shown in Figure 107. This circuit shows

of the tube form another circuit in which the voltage rises and falls simultaneously with the voltage in 1-2. At the instant depicted in Figure 107 the voltage in 1-2

(Continued on page 24)

CROSLLEY
for the Radio World

New Two Tube Set at \$18.50
REGENERATIVE

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

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Powel Crosley, Jr., President
Formerly
The Precision Equipment Company
and Crosley Manufacturing Company
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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.

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Agents for New York and Vicinity—AMBASSADOR SALES CO.,
74 Cortlandt St., Phone Cortlandt 6296

RADIO FOR EVERYBODY

(Continued from page 23)

and 3-4 is at maximum. One 800,000th of a second later the voltage in these coils will be at minimum during a reversal of the current flow in these circuits, which reversals occur at the Radio frequencies of 800,000 per second. At the moment

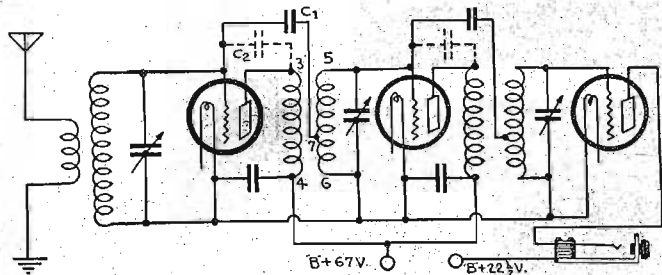


Figure 108.

shown, however, when the voltage difference between points 3 and 4 is at maximum, the voltage in 5-6 is at minimum. This condition is called "voltage 180 degrees out of phase."

If a condenser is connected between 5 and the grid of the first tube, the potential in it will be exactly opposite to the within-the-tube condenser which connects the first grid with 3. These two nullify each other's action and objectionable regeneration cannot occur.

Going now to the next tube we find that 5-7 and 7-8 rise and fall together. At the instant shown in Figure 107, the potential difference between points 5 and 6 and 7 and 8 is at minimum. Since the inductances 7-8 and 9-10 form a transformer exactly like the previous one, there is another condition of "voltage 180 degrees out of phase" and to nullify the small and unseen condenser in the second tube we can do exactly the same thing as previously. A small condenser called a "neutrodon" is connected from 9 to 5 which offsets the within-the-tube condenser across 7 and 5.

"But," says the man who has built a neutrodyne, "we do not connect the first neutrodon to the second grid. We connect it to a tap on the inductance 5-8. Why that?" This is done in order that a larger and more easily adjustable neutralizing condenser may be used. Neu-

tralization exists when we have an equation in which both sides of the equation balance each other. Each side is made up of several factors besides capacity, but for the sake of simplicity we will call it:

Inductance 3-4-C₂=Inductance 5-6+C₁.

In the above equation, the proportion of Inductance 5-6 to the total or of con-

denser C₁ to the total does not matter. Since we have found that the mechanical construction of a C₁ condenser for use in Figure 107, is impractical, it is but natural that we cut down on the factor 5-6 and tap off at point 7. Thus we can make C₁ larger and still get balance in our equation, because

Inductance 3-4+C₂=Inductance 6-7+C₁.
(TO BE CONTINUED.)

THIRTY MINUTE A-B-C

(Continued from page 22)

reliable and occasional range, as any vacuum set can at times reach several thousand miles when circumstances are favorable. Some are content to merely hear that a program is going on and decipher the call letters; others want clear reproduction, if only on locals.

(TO BE CONTINUED.)

Function of Potentiometer
A potentiometer looks like a rheostat, but has an entirely different use. Both ends of the winding are connected across some source of voltage supply. Then from one of the ends and the slider arm two leads are taken. The voltage between the terminals of these two secondary leads may be varied from zero to maximum.

SUPER-HETERODYNE

(Continued from page 21)

The Lathi Circuit

Mr. M. R. Luthi of Geneva, Switzerland, is another enthusiastic European amateur of the Trans-Atlantic tests. His circuit is what he built a special super-heterodyne for presented in Figure 4.

He makes use of what is known as a 180-meter Beverage antenna. The information available was not as complete as might be desired but the form of the circuit presents numerous interesting features.

The range of this receiver is from 200 to 400 meters. The coupler can be of any standard type for the wavelength range desired.

The oscillator coil windings were not described but can be assumed to correspond closely to the values presented for the Contant circuit.

The first pair of phones are described as the high frequency control phones. The second set really represents a loud speaker as the original circuit has six stages of resistance coupled amplification.

A double oscillator is used for both short and long wave heterodyne.

The Beverage antenna consisted of one wire 585 feet long supported by two posts, 14 1/2 feet above ground and running east and west. Very little parasitic noise was experienced with this type of antenna.

(TO BE CONTINUED.)

The Reader's View

Announcing Call Letters

As a Radiophan, I am writing you to see if you can give a little publicity to the matter of getting signals a little more clearly from the different announcers, as some announcers merely give their signal and station at the beginning of their programs. If they would repeat these signals more often, and if the long-winded speakers they sometimes have on their programs would make frequent reference to the station from which they are sending, it would give the fans a better opportunity

of catching the signals. A real fan is nearly always as interested in the signals as he is in the program.

I am quite certain that I have had Canada several times, as well as other distant stations, but due to interference or poor reception, would only get fragments of the program, and fail to catch the signals.—Clarence L. Rut, Beaumont, Tex.

Government Pay

Referring to your article "Army Radio Net Short of Hands" on page 7 of Radio Digest for January 5, 1924, I have been in the Signal Corps for three years, of which I spent two and one-half years in Alaska as Radio and telegraph operator. At that time the pay was approximately \$110 per month and we had to buy our own subsistence and cook it. Since I have left the service the pay of the enlisted man has been reduced considerably and it is small wonder that they are short of operators. Many of my old friends who were in the service with me have entered civil life where they get more pay. Now I believe if the Army Signal Corps would pay the higher wages they would get more men. There are big chances of advancement and learning a trade in the army.—Mr. John Penaz, Racine, Wis.

\$100 Reward

This would not be too much for the free service rendered you by the numerous broadcasting stations you listen in on. Because this service costs you nothing, it does not follow that you should not show your appreciation of this wonderful service. You owe a letter of thanks and appreciation to every station you have tuned in on last year. Make a record of every station you hear and write them a letter.—C. A. D.

KELLOGG USE-IS-THE-TEST

Build Your Radio Set With **Kellogg** Guaranteed Parts



KELLOGG Head Sets assure clarity and volume, a requirement for long distance reception. The magnet is of special tested steel and hardened by our own method and process, which controls the heat and time, electrically and mechanically eliminating any possible variation. The magnet windings are of great accuracy. The mountings, end plates, wire and insulation are of the best materials suited for the purpose.

Kellogg head sets are the lightest—used most popular on the market, and used by both experts and amateurs for their all around superiority. Handling these sets while listening does not effect reception.

No radio receiver is complete without a Kellogg head set. Be sure you get Kellogg so that you know you have 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



No More Shocks in Using the New **ALWELL** Wooden Handle Soldering Iron

The Alwell soldering iron, with its handle made of wood, affords the greatest boon to the builder of sets from the sudden and ruthless electric shocks often received from metallic irons. Built substantially of good material, furnished with either the small or large point, and equipped with standard cord and plug, Alwell is long lived and very serviceable. Above all, it offers one of the biggest bargains in Radio at

\$300 With Choice of Points Extra points 50c each

At all good dealers or **SENT POSTPAID ON RECEIPT OF PRICE**

HALL & WELLS Manufacturers' Representatives and Exclusive Distributors of **ALWELL** Soldering Irons
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JOBBERS Same territory is still open to live jobbers and dealers **DEALERS** for this fast and popular Alwell soldering iron. Immediate delivery assured. Better wire.

Do You Know PREMIER'S BIG "5"

Audio-Frequency Transformer
The smallest, most efficient Radio Transformer made. Maximum reproduction volume, minimum distortion. 100% shielded. Unconditionally guaranteed. Price, \$3.50. Rats 1 to 3, 1 to 4, 1 to 5, 1 to 10, \$4.50.

"MICROSTAT" Trade Mark
Super-Vernier Rheostat
New principle. Two windings in parallel. One 6 ohms, other 40 ohms. Absolutely noiseless. Bakelite moulded. Silver etched dial. Price, \$3.00, and worth it.

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Two Rheostats in One
Windings independent of one another. Each operates one tube. Simplifies wiring. Made for all tubes. Bakelite moulded. Silver etched dial. Price, all types, \$3.00.

"POTENTIOMETER" Trade Mark
Double Disconnect
Outstanding feature is the Double Circuit Breaker, which automatically disconnects A and B battery circuits. Prevents battery drain and burnt out tubes. Price, \$2.50.

"MICROMETER" Trade Mark
Variocouplers
Highly selective Variocoupler having 180 degree orientation and 20 A t e n a taps. Range 150 to 850 meters. A high quality Coupler. Price, \$3.50.

Ask your dealer to show you these "Big 5." Write for Free Bulletin No. 92 describing these and other Premier Quality Radio Parts.

Premier Electric Company
3510 Ravenswood Ave. CHICAGO

A Real neutralizing condenser

THE newly perfected Shamrock Neutralizing Condenser practically eliminates all body capacity. It has lock-screw adjustment—and is glass enclosed. These and other exclusive features—make this condenser a little wizard of efficiency. It permits one to neutralize a set with ease and precision—in the shortest length of time. Makes your work the equal of factory experts.



The Shamrock Kit, \$20

CONTAINS two of the above neutralizing condensers—and three Shamrock air core transformers mounted on U. S. Tool condensers. Another exclusive Shamrock feature. Inspect this kit at your dealer's today. If he hasn't it in stock, send us the coupon below.

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Send No Money **SHAMROCK MFG. CO.**
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Free Our guarantee of money refunded if the kit is not satisfactory, gives you a free trial over a reasonable period of time.
Gentlemen: Send me prepaid one Shamrock Kit, upon receipt of which I will pay postpaid \$20.
Name
Address
Dealer's Name

Shamrock—for Selective Tuning

Better Sets and Parts Is a Better Way to Radio

Good Reception Only as Good as Set

By E. T. Flewelling

WE HAVE been spending a lot of energy lately playing with the lower wave lengths in Radio; that is, from 25 to 125 meters, and many, many times in the "wee sma' hours"—it is 3:00 a. m. now—I have wished that about ten or twenty thousand of my good friends might be peering over my shoulder, so that they could see some of the things that happen in this exceedingly short wave length range. In this field one gets absolute proof of things—so absolute that there is no room left for doubt.

If I could drive home the facts of the case I would probably save many very

AN ENTHUSIASTIC FLEWELLING USER

Gentlemen: We finished building a one condenser super-set some time ago and must say that the results are wonderful. We can receive Detroit, Schenectady, Chicago, Pittsburgh and a few other points on a piece of wire about 30 feet long which is hung around the room. We have never built a set that is as sensitive, or as critical, and yet so easily controlled. Using the ground wire only, long distance reception is splendid. We are so sure. We have not as yet had any success in amplifying signals from the Flewelling detector but hope to in the near future.

It is the ideal set for places where erecting an outdoor aerial is not allowed.

We want to thank Mr. Flewelling and the Radio Digest for showing us how to get the most out of Radio at the least expense.

Very truly yours,
The Battery Shop.

valuable dollars for thousands of people. Probably I can't do this, but this little chat with you all is going to be a very earnest attempt at it, anyway.

Best Apparatus.

For over a year, now, I have been consistently pounding on one subject at least: buy only the best available Radio apparatus. When we buy clothes, etc., we know that the best is none too good, but we are compelled to listen to our pocket-book. The same is true to an extent of Radio, but with this very important exception, that as to the pocket-book, we find that we have suffered a dead loss, because we spent our money for a piece of worthless junk. I know, for I've done it myself. I know what it means to a youngster to spend three hard earned dollars for a condenser and then wake up a month or two later to find that he could have doubled the ability of his set with a better condenser—\$3.00 lost. So I have tried very hard indeed to keep others from learning these things in the bitter school of experience.

Short Wave Length

Let me tell you of a few things that happened around 75 meters, for instance,

First remember it's a very good rule which says that the shorter the wave length the better the apparatus used must be. The same apparatus will work at 1,000 meters and refuse absolutely to do anything at all at 75 meters. No guess-work here at all; either your set works or it is as dead as dead can be.

At 75 meters we can get good readings on our instruments that tell just how good a piece of apparatus is. We do not have to judge by the volume of sound; we just read it right off of the dial of the meter. For instance, one condenser lets us get a reading of 1.5 amperes, the maximum for our set; it is removed and replaced by another condenser, which only allows us a reading of 1 ampere. The second condenser is about two-thirds as good as the first at first glance, but unless altogether if one considers the case long enough.

Short Connections

Again, a short connection removed and replaced by a long one makes the set refuse to work. A piece of solid wire replaced by stranded wire—same story. A poorly designed socket half lost. A piece of solid wire replaced by strip copper—such wide gauge greatly improved results, and so on to your heart's content. Seventy-five meters, or thereabouts, doesn't argue with you for one moment; either you use the best that you can get or you don't use seventy-five meters.

Now the same thing is true of 200 to 600 meters, but of course, it is not as apparent to such a great extent. The difference between good and bad apparatus is there unmistakably, as those of us who have heard what one little tube can do are able to testify. Such results as these are ample justification for the writer's stand for better Radio apparatus, and it almost seems now as though his attitude in the matter is about to receive a little approbation from those who know.

Standardization of Apparatus

The Bureau of Standards called a meeting among those in the industry to consider the standardization of Radio apparatus. The results of this meeting are still growing very rapidly. The American Institute of Radio and Electrical Engineers, the Institute of Standards, and like organizations are all working earnestly toward this end and very good results must of necessity come.

Perhaps we shall find that it will go even farther; for instance, standardization is one thing, but grading of apparatus is another. We go into a store now and are asked \$10, \$6, \$3 or \$2 for a condenser, and must judge for ourselves which is the best one. Suppose we went into the same store and asked to be shown grade A condensers, or if we couldn't quite afford grade A, we asked for grade B. We would not have to guess what we were buying, because each article would be graded according to quality and price, and would bear some such mark as "Approved by the National Radio Manufacturers." There

is no such body that I know of, but it might possibly be formed.

A whole book might be written on this subject, but here is the outline of an idea which we all should support for the sake of our time, patience and pocketbooks, if for nothing else.

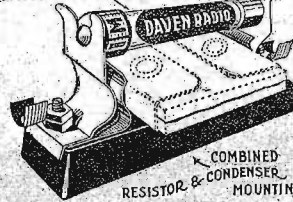
Association of Manufacturers

The formation by the Radio manufacturers of a disinterested body or laboratory that will test each product marketed to the public and grade these products as typical American merchandise of grade A, B or C, as the case may be, or some such similar idea that will be of benefit—and emphasize on this, of benefit to the manufacturer, the dealer and the public. There is no difficulty worth mentioning to be encountered in such an idea; it is already carried out very successfully in other fields; by the insurance companies, for instance, in the National Board of Fire Underwriters, who refuse you insurance on your house if you insist on using material in your electric light wiring that has not been approved by the national board.

Let us have a demand for such a board. Make the thing national and operate it by the national manufacturers; then, it can't be bought or influenced, and then, too, it will not only be an expert to select a real piece of Radio apparatus.

Let an element of uncertainty enter into a consideration of my idea, let me say here that I have no personal ax to grind. I see no personal gain in it, but I

DAVEN RADIO RESISTOR



COMBINED RESISTOR & CONDENSER MOUNTING

This new Condenser Mounting saves time and trouble when installing, changing or replacing your Grid Condenser or other fixed condensers. It eliminates the use of the soldering iron.

Use Daven Resistors for Perfect Results

(All Values, 5000 Ohms to 10 Megohms) Radio Engineers who know the importance of using only the highest quality parts in their experimental work find that Daven Resistors are the most accurate. They insure quietness and purity of tone reception. Send for Catalogue.

If your Dealer cannot supply you, write
The Daven Radio Company
"Radio Resistor Specialists"
13 Campbell Street Newark, N. J.

can see the enormous advantages of such a proposition and as I have consistently worked for it, I should be glad to do whatever I can to further better Radio.

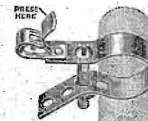
Watch Contact on Tubes

Often the contacts underneath the vacuum tubes become corroded and the circuit is not properly completed. It is a good plan to sandpaper the ends of the contacts occasionally, thus keeping them bright and shiny, so that they make perfect electrical contact.

Inefficient Tube Socket

Beware of the tube socket with no name on it. With some of the low price receptacles, the resistance between the grid and the filament connection posts has been measured and found to be as low as 5 megohms. The leakage through such a socket quite often makes a set inoperative.

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.

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MILWAUKEE: Julius Andrews Sons Co.
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GENUINE R. C. RADIOPHON TUBES... \$4.24

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Silk wound coil sets on Bakelite tubing... \$3.38
Cotton wound coil sets on plate tubing... 2.19
"LAYTON" resistances 48, 90 ohms... 1.19
"AMPLEX" Grid-condensers... .39
"AMSCO" 6-ohm rheostat with pointer knob... 1.04
"AMSCO" 20-ohm rheostat with pointer knob... 1.04
"AMSCO" 400-ohm potentiometer with ptr. knob... 1.47
"AMSCO" 29-pin audio transformer... 1.08
"COMO" Duplex Push-Pull Transformers (pr.)... 3.38

Complete parts for 5-tube COCKADAY set as specified in January Popular Radio... \$52.49
COMPLETE, LESS CABINET PARTS... \$12

ERLA REFLEX PARTS

"ERLA" Reflex Audio transformers... \$3.89
"ERLA" Crystal detector... .79
"ERLA" Latching waxed mica coupling... 5.78
"RAPHBUN" 11-plate condenser... 2.56
"RAPHBUN" 23-plate condenser... 2.68

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"BEEHIVE" 3-1 & 5-1 Audio transformers... \$2.79
"ACME" Audio or Radio transformers... 3.54
"ALL AMERICAN" 1-1 & 1-2 audio transformers... 3.92
"ALL AMER." 2-1 & 5-1 audio transformers... 3.64
"ALL AMER." Push-Pull transformers, pr... 9.95
"HORDANSON" Push-Pull transformers, pr... 3.57

VARIABLE CONDENSERS

(Moulded End Plates Guaranteed)
11-PL. Regular... \$6.84 Vernier with dial... 8.79
23-PL. Regular... 1.19 Vernier with dial... 1.49
43-PL. Regular... 1.34 Vernier with dial... 2.49

2 AMP. Battery Charger with "TRUNGAL" Bulb... \$9.19

5-Ampere size with bulb... \$16.45
"BREMER-TULLY" Vernier tuner... 3.94
"UNCLE SAM" Tuning coil... 4.76
"GOLD SEAL" 1-1 & 1-2 audio transformers... 13.24
"VALLEY" New style battery charger... 16.49
"WESTERN ELECTRIC" Victrola attachment... 9.19
"ATLAS" Phonograph attachment... 9.47
"ATLAS" Loud Speaker (Ambitions)... 17.44
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We carry one of the largest stocks in the country and can supply most any standard part at from 15% to 30% from the list price. Send us your orders and they will be promptly filled. Try our service.

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D864 R. C. 11 plate... \$1.05
D865 R. C. 22 plate... 2.85
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D647 Wooden type... 2.19
D648 Spring mounted... 2.53
D645 Workite... 2.95

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D628 Jefferson Star... 2.69
D629 Arma... 3.79
D654 Arma Radio... 3.79
D630 Eria Reflex... 4.15

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D628 Ambush... 3.25
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RHEOSTATS AND SOCKETS

D629 20 ohm rheostat... .49
D630 20 ohm rheostat... .49
D628 Metal socket... .59
D623 Mounted socket... .94
D634 Triple socket... 1.89

B BATTERIES

D660 225 volt largest... 1.45
D601 45 volt largest... 2.90

PYRAMID RADIO OUTLET CO.
23 DUANE ST., New York City

Morrison



Loud Speaker

TO HEAR a radio concert reproduced by Morrison creates an instant desire to own one of these faithful Loud Speaking Units. For it seems like magic to hear so truly the singing quartet and the sweet-toned violin. Even with full volume no harshness nor vibration creeps in.

Then, too, Morrison is adjustable—turn a little dial and regulate the volume to your taste. In surprising contrast to other units a Morrison you cannot be satisfied with less. Distant stations are unbelievably loud and clear and you can soften the tone if you wish.

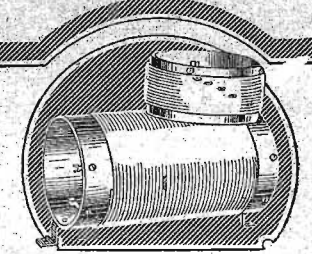
Every Morrison carries a "money-back" guarantee.

Handsomely Nickel Plated
\$10.00
Complete with 5 foot Cord
Free two-color catalog on request

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The market on Morrison is active. Our merchandising plan will interest you. Write immediately for details and discounts.

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The Only Authorized Cockaday Coil

Capacity effects, high dielectric losses, leakage, broad tuning and howling caused by coils made of cardboard tubes, shellac and cotton covered wire must be eliminated to get efficient results from Cockaday sets and other circuits.

Replace your old coils with the only Authorized Cockaday Coil, built exactly in accordance with latest specifications of Laurence M. Cockaday, inventor of the famous Cockaday Four Circuit Tuner.

Each Authorized Coil bears Cockaday's personal signature. Built on 5/8" hard rubber tubes, threaded (no shellac), and wound with double silk covered wire. Gives maximum selectivity, greater volume, sharp tuning, maximum sensitivity and tonal quality when properly hooked up. Guaranteed.

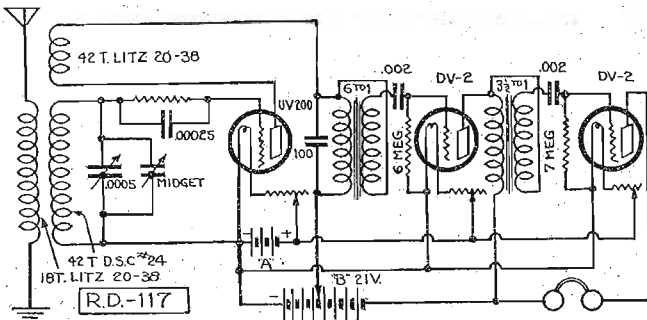
At your dealers, otherwise shipped to you postpaid

\$5.50

Approved by **ShwCockaday**

PRECISION COIL CO., Inc.
200-D Centre Street
NEW YORK

CIRCUIT THAT'S DIFFERENT, R.D.-117



PHILADELPHIA fans are all raving about Ireland's DX hook-up, so Mr. A. E. Ireland of 27 W. Elmwood Ave., Sharon Hill, Pa., sent us full details to pass on to our readers.

The circuit is a real long distance wonder, and when properly assembled has no body capacity effects.

It makes use of an unusual tuning coil, which consists of a primary, secondary and tickler. The primary is untuned, but its position in relation to the secondary

can be varied by sliding it along the tube on which the latter is wound. This feature, the designer claims, adds greatly to the selectivity of the receiver. Attention is drawn to the arrangement of the parts in the two stages of amplification. Fixed condensers are used in the grid circuits of each of the amplifying tubes, while the primary and secondary coils of the transformers are connected in parallel. The use of high resistance leads on each tube also should be of interest.

MILOPLEX WAVE TRAP

(Continued from page 19)

winding the No. 18 and No. 22 at the same time, until eight turns with their taps have been put on, then continue on with the No. 22 for the full 60 turns, as this makes a much neater job.

Our coil is now complete and, if made correctly, we should have seven terminals, viz., 1 and 2 the start and finish of our 60-turn coil, 3 and 7 the start and finish of our 8-turn winding, while 4, 5 and 6 are taps from the 3rd, 5th and 7th turn of our 8-turn coil.

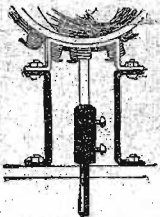
Connecting Filter

The connections for this trap are identical with that for the compound trap

NO MORE BODY CAPACITY

Shield your tuning instruments with HILCO Extension Sets

Attached in few minutes time; no extra drilling. Puts Variable Condensers, Variable Couplers, Variable Condensers or Inductance Coils back from panel. More efficient for reducing body capacity than shield or brass lining on back of panel, and far simpler to attach.



Price 75c Set

HILCO Radio Products are now sold by most dealers and jobbers. If your dealer or jobber can't supply you, send his name and stamps with order and we will supply you.

A. E. HILL MANUFACTURING CO.
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BROADCASTING STATIONS AND VACUUM TUBE CHART

A Radio Book That Sells at Sight! Used by all Up-to-date Listeners everywhere. LIST of Broadcasting Stations. SPACE for DIAL SETTINGS. Make a record of it so that you can go back to any station you have heard. CALL LETTERS of each Broadcasting Station. Wave Length. Frequency Key. Distance. Power in Watts, etc. ALL AT A GLANCE!

VACUUM TUBE CHART

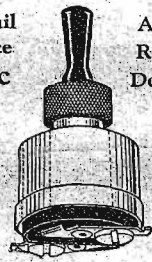
How to Select and Use Them The different RADIO TUBES illustrated. Tells you what TUBES to use to get the BEST out of your receiving set. Tells you the power and current required and consumed by the different tubes from Laboratory Tests. What TUBES work best with a DRY CELL or STORAGE batteries, or on B.T.H. A storehouse of information. If you SEE this book, you will want one. That's HOW GOOD IT IS!

Price 50 Cents
At Your Dealer or Sent Free on Receipt of Price. Remit by Money Order (No Stamps).
VAN PUBLISHING CO.
110 Nassau Street, New York

with series parallel switch, published in my article dated March 8th, or if series parallel switch is not desired, then terminal 3 goes to antenna, while terminals 4, 5 and 6 go to switch contacts; terminals 7 and 2 go to stator and rotor plates of a

Bradleyswitch PERFECT BATTERY SWITCH

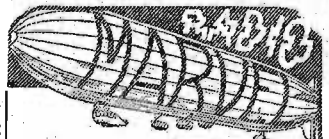
Retail Price 60c At all Radio Dealers



A Compact Battery Switch

The Bradleyswitch is a beautifully finished radio battery switch. It is extremely essential in sets using UV-199 tubes, to be sure the battery circuit is open when the set is put away. Easily installed. Pays for itself many times in longer battery life. Try one today!

ALLEN-BRADLEY CO.
290 Greenfield Ave., Milwaukee, Wis.



\$110.00	Crosley Receiver, Type 3C.....	\$102.00
42.00	Crosley Receiver, Type Y.....	39.00
12.00	Westinghouse Storage Batteries.....	6.39
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AMSCO VERNIER VARIABLE CONDENSERS		
32	Plate, \$4.00; 43 Plate (4 in. dia.).....	4.50
25	Amso 6 other Rheostat, without dial.....	25
Amso 20	and 30 ohm Rheostats, without dial	
Radio Solenoid Iron, with solder and one box	soldering paste, free.....	1.69
SUPER-HETERODYNE KIT, consisting of—		
1 B. P. Trans. No. 1716, J. A. T. Co., 1 A.	2 A Audio Trans., 5 By-pass Condensers, 1	Oscillo Coupler, 1 Tuned Pillar Coupler,
Pin Trest and Manual.....		55.00
REMITTANCES MUST INCLUDE POSTAGE		
Please do not send stamps		
SEND FOR OUR FREE MONTHLY PRICE LIST DEPT. R. D.		
MARVEL RADIO CO 110 NASSAU ST., NEW YORK		

.0005 variable condenser, and the contact on the switch blade goes to the antenna post of your receiving set. Elimination of the interfering station is accomplished in the same manner as described last week, in which we tune in the interfering station by use of the switch taps and rotation of the trap's variable condenser, and then use the set's tuning apparatus for bringing in the desired station, which was carefully explained last week.

With practice it is quite surprising to note the real efficiency of this remarkably simple device. Quite naturally, one should not expect equal results with a homemade coil of this character as with the manufactured product, as great care must be exercised in their construction, and I am hoping that spider-web traps of this character will be put on the market by reliable manufacturers, as they have of the type described in my first article.

Variometer Wave Filter

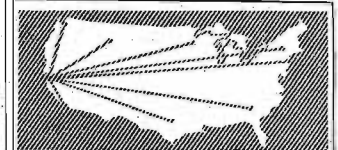
And now for the variometer type, because I quite realize "My Gang" is getting hungry for me to go back to "trick hook-ups," and I'm going to do just that—I'll say I will. Mercy, tricks are me all over, Maggie, and I'm sure in my glory—don't give a cuss whether I eat or not—oh, what a lie—when making a circuit do until I cussed it out and twisted its wires. All right, what's the variometer trap trick? Don't you dare laugh—if you do you can leave the room, you know. Maggie says, "If I spring this and call it a wave trap, she'll be after thinking I couldn't enjoy Paradise unless they gave me variometers for lunch." Well, I never could manage even a good cook, but I can a variometer, so why try to be a jack of all trades? Even went and stuck on in that loop regenerative reflex. Well, I had some room left, so why not?

All right—first you split the variometer—see, I knew he was going to do that—then take half the windings of the stator

off and sell 'em. Wait a minute; if it's one of them or those kind that have the stator wires hid under mud or bakelite, then forget removing them and take half the wires of the rotor—you know, we're going to make this or break our spiers.

Now we're ready to go—easy, wasn't it? How do you hook it up? Connect either the rotor or stator, whichever has all the wires left on it, to a .001 variable condenser. While one terminal of that which you took half the wire off of should go to antenna and its remaining terminal to the antenna post on your set, and what have we? Surely an inductively variable tuned trap. Certainly it works. Do you suppose he is kidding us? No, he doesn't know how; he's too old. All right, supposin' we make it and then—let's eat.

(TO BE CONTINUED.)



ON ONE TUBE

Broadcasting from Atlantic Coast, Canada, Mexico, Cuba and Hawaii heard in California by users of the CROSS COUNTRY CIRCUIT. Range due to simplicity. One tuning control. ANY NOVICE can build easily and cheaply. Dry cell tubes used. No soldering. Complete instructions. Blue print panel layout, Assembly Photo, etc., post-paid 25 cents. Stamps accepted.

WHAT USERS SAY
EAST—Am most pleased with the parts ordered from you. The first night hooked it up and received Omaha. Since then Minneapolis and Los Angeles. It works better without amplification than most sets with two stages.—Donald, S. C.
WEST—I am sending you a list of some of the stations heard on one tube: WSB, WGT, KDKA every night, PWX, WWJ, WTAM, WLV every night, CPAC, CHCB, No. 10ms ago I purchased another set of parts from you and first night got WGR, Buffalo, and KDKA, Ione, Calif.
NORTH—Received coils O. K. I have same results with these that I had with last will be wanting more. I am 1,500 miles from nearest station and have picked 50 to date. Chicago, Havana, Mobile, New Orleans and TWO IN ENGLAND
Lunenburg, Canada.
Send stamp for further information
BOE D-117
Vesco Radio Shop OAKLAND, CALIF.

The New
KEYSTONE
RADIO LIGHTNING
ARRESTERS

The new Keystone Arrester is made of genuine Bakelite with moulded-in binding posts and provides maximum protection against lightning and static charges. Fully approved by Underwriters—should be in every series lead the year 'round. Absolutely weather, dust and damp proof and has no vacuum to lose—it will operate for 31 years' experience in lightning arrester design. Sold in a red box by Dealers everywhere.

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Burned Out or Broken
RADIO TUBES REPAIRED

All Tubes Guaranteed to Work Like New
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RADIO DIGEST PUBLICATIONS
125 West Madison St. - CHICAGO, ILL.

Wave Trap Prevents Interference

Howls and Squeals from Nearby Sets Eliminated

This wave trap will tune out all the radiation interference of other receiving sets in a congested neighborhood if troubled with howls and squeals, and is especially adaptable to single circuit sets.

WORKSHOP KINKS? EARN A DOLLAR—

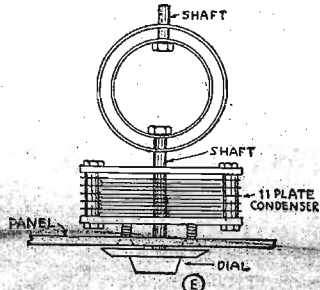
THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material.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

can be used with any circuit with good results, and is very simple to construct.

List of parts required:

- 1 Cabinet 6 by 6 inches, by 8 inches deep.



- 1 Shaft
- 1 Coil tube, cardboard, 3 3/4-inch diameter, 1 1/2 inches long.
- 1 Coil tube, cardboard, 4-inch diameter, 2 1/2 inches long.

CATALOG

Latest Reflex Neurodyne and Super Heterodyne Circuits. 40 Diagrams, latest Hook-ups. Largest Complete Stock.

SPECIAL American Reflex Neurodyne Super Sensitive Crystal, 35c ea. Hot as Hot. Every Spot. Hear stations clearly. **GUARANTEED ONE YEAR.** Jobbers and Dealers write for Quantity Discounts.

AMERICAN RADIO MFG. CO.
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Dept. V 10 West 14th St. Kansas City, Mo.

ELECTRAD VARIOHM

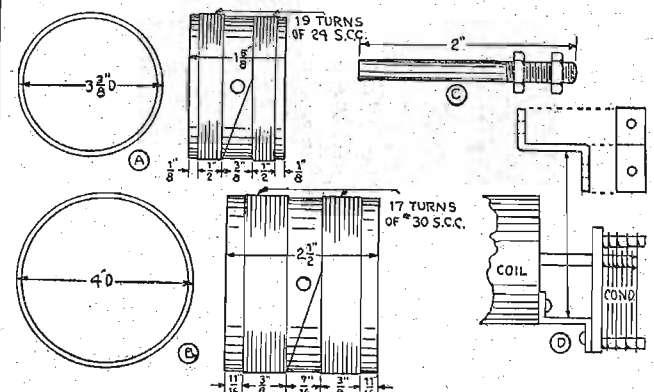
Doubles Your Distance Eliminates Circuit Noises

The Variohm enables you to get exactly the correct grid resistance for your tubes and set. Any resistance from 1/4 to 30 megohms by simply turning the knob. Once set, stays permanently. Built like a watch, yet never gets out of order. Moisture proof and non-microphonic. Can be used with any standard fixed condenser. Price, 75c, mounted, \$1.00.

At your dealer's, or direct. Satisfaction guaranteed or money back.

ELECTRAD, Inc.
423 Broadway, New York, N. Y.
Dept. L

CONSTRUCTION OF THE COILS



- 50 Feet Number 24 s.c.c. wire.
- 50 Feet Number 30 s.c.c. wire.
- 1 Small shaft with two nuts.
- 3 Binding posts.
- 1 Small brass angle piece.

Construction

The cabinet can be any small box large enough for the completed unit. It is not necessary to have a panel, or to shield same, as there is no capacity effect.

Purchase an 11-plate variable condenser, one with the shaft extending beyond the rear far enough to permit the rotor of the variometer to be fastened on it as shown at E.

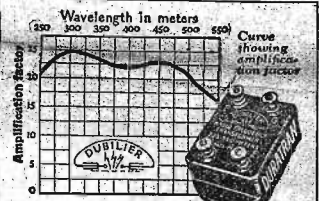
Wind the coil with Number 24 s.c.c. wire, 19 turns on each side of shaft A. Make a small shaft, C, about 2 inches long, threaded on one end, and fasten it with two nuts, one on each side of tubing on the other end of the coil.

The outside coil of the variometer B is wound with 17 turns on each side of the shaft with Number 30 s.c.c. wire and the bottom is fastened to the center screw on the rear of the condenser. To hold it firm, make a small brass bracket as shown at D.

The windings on both coils are in the same direction, clockwise and in series. The completed wave trap is shown in E. The circuit and how to hook it up and attach to a set are shown in G.

The wiring of the circuit is as follows: start with the binding post on the right top of the cabinet. Connect this to the rotary plates of the condenser and from

(Continued on page 28)



The Dubilier Dura-tran

The radio frequency transformer that amplifies uniformly over all broadcasting wave lengths. Price \$5.00 at good dealers.

Dubilier Condenser and Radio Corp.

44-50 West Fourth Street, New York

World's Greatest BATTERY BARGAIN

FREE Written 1-Year Guarantee 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. They will get a hydrometer and a "B" Battery FREE and they get the best battery built.

Compare These Prices

Five Per Cent Discount for Cash with Order	For UV-199 Tubes, Same Features as 2 Volt.
Special 2 Volt Storage Battery.....\$5.00	For WD-11 and WD-12 6 Volt, 80 Amps.....\$ 3.50
For WD-11 and WD-12 6 Volt, 80 Amps.....\$ 3.50	Tubes. Will run 200 hours on one charge.
6 Volt, 100 Amps.....\$ 5.00	Rechargeable. Special 4-V. Storage Battery.....\$5.00
6 Volt, 120 Amps.....\$ 5.50	
6 Volt, 140 Amps.....\$ 6.00	

Send No Money. Just clip this ad and mail with your name and address. The battery you specify will be shipped to you the day your order is received. When the battery arrives, inspect it—read our 2-year guarantee before you pay one penny. Get the "B" Battery and hydrometer FREE. Order today.

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AT LAST Intermediate Radio Frequency Transformers

Now you can build a Super Heterodyne receiver with the confidence that you will have "the best there is." You can log all stations and select them at will, with clear, loud speaker volume and minimum interference.

Branson Special Transformers have been designed for this work. Rigorous tests prove them far superior to anything heretofore available.

Our publication "Super Heterodyne Construction" makes it possible for the amateur to construct a complete and efficient Super Heterodyne Receiver.

Prompt delivery. At your dealer's or write for all information.

CHAS. A. BRANSTON, Inc.
835 Main St., Buffalo, N. Y.
In Canada—Chas. A. Branson, Ltd., Toronto, Ont.

THE GREATEST ADDITION TO RADIO RAJAH SOLDERLESS TERMINALS

For AERIAL, GROUND & BATTERY CONNECTIONS

Patent Pending

Instantaneous in Operation—Positive Contact

Just push removable part, attached to wire, on the base stud and it snaps into place. Double bronze spring clip insures perfect connection.

To insure it is as easy to remove as it is to assemble to the cable.

Patent Pending

A positive electrical connection in ten seconds, without solder or tools, that cannot pull out or shake loose and is as easy to remove as it is to assemble to the cable.

Base studs secured by No. 8-32 screws and will fit all "B" batteries with screw posts.

Rajah Snap Terminals allow instantaneous change in plate voltage with a secure connection, better than any other.

No owner of a radio set who has seen or used a Rajah Snap Terminal will ever use any other type of binding post.

Price: Snap Terminal and Base Stud, complete as illustrated, each, 25c.

Base studs are sold separately as they can be used whenever a change of connection is desired, thus permitting a quick change of lead to and battery wires from one set to another.

Special Introductory Offer: 1 Dozen Snap Terminals and Base Studs complete by mail prepaid, \$2.00.

If your Dealer can not supply you, order direct and we will mail prepaid.

Dealers get in at once for the best-selling radio device ever.

RAJAH AUTO SUPPLY CO.
Bloomfield, New Jersey U. S. A.

Adding Amplification to Crystal Receiver

One or two stages of amplification may be added to a crystal receiver with good results, but if this installation is contemplated it is advisable also to use a vacuum tube to replace the crystal detector, as batteries for filament heating and plate voltage must be provided for the amplifying stages and are therefore available for use with a detector tube. Sometimes, however, the crystal detector is preferable to give clearer and less distorted reception.

Aerial Strain

An aerial should not be fastened rigidly to a tree, because the wires may snap when the tree sways. An old automobile inner tube placed between the tree and the insulator is an improvement, since the tube has enough "give" to take the strain of the antenna wires.

AT LAST The Guaranteed Tube

Any Tube REPLACED That burns out within one year. That depreciates in quality within one year.

THE HARP

Pure Sweet Tone—Without Distortion

200 R—Radio Frequency.....	\$3.50
200 DA—Audio Frequency.....	3.50
200 D—Detector.....	3.50

Mail Orders Filled C. O. D. Dealers and Jobbers Supplied.

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MAGNATRON

MAGNATRON has a name that guarantees tube satisfaction and real tube performance.

The MAGNATRON DC 201A and the MAGNATRON DC 199 stand foremost among tubes today. At the new low list of \$5 they are an outstanding value.

Your Dealer Has Them!

CONNEWAY ELECTRIC LABORATORIES
309 Fifth Avenue NEW YORK CITY

Here Are the Names of First Persons in First Ten States and Last Persons in Last Ten States Ordering "Where I Go By Radio"

The Ideal Radio Record Book, with Unique, Complete Record System, Correct List Radio Stations, and other Useful Features; 2 Popular Editions, \$1.00, or 1 Holiday Edition, \$1.00, Between January 16 and February 9 as Per Special Adv. in This Paper.

First ten—W. W. Kany, Chasote, Kas.; Mrs. Garrido Bray, Pawnee, Okla.; A. G. Love, Beauport, Tex.; F. E. Reinart, Toluca, Mich.; W. W. Park, Cincinnati, Ohio; W. R. Fleming, Norton, Va.; Robt. H. Julius, Baltimore, Md.; G. S. Sherman, New York City; Sam'l S. Bonew, Windsor, Pa.; Leo C. Baldwin, Marietta, Ga.

Last ten—John E. Jardine, Nutsugen, Mich.; Claudio Argenti, Habana, Cuba; Burton Dyson, Tylerville, Conn.; A. L. Buck, Serrys, Okla.; John H. Kam, Buffalo, N. Y.; M. C. Moore, Macdonald, W. Va.; John Hoke, New Castle, Pa.; Chris Kemp, Jr., Springfield, Ohio; Dr. F. C. Allen, Bonham, Texas; Dr. E. A. Dunn, Plattville, Wis.

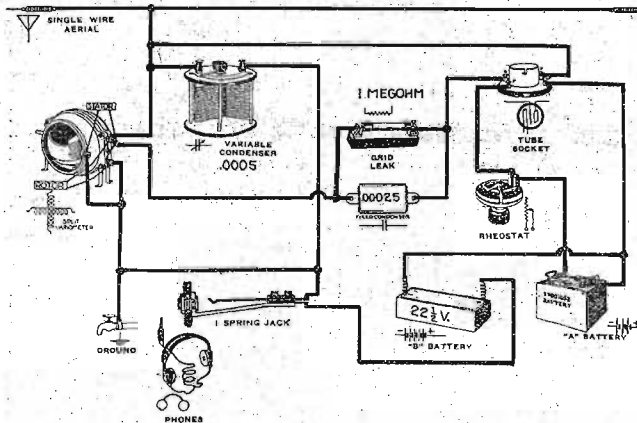
Orders were received from many other "Ra-Owls" in the same and other states and provinces, but above are the first and last ten as specified. Orders in that period from all above show 33 states, provinces and foreign countries represented.

This plan aroused such widespread interest that we will repeat it and will publish as herein but with new final date of April 10, 1924, instead of first and last persons in first and last ten states ordering 2 popular editions \$1.00, or one holiday edition, \$1.00, by April 10th. Order today for yourself and friends, then you and others watch for your name in our ads.

Radio Dept. **PROGRESS PRESS** Drawer D Union, South Carolina, U. S. A.

Please send us a good bookkeeping record of yourself showing you using "Where I Go By Radio" free with every book.

ANOTHER SPLIT VARIOMETER CIRCUIT



HERE'S still another of those split variometer circuits. Mr. Earl Addison of 4426 North Robey Street, Chicago, sent it in to us with the following comments:

"I am taking the liberty of enclosing a hook-up that I came upon quite by chance, and which has proved so good that I feel I'm through with further experimenting. After trying out the Reimartz, Flewelling, Cockaday, Neutrodyne, and others less well known, with more or less success, I developed the enclosed circuit which I feel has a little edge on them all.

"It is possible that this hook-up will prove of interest to your many readers, and I hope that, after carefully trying it out, you will see fit to publish it for their benefit.

"Night after night, with uncanny consistency, this circuit is bringing in Pittsburgh, Schenectady and other points of like distance, with practically no interference, and with unusual volume and clearness. The set is super-regenerative and performs as well without a ground connection as with it."

Circuit Test

For a simple test which will at least detect a complete break in a coil or transformer, one can employ a standard flashlight bulb and its battery. Connections to the bulb should be made to the conductor under examination, with the bulb in series with the circuit. The bulb will light if the connection is not broken. Bulbs of large current capacity must not be used for test purposes, as excessive flow of current through the delicate wires of a transformer is apt to overload them.

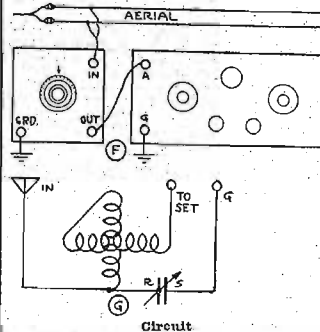
Size Wire for Inductances

Number 20 sec. or disc. wire is advised for single layer primary inductances. It runs twenty-five turns to an inch. Number 22, with thirty-one turns to the inch, should be used for the secondary and plate circuits. If variometers are used for tuning the grid and plate circuits, buy those that are wound with Number 18 or 20 wire.

HOMEMADE WAVE TRAP

(Continued from page 27)

there also run a connection to the rotor of the variometer which is connected in series with the stator of the variometer. The other end of the stator coil is connected to the lower right binding post on the receiving set. The third binding post on



the lower left side of the cabinet is connected to the stator plates of the variable condenser, and is grounded. If possible a separate ground wire on this terminal should be used.—F. T. Klib, Springfield, Mass.

Panel Shields

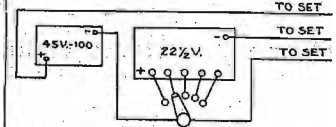
When shielding a panel, remember that the tinfoil glued to the inside of it must not touch any piece of apparatus. Cut the holes in it considerably larger than those where the shafts and screws pass through, so that there is no danger of having them touch, make sure this tinfoil shield is connected to the ground binding post only.

Do Not Use Bell Wire

Do not use annunciator (bell) wire in winding inductances for receiving sets. The wax coating on the wire reduces the efficiency of the coil by increasing the distributed capacity. If Number 16 or 18 wire is necessary use dec. It will prove entirely satisfactory.

B Battery Switch

The illustration shows a switch for a variable B battery. The parts necessary to make this device are one switch arm and from five to seven switch points. Mount these on a small wood panel, 3 inches square. Run a wire from each switch point to each plus terminal on the B battery. Run wire from the center



of the switch arm to the set, also run a wire from the minus side of the battery to the set, both in the usual manner. This little switch will enable the user to regulate the plate voltage without having to take the trouble of changing numerous wires. In case amplifiers are used the minus side of 45 or 100-volt battery is also connected to the center of the switch arm.—E. C. Higgins, Kansas City, Mo.

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

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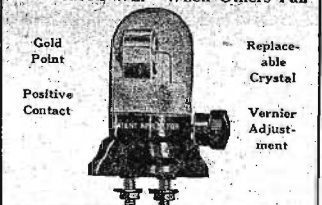
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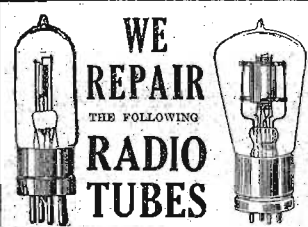
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JOBBER-DEALERS: This is a fast seller. Write for discounts.
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The FADA "One Sixty" is the four-tube Neutrodyne radio receiver that in selectivity, volume, distance and clarity equals the best results 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.
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30 ohms full resistance. No adjustment to puzzle. No dials to break. No Carbon Powder.

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\$500 IN CASH PRIZES! (NAME) (A CIRCUIT!)

\$250.00 first prize and 102 other prizes \$100.00 to \$1.00 for best names applicable to sensationally successful new Radio-Frequency hook-up using B-T 3-Circuit Transformer. Features of this circuit: no oscillation, no re-radiation, no complex adjustments. Radio Frequency mastered! Where others end it begins. Name this circuit, win honor and money! In case of a tie duplicate prizes will be awarded. Open to everyone. This contest closes April 5. Write for details today!

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Tube for Tube—the Most Powerful Circuits Ever Built. Write for free Bulletin No. 16
Electrical Research Laboratories CHICAGO. ERLA

Interference Comes from Regenerative Receivers

Watch Your Set and Tune In Without Oscillations

By L. W. Chubb

AS THE number of broadcast listeners increases, it is becoming more difficult to get clear, uninterrupted reception of the Radio programs in the congested districts of our cities. This is true in spite of the better and more powerful stations which transmit for our entertainment.

One of the greatest causes of the interference is the misuse of regenerative receivers. The newspapers today are condemning the regenerative receiver and advocating its elimination because of the interference that it creates. Conclusions have been drawn too hastily and my purpose is to show that in most cases the trouble is with the operator rather than with the receiver.

Whistling Noises

When tuned to a distant signal, most of you have noted loud or feeble whistling noises which change rapidly, or slowly up or down in pitch, or continue to blast a steady note. You have also noticed, if you use a regenerative set, that when tuning your receiver, with the regeneration or tickler too high, similar and stronger noises are produced when the instrument is being tuned. These noises are beat noises, commonly called "birdies." They represent the audible frequency difference between the inaudible high frequency wave

transmitted from the broadcasting station and the inaudible high frequency current of your oscillating detector tube. Thus, if the station is transmitting on a wave length of 300 meters, the wave frequency is one million cycles, or vibrations per second. If your oscillating detector tube is generating a frequency of 1,000,512 cycles per second it is acting like a miniature transmitting station, and within a short distance of your receiver the two sets of waves will combine and your neighbor, who may be tuned to the transmitting station, is one million cycles or vibrations per second, which is the difference between the two frequencies and which will give a sustained note having a pitch of upper C in the musical scale. You also will hear this whistle, and as you change your tuning, the local oscillation frequency will change and the difference or beat frequency will go up or down in pitch. At a central point where the two frequencies are equal, there is a quiet place called the "zero beat," on either side of which the beat note produced goes up in pitch until it can't be heard.

Using Receiver in Oscillating Condition

The regenerated detector tube in the reception of broadcasting gives an amplification equal to between two and three separate stages of Radio frequency amplification, and is, therefore, the most simple and economical method of receiving. Like all good things it has its abuses. In congested districts the music and speech from a broadcasting station is often distorted and rough, and the already mentioned beat note noises spoil the enjoyment when signals are tuned in by using the receiver in the oscillating condition or listening in zero beat—"riding the wave," as it is called.

Disturbances of this kind are entirely unnecessary and it is hoped that they can be eliminated by a system of education on methods of receiving and by co-operation with your neighbor. Our experience has shown that many listeners do not know that the squeals which they produce in tuning their receivers are heard by others, and many do not know that the many noises which they hear are from receivers in the neighborhood. Such disturbances are then the result of ignorance rather than indifference. Everyone wants to be a good neighbor. If his "birdies" disturb others he should be told about it and informed how to operate his receiver without producing them.

In some districts the listeners have an understanding that they will hunt signals

with the tube oscillating, and that if a neighbor is disturbed, he should signal back by purposely producing a succession of "tweets." This practice, however, cannot be a solution of the difficulty, for many receivers are in service which will not oscillate and it is impossible to give a signal of warning.

Radiation

Every tuned antenna radiates to a certain degree, but radiation below the point of oscillation follows the variations of the incoming signal and causes no noise or distortion. Above the point of oscillation, however, the receiver gives an independent and sustained radiation which depends upon the tuning of the antenna circuit and which causes the disturbing noises.

The instruments which radiate are the regenerative receivers without Radio frequency tubes in front of the detector. There are several types and many regenerative hook-ups which when improperly used give the trouble. The most common are the single-circuit and various types of coupled, double and so-called three-circuit tuners.

Coupled Circuit Sets

The worst offenders are the coupled circuit sets, especially the one-tube and homemade variety. When the two circuits are out of tune the radiation from such a receiver is not so strong as that from the single circuit. However, the trouble is more persistent, for it is almost universally used in the oscillating condition while hunting signals. Only the expert can handle such a receiver properly, and unfortunately this type is present in greatest numbers in congested districts where the added selectivity is essential. With the circuits out of tune the radiation is weak in the antenna circuit, but before the desired station is tuned in by repeated trial adjustments, many more squeals have been emitted than with the single circuit even when improperly used. Noises are also made with the double-circuit receiver when leaving a tuning position unless the regeneration is lowered first. If the first move is made by changing the tuning of either circuit, the tube will start to oscillate due to the decreased absorption of the antenna circuit.

Homemade Sets Trouble Makers

The homemade set is a great trouble

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.

Rubber Material Best for Panel Insulation

Now that the day is passed when the Radio set builder wound his own coils and wrapped his own condensers, the construction of a receiver becomes mainly a job of assembly. The enthusiast buys an array of instruments, a panel to mount them on and some dials to operate them. His real task, then, is one of cutting, drilling, countersinking and mounting.

To expedite his work he requires an insulation material which can be readily worked with the few simple tools ordinarily possessed by the amateur. And it isn't every style of panel which wears well, looks well, and at the same time doesn't get in the way of the drill or the teeth of the hacksaw.

Then there are some other qualities, not so apparent offhand, which the insulation selected must have. The physical nature of the panel should be such that there is practically no water absorption. A loose fibrous substance into which water can penetrate will not only buckle and swell, but what is far more serious permit so much leakage between binding posts that signals are weakened or regeneration impossible.

Low dielectric constant and a low phase angle difference are also essential to prevent the passage of Radio frequency current through the insulation material. High resistivity is indispensable as well, for the energy picked up on the antenna is too precious to be wasted. In tests of a number of "balky" receiving sets, excessive loss through panel material, which, though very hard and strong, was of a fibrous nature and absorbed moisture, has often been found. Stood on the radiator for an hour or so, the sets resumed operation after a fashion, but they represented a waste of labor and effort that was to their well-meaning constructors, truly appalling.

Another characteristic of a panel, which, in truth, is of more than passing importance is its appearance. The front of the set is in sight day and night, and a panel containing excess of free sulphur in its make-up, which yellows with age, is no attraction. Indeed, a roughening of the surface allows dirt and dust to lodge on the panel and in that way considerable surface leakage loss takes place. The high finish of the panel should be retained both on front and rear, for this very reason.

The older forms of hard rubber were considered standard for electrical instrument insulation before the advent of broadcasting, but when it came to Radio frequency currents, a special grade had to be developed to fill the bill.

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One Amp., 6 Volt Tubes Changed to 1/4 Amp. Tubes
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Questions and Answers

Potentiometers

(06146) ACS, Lorain, Ohio.

In the construction of the Miloplex circuit, why do you advise using a potentiometer of high resistance with dry cell tubes and one of low resistance with 6-volt tubes?

A.—The author of the Miloplex circuit advises resistance of potentiometer, as cited, on the promise that there is so much current in the storage battery that the loss through the potentiometer will be negligible as compared with a similar loss from dry cells.

ULTRA-AUDION QUESTION

Dear Sir:

In your very useful and highly appreciated publication I noticed in the Questions and Answers department a question answered, and I think that I am able to give you a little additional information on the matter discussed.

The question is number 5935, and appears in the issue of Oct. 13, 1923, which I have just received.

The set I used during reception was a homemade single tube ultra-audion receiver. I use a 90-degree variometer and a 23-plate condenser. The tube used at that time was a UV-200.

The ground was made by a connection to the conductor's train valve. I may state that there was absolutely no frictional electricity noticeable in this case.

The stations listened to, with the length of reception, were: WJLA from 7:30 p. m. till 8 p. m.; SCA from 8:00 p. m. till 8:30 p. m.; and CJA again from 8:30 p. m. till 10:30 p. m.

Both these stations are local ones and I should estimate that I was possibly eight miles from the station when they signed off and that I had traveled altogether about 20 miles during the 2½ hours I was listening in.

Yours very sincerely,

W. H. Croft, Edmonton, Canada.

Ultra-Audion Circuit (06067) JOB, Clarksville, Tenn.

Please advise if the ultra-audion hookup is as efficient as you state on short ones, say 2,500 up to 20,000? Can't I use four audio transformers for a push-pull amplifier without putting them on two cores; couldn't this be accomplished by

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Cards not back unless
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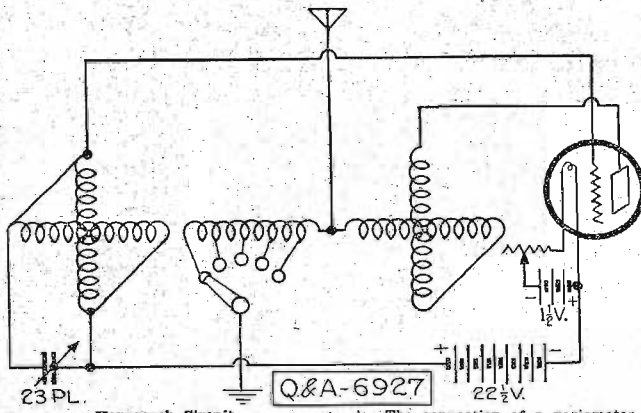
with Unit and Cord for \$9.50

16 inch Bell. Height 21 inches.
Colors: Black, Mahogany, Olive Green.

On account of the unethical methods pursued by the average Radio dealer, I have decided to sell my product direct to the consumer. This eliminating the factory sales agent, the distributing jobber and dealer, and saving for the consumer four profits. My speaker would sell in the retail store for \$25.00. Buy direct and save the difference. My price, \$9.50, does not include shipping.

EMIL DECLYNE

15 Park Row, Room 612, NEW YORK CITY
Send M. O. or C. O. D. Dept. R. D., Barclay 2393



Kopprasch Circuit (06927) JWL, Chicago.

How can I parallel a simplex wooden variometer for the Kopprasch circuit, and where can I secure a schematic diagram of this circuit?

A.—The connection of a variometer in Kopprasch circuit is accomplished by taking a tap off the connection that joins the rotor with the stator. Diagram of the Kopprasch circuit is shown in the illustration, which we trust will serve you helpfully.

connecting up on method used by power companies for various transformation, that is, by coupling secondaries of two in series and primaries of other two in series and take out a mid-tap?

Is this equal to a conventional two-stage audio amplifier?

A.—The ultra-audion circuit does not function effectively on wave lengths over 1,000 meters.

Audio frequency transformers can be used, as suggested for push-pull amplifier, the method comparing favorably with the ordinary two-stage audio frequency amplifier.

Battery Trouble

(05667) FDG, Lakewood, Ohio.

In the July 31, 1923, issue of Radio

RADIO TUBES, Sold, Exchanged, Repaired. Free Circular. AMERICAN RADIO TUBE WORKS, IRVINGTON, N. J., U. S. A.—Adv.

Distance by new method.—Use a wacometer to easily locate, faint, and distant stations. Complete directions for building, calibrating, and using. Simple instructions for adjustments or guessing. Send 10c. Raymond Moore, North Fourth Ave., Tucson, Ariz.

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If you are not fully satisfied with the transformers, return them within 5 days and your money will be refunded.

COYNE RADIO SERVICE
Suite 203
507 Fifth Avenue, New York City

Digest, I noticed the R.D.-90, which is a diagram containing three tubes and three variometers. I have tried this circuit for about four months and have had fairly good results with it. Is it possible to obtain any further details on this circuit? I would like to know the right constants to use to get best results. I have received KHJ quite a few times, but there was a lot of noise connected with this distant reception. Lately I have experienced a peculiar crackling, humming noise which was not noticeable before. I have new B batteries and am sure it is not the fault of these. This noise is

connecting up on method used by power companies for various transformation, that is, by coupling secondaries of two in series and primaries of other two in series and take out a mid-tap?

Audio frequency transformers can be used, as suggested for push-pull amplifier, the method comparing favorably with the ordinary two-stage audio frequency amplifier.

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INSIDE AERIAL
Substitute for Outside Antenna
12-Feet Long
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Suspended from
Wires
BUY A FULL SIZE ANTENNA
Use double wire settings for strength
Use wire with insulating coverings

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No. 222A—27½ volt, variable, \$1.52
No. 322A—27½ volt, variable, \$1.85
No. 345A—45 volt, 8 taps, \$3.25
AYRES BATTERY CORPORATION, Cincinnati, Ohio

loudest when the variometers are practically at zero. I have never noticed the same noise in any other set before. It sounds like a CW set with the key pressed down and held there but as the hum is present at all times it could hardly be this. Could you suggest a reason?

Whenever I use an audio amplifier I have to use a separate A and B battery. The poles are reversed from the poles on the receiver. Is it possible to connect the amplifier so that I can use the same A and B battery? I use no jacks.

As I have a number of different parts of Radio I would like to get your opinion as to what you think is the best circuit for all-around use for clearness, DX, volume, etc. I have tried numerous circuits including Radio frequency, regeneratives, Flewelling, Reinartz, Reflex, etc., but don't know which is the best. Some have given good results, some bad.

A.—We regret that we have no further details of R.D.-90 than already offered. All values as given in diagram and descriptive article are demonstrably effective. We would not recommend any departure from them.

The disturbance you have encountered may be caused by some factor external to the set. This can be determined by disconnecting antenna and ground. A defective grid leak would cause the action.

In all R. D. diagrams illustrating addition of audio frequency amplification, the same batteries are indicated for both filament and plate supply. You should be able to conform to this if properly following the circuit shown.

All the circuits you mention are efficient and popular. Selection among them is largely a matter of personal preference, each having its peculiar virtues and limitations.

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Finest adjustment for all screws. Postpaid 50c. Dealers Wanted.
MESTRO RADIO PRODUCTS COMPANY
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Malone—Lemmon Control-o-meters
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\$18.00 DR. SEIBT IMPORTED "SUPER HEADSET".....	\$5.90
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Radio

Illustrated



Few children can claim having celebrated a Radio birthday party. Not so for Mickey Bennett, the child motion picture star, for Mickey celebrated his seventh year mark at Station WOR, Newark, N. J., where he made his second studio appearance and "met" the invisible audience which had been informed previously of the celebration. Mickey called the party "the biggest birthday party in the world" and at that he wasn't far from right.



Good music helps make good food at the Almanac hotel, New York, where the chefs enjoy Radio programs while doing their culinary duties. An aid to the temperament? Fotograms Photo



While 2L.O. London, broadcasts a lesson in golf, this Englishman takes full advantage by receiving instructions on the links. A portable set permits learning the proper form and stances to employ in the ancient and honorable game. Wide World Photo