New Two-Tube Reflex Crystal Neutrodyne Set; 58 Advance Programs; A-B-C Lessons for Radio Beginners; How to Operate and Locate Troubles

Vol. VIII

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SATURDAY, APRIL 5, 1924

SIMPLIFIES "SUPER-HET"

POPE PIUS TUNES IN HIS GIFT SET

AERIAL POLE RIGGED TOP OF VATICAN

Pontiff, Now Able to Keep in Closer Touch with World, Enjoys Broadcast Reception

LONDON.—Pope Pius has joined the great crowd of listeners in. A British Radio firm has presented him with a Radio receiving set and the recent rearing of a slender aerial pole on top of the Vatican has become a striking sign of changing times.

times.
The Pontiff blessed the installation after

The Pontiff blessed the installation after appropriate ceremonies and then heard the first call from London. Cardinal Gasparri, Papal Secretary of State, and several domestic prelates were present.

Pope Pius has expressed great pleasure over the gift, which has put him in touch with the entire world without an intermediary. The importance of the installation is enhanced by the fact that though the Pontiff enjoys diplomatic immunity like every other sovereign, his mails and cables must pass through Rome's central offices. From Saturday on, however, he can dispense with these when he desires.

One of the grievances which all pontiffs from Pope Pius XI down have had against separation laws is that the Vatican has been unable to communicate with the outer world directly. This objection is now partially removed.

WPAL Received in Argentine

COLUMBUS, O.—WPAL, Superior Radio Company, here, has been received with absolute clearness at Tunuyan, Argentine Republic, 6000 miles away.



ARMSTRONG BRINGS OUT NEW SCHEME

Does Away with at Least One Tube on "Rolls Royce" Receiving Set

Tells of Second Harmonic

Novel Idea Unfolded Before I.R.E. May Make Set Within Reach of All Fans

NEW YORK.—Elimination of one tube from the well-known super-heterodyne receiver by its inventor, E. H. Armstrong, is hailed with delight and import by Radio engineers.

At the recent meeting here of the Institute of Radio Engineers, the man who once owned the regenerative receiver patent, showed technicians he still had several tricks to perform when he, by what is known as the "second harmonic," caused the first detector tube to "double" for the oscillator tube.

The secret of Mr. Armstrong's improvement iles in the second harmonic, a mysterious term which will be explained. But to the practical mind the improvement has but one meaning. One less tube! Insamuch as the "super-het" usually deasmuch as the "super-het" usually de-

(Continued on page 7)



A. T. & T. IN OPEN

OFFERS TO LICENSE ANY PLANT FOR A FEE

WHN Would Get a Pe W. E. Harkness Frankly Names the Prices Even

NEW YORK.—The American Telephone and Telegraph company has backed down, partly at least. At a recent meeting held here under the auspices of the Radio Trade association to clarify the broadcasting situation, officials of the A. T. & T. made some frank promises and admissions, which halt for the time being any attempt at establishing a broadcasting recognition.

monopoly.

W. E. Harkness, vice president of the
A. T. & T. company said that the company he represented would license any
broadcasting station that applied for one,
In reply to a question as to whether he
would license Station WHN, he answered,
"Yes." Havipasse Gives Pirayes Harkness Gives Figures

At the meeting figures on the cost of meent "licenses" were disclosed by Mr.

At the meeting figures on the cost of patent "licenses" were disclosed by Mr. Harkness.

"The license fees are from \$1 for a recognized educational institution to \$2,-600 for 500-watt stations operated by commercial concerns or others for their own benefit," he said, "The licenses are for their own benefit," he said, "The licenses are for the entire life of the patents.

"The patents referred to are eighteer controlled by the A. T. & T. and the De Forest companies, both parties in suit now pending against Station WHN for alleged infringement.

The statement made by Mr. Harkness, providing it is carried out, assures the American Radio public that any person or organization which has received a license from the Department of Commerce to operate a broadcasting station, can operate the station under the patents of the A. T. & T. in Open First Time

This is the first frank and definite state-

T. & T. on payment of a single fixed sum.

A. T. & T. in Open First Time

This is the first frank and definite statement from the A. T. & T. saying that any independent owners could obtain a license, or stating the price of such a license.

To the question asked by Charles Pope Caldwell, attorney for Station WHN in the suit, as to whether the A. T. & T. would license any station over 500 watts, inasmuch as Station WEAF itself was 1000 watts, Mr. Harkness replied, "Our station, WEAF, is not an argument. There never has been a set built like the set we have. It was done for experimental purposes and it cost us a lot of money. This station operates, moreover, on a special license from the Department of Commerce whose terms can only be me by concerns which have a large staff of engineers and complicated equipment. If any of you men, however, want a five-kilowatt set you can have it—if you are willing to pay for it. And it will cost you perty penny. It has cost us that."

Henry M. Shaw, president of the Radio Trade association, said: "There will be no momopoly in broadcastins, because the public will not stand for it."

"KING TELEPHONE" IN MORE TROUBLE

Church, Radio Trade Association, Newspapers, Shoulder Arms in Control War

Newspapers, Shoulder Arins in Control War

NEW YORK.—Aroused by the suit against WHN, many new and important interests have joined the fight against the now plain attempt of the American Telephone and Telegraph company to control the air.

Mr. Henry M. Shaw, president of the Radio Trade association here, has announced his organization as opposed to any such control of broadcasting as the phone company desires. Rev. Charles Francis Potter, representing the Church, sup in arms because advised by the Bell company that if he erected a station of his own he would be infringing its patents. Secretary of Commerce Hoover announces that there shall be no monopoly of the air. Newspapers countrywide are taking up arms against "King Telephone."

Previously lined up against the phone company were the City of New York, Station WHN and the North American company were the City of New York, Station WHN and the North American company. The public's contempt for A. T. & T. tactics had already been aroused by the poorly disguised attempt of WEAF to get contributions to its programs through the creation of the so-called Radio Music fund. Altogether, the American Telephone and Telegraph company could not have better aroused universal condemnation and hatred of its actions if it had deliberately set out to do so.

Vacuum Tube in Movies

vacuum Tube in Movies
TULSA.—The Radio exhibition recently
held here under auspices of the Technical
Club of Oklahoma featured a motion
picture depicting the operation of a
vacuum tube.

PLENTY FROM TOLLS OF 'KING TELEPHONE'

March 20: P. M. 8:00- 8:10—Harowitz Bros. 100 9:00- 9:10—Bank of America. 100 9:46-10:15—National Carbon Co. 200 10:30-11:00—National Carbon Co. 200 10:30-11:00—National Carbon Co... 200
March 21: P. M.
7:50-8:00—National Carbon Co... 100
8:00-8:30-United Candy Co... 200
8:30-9:00—LaSalle Exten. Inst... 200
9:00-10:00—Astor Coffee Co... 400
March 22: P. M.
8:30-8:40—The Curtis Co.... 100
9:00-10:00—American Chicle Co... 400
March 24: P. M.
8:00-8:10—Lawyers Mortgage Co. 100
8:30-8:40—Sales Literature, Inc. 100
9:30-10:30—Atlantic & Pacific Tea. 400 Total\$3,400

A movement has been started to organize a "Radio Listeners' Protective Association" with headquarters in Baltimore, Md.

Critics Rap Class "D" License Plan

Requirements Make Permits Available Only to Large Manufacturing Interests

WASHINGTON, D. C .- Recent criticism, especially since the hearings on the White Radio bill, of the granting of Class D licenses by the Secretary of Commerce,

licenses by the Secretary of Commerce, has been severe. The explanation has been made by officials of the department that there is nothing unusual in the granting of these licenses. They say the licenses are granted for short periods of time and will be given anyone meeting the requirements. Up to this time licenses under this class have only been granted to Stations KDKA, WGY and WEAF, controlled by large manufacturing interests, members of the Radio Corporation of America.

The requirements, however, are such as to make D licenses unavailable except to large Radio Interests.

Chamber of Commerce at

Chamber of Commerce at

Birmingham Wants Plant
Birmingham ALA.—The Chamber of
Commerce here may be the first similar
organization in the United States operating a big Radio station, if their present
plans go through.

According to Secretary O. L. Bunn the
chamber is negotiating with the Alabama
Power company for the purchase of WSY.
Secretary Bunn explained that the commerce body would have the funds June
I with which to purchase WSY.
"In the event we get the station we
will make it one of the largest and finest
in the United States," said the secretary.
"The advertising benefit to Birmingham
and to Alabama would be incalculable."

RADIO TREATMENT RESTORES HEARING

DOCTORS USE AIRWAVES AS DEAFNESS CURE

Youth, Born Deaf, Puts on Headphones and Hears with Both Ears

CHICAGO.—It is believed by many physicians here that Radio eventually may cure partial deafness. A number of cases have already been cited as proof conclusive substantiating this claim.

The cure is effected by the intensely amplified sound waves which pass along the auditory nerves from the head phones, massaging the nerves and stimulating them to the extent that hearing is restored.

One case is reported of a superior of the control of the case is reported.

One case is reported of a man who two years ago, was totally deaf in his left ear. Now, after constant treatments by Radio, he declares he can hear a whisper across the room.

Deaf at Birth: Now Hears

Another, a young man twenty-two years of age, deaf and dumb at birth, placed the head phones on his ears for the first time. He wrote on a piece of paper that he was receiving music through his left ear, no sound being audible in his wight.

left ear, no sound being audible in his right.
Thinking perhaps that the organs of the right ear were in such condition that he would be unable to receive any sound into it, the phone was removed from the right ear and placed over his heart. After doing this the young man was able to distinguish the applause after a concert.

Later the phone was replaced to the right ear, and the young man discovered after listening for one hour that he was able to hear with both ears equally well.

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All the Live News of Radio.

Before They Thought of "Mikes"

Operating and Trouble Shooting for the Owner of a Tuska Type 225 Receiver.

Soperating and Trouble Shooting for the Owner of a Tuska Type 225 Receiver.

What's Wrong with Your Receiving Set, Chapter VI—Tuning Out Interference, by Peter J. M.

Clute

Thirty-Minute A-B-C Lessons for Radio Beginners, Chapter III—How Radio Is Broadcast, by P. E. Edelman.

An Evening at Home with the Listener In, a chart to show when to listen in for your favorite Advance Programs for the Current Week at the Larger Stations.

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by John T. Mathews.
R. D.-119, a Simple Regenerative Circuit.
How to Make Set with Double Crystal.
Poorly Designed Tube Bases Cause Current Loss, the Prevention of Small Losses Increases Range,
by Henry Stockdale.
Questions and Answers.
Directory of Radiophone Broadcasting Stations, Part I.
Radio Illustrated, a page of pictures.

Looking Ahead

"What's Wrong With Your Receiving Set?"—the instructive series by Peter J. M. Clute—will tell you all the mysteries of tuned Radio frequency amplifiers next week, and the difficulties often attending the operation of such devices will be explained so that the troubles can be remedied. Four new circuits are to be

shown.

What Do Radio Inductances Do?—Magnetic fields, coupling, capacity effects in coils, types of coils used in Radio, variometers, variocouplers and load coils, are to be told about next week by P. E. Edleman in his easily understandable style. How do you like "Thirty-Minute A-B-C Lessons for Radio Beginners"?

Plain enough?

Plain enough?
"Straightening Out the Reradiation Problem," a two-part article by Ralph R.
Bacher, engineer for one of the finest set manufacturers, will be started next
week. He will show you the finished product, made by his company, but will also tell you exactly how to proceed to make your own reradiation preventer, and thus gain the love of your neighbors again.

New Two-Tube Circuit is promised for next issue by H. J. Marx. Its advantages are simplicity of operation and plenty of volume and distance. It's easy to

make, too.

R. D.-120 for the Hook-Up Hounds has a nice new coil specified that builders of this circuit will have to wind themselves. But it's worth winding for the results.

Newsstands Don't Always Have One Left WHEN YOU WANT

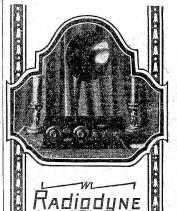
Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

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

SEND IN THE BLANK TODAY



"The Voice of the Nation" NO LOOPS - - NO AERIAL

THE air is your theatre, college, church and newspaper if you own a Radiodyne. New York, Cuba, San Francisco and Honolulu can be picked up clear and distinct without interference from nearby stations.

The RADIODYNE is ready for The RADIODYNE is ready for operation by simply grounding to a water pipe or radiator, and throwing a few feet of wire on the floor. Uses any standard tubes—dry cell or storage hattery. Extremely selective. Simple to operate. Only two controls—you can tune in on any program you select—any wavelength from 200 to 700 meters.

For use in apartments, boats, automobiles, railroad trains, etc., the RADIODYNE is enjoyable where other receiving sets would not be practical.

Price \$150.00

Write for illustrated folder which describes the RADIODYNE in detail. Every radio fan will be interested in this new type (antennaless) receiving set.

PAR

WESTERN COIL & ELECTRICAL CO. Wis. 312 5th St., Racine,

TIME, DISTANCE OF AIRWAVES MEASURED

DOT TRAVELS 8,500 MILES IN .046 SECONDS

Message Sent from Washington to Warsaw, Answer Received in Three Minutes

WASHINGTON. — Some well-informed Radio engineers and many blase Radio-phans were electrified and even astounded to observe the Radio time and speed experiments of Captain R. H. Ranger, conducted a few days ago at the Cosmos Club here.

ducted a few days ago at the Cosmos Club here.

He not only transmitted a Radio message 4,250 miles to Warsaw, Poland, and got a reply in approximately three minutes, but he measured the time required for a single Radio impulse to make the round trip as .046 seconds. The latter experiment was to show that contrary to a popular conception, Radio is not instantaneous.

"The fact that a Radio impulse traveling over a given distance, negotiates this space in a definite and fixed time, may set a new standard against which time and distance may be measured, giving a degree of accuracy and reliability surpassing even the accepted methods of astronomical observations," Captain Ranger declared.

declared.

What Experiments Mean

"What does he mean?" some of the uninitiated immediately inquired. He meant that since it takes appreciable and measurable time for a Radio signal (a dot in this instance) to travel a given distance, we have a new standard measuring instrument which will remain the same for centuries, and, with continued use, our ability to measure even small lapses of time will increase. Practical applications include aids to the mariner, until recently dependent upon dead reckoning when the sun was invisible and Radio beacons were not available.

or sun was invisible and Radlo beacons were not available.

"Radlo," Captain Ranger said "will be the answer to civilization's demand for greater accuracy." Already this system makes it possible to check the accuracy of automatic relays and in the future we may expect more useful applications.

For example, to check time differences between two distant points. With a globencircling chain of powerful stations, the world time could be carefully calibrated. The Radlo "dot" can eventually be made to act as a very accurate check on longitude determinations.

Checks Difference in Longitude

Checks Difference in Longitude
By way of explanation, Capitain Ranger
said: "Suppose cioless at Warsaw and
New York are geared accurately to the
sun's time at each locality. Then transmit Warsaw's sun time to New York. The
difference in the two clocks, in New York,
gives the portion of the day or revolution
of the world between the two, which is
the difference in the longitude.

of the world between the two, which is the difference in the longitude.

"With the present advances in Radio, the least accurate part of such measurements comes in the solar observations, but in spite of this, accuracies below fifteen feet in the 4250 miles covered, are in order." When the round-the-world Radio "robin" has checked the speed of Radio waves to the final degree, Radio alone will give the actual distances between any two points, according to this engineer.

Concerning the possibility of communicating with Mars, the Captain was skeptical, due to the fact that the earth's envelope acts as an impervious electric mirror and reflects Radio waves to the earth. This "heavyside" layer, he explained, would tend to deflect any signals emanating from Mars.

Rotary Uses Radio Sets

to Bring Joy to Shut-ins
DALLAS, TEX.—"Bringing Sunshine to
the Shut-In," is the slogan of the Radio
shut-in committee of the Dallas Rotary
Club. It was announced recently that an
appeal for funds to buy a receiving set for
the home of every shut-in in Dallas county,
was under way.

LAW FAILS TO BLOCK "WHISTLING NOISES"

HICAGO,—Present regulations of the Department of Commerce prevent legal restriction of Radio interference by improperly operated regenerative receivers, according to E. A. Beane, ninth district Radio supervisor. Mr. Beane said recently that within the past two weeks he has received hundreds of letters and telephone calls from Radiophans complaining of the whistling noises produced by regenerative sets without proper coupling adjustments. ling adjustments.

PRISONERS TAKE "U" **COURSE IN AIRWAVES**

S TATE COLLEGE, PA.— Several Radiophan prisoners at Rockview penitentiary, Center county, have enrolled in the Radio correspondence course of Pennsylvania State College. They are permitted the use of the prison receiving set for experimental work in connection with the studies. Instructors in college extension work visit the prison twice a week to conduct classes and report much interest in Radio engineering among the prisoners enrolled. prisoners enrolled.

APPEALS FOR GREEK ORPHANS



Mme. M. Fsamados, wife of the Greek Charge d' Affaires in Washington, recently made an appeal over Station WRC, Washington, D. C., for the suffering orphans of Greece. In addition to the appeal, Mme. Fsamados, who is a talented singer, charmed the thousands of unseen listeners with a program of Greek folk songs.

200 in Two Hours Answer WAAW's Radio for Slogan

WAAW's Radio for Stogan OMAHA.—More than 200 telegrams were received within two hours by the Station WAAW, Omaha Grain Exchange, recently after a message had been broadcast asking for a slogan. The slogan was to have been made of words beginning with the letters W A A W.

The judges awarded first prize for "Where Agriculture Accumulates Wealth" to Harvey C. Dendall of Lincoln, Neb.

Calcutta Fan's 5-Valve Set Hears Pittsburg Broadcast

LONDON.—Pittsburgh's broadcasting has been heard in Calcutta, India, accord-ing to recent dispatches from that city. A Calcutta amateur Radio fan, under-stood to have been using a five-valve set, picked up broadcasting from Pittsburgh for a half hour. British listeners had failed to hear the broadcasting when it was relayed from London, due to atmos-pheric conditions here.

MOVIE DOG BARKS ABOUT HOLLYWOOD

STORY AROUSES BULL PUP: ATTACKS RECEIVER

Strongheart Tells of the Screenland "Flappers"; Says He Has a Devoted Wife

DETROIT.—Strongheart and his adored mate, Lady Jule, the two famous movie dog stars delighted a wast audience of Radio enthusiasts, including those in the dog family, when they recently appeared before the microphone in the studio of WCX, the Detroit Free Press. Strongheart barked out his story and was heard all over the United States and Canada. Lady Jule was less demonstrative and had very little to say. As most everyone who attended movies knows, Strongheart is a German shepherd dog. His English, attended movies knows, Strongheart is a German shepherd dog. His English, while impressive, was only understood by the dog Radiophans, and from the communications WCX has received from many parts of the country, the dog listeners apparently were many.

parts of the country, the dog isteners apparently were many.

Bull Pup Attacks Loud Speaker
A letter received from a bakery in Marion, Ohio, states that when Strong-heart began to bark his story from WCN, a listening in bull pup started a rough house by making a ferocious attack on the loud speaker.

After Strongheart had finished his three-minute discourse in barks, his manger stepped to the microphone and interpreted what he said and this is it:

"My name is Strongheart. My weight is 92 pounds. I am a German shepherd dog. Some call me a police dog, but there is no such breed of dog as that. I will admit, however, that I am a trained police dog, but for a considerable time I have been a movie star. Like many others engaged in that particular vocation I take much-delight in female society.

Takes Jule for Better or Worse

much-delight in female society.

Takes Jule for Better or Worse
"So one day when a bunch of doggy
flappers frisked before me I decided it
would be better all around to take a companion for life. I gave them all the onceover and finally decided upon Lady Jule
here. She weighs only \$2 pounds. Although at one time a regular flapper, I
have found her a most devoted and faithful wife. We have five children back in
Holly wood and they are the cutest thinss
you ever saw."

Both Strongheart and Lady Jule were a

Both Strongheart and Lady Jule were a theater attraction here recently. Dur-ing their spare time they visited many schools and hospitals where they delighted thousands of little folks

Broadcasting Circuit Makes Its Appearance

Wendell Hall "Booked Ahead" on Vaudeville Plan

NEW YORK.—In vaudeville various acts are booked ahead and regular schedules laid out for them to visit a chain of theaters. The "Radio Circuit" has been created by the National Carbon company in making arrangements far in advance for its popular entertainer, Wendell Hall, to travel a chain of broadcasting stations on a predetermined schedule.

Mr. Hall, widely known as the "Red Headed Music Maker," has already appeared at Stations WIP, WDAR, WT, WEAF, WJAR, WCAO, WSB, KYW, WDAF, WJAR, WCAO, WSB, KYW, WDAF, WOS and WWJ. His route includes WBAC, Columbus, April 4; WSAI, Cincinnati, April 1, 2, and 5.

WBBX Is Name of New Sears-Roebuck Station

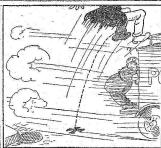
CHICAGO.—The new Sears-Roebuck Ag-icultural Foundation broadcasting station, proutural roundation broadcasting station, planned to go on the air early in April, will be called WBBX, according to an announcement from Edgar L. Bill, program director. Work is being rushed not only on the station itself, but also on the loop studio in the Hotel Sherman.

THE ANTENNA BROTHERS

Spir L. and Lew P.

A Police "Flivver" Set, Maybe

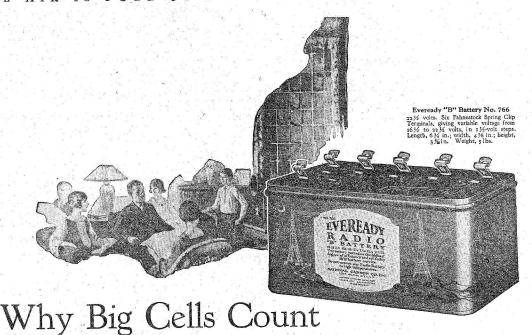








S H O U L D N 'T M I S S THINGSYOU FULL



in Radio "B" Batteries

HIS handsome metal case Eveready "B" Battery No. 766 costs only two-thirds more than the smallest Eveready "B" Battery, but it contains seven times the electricity! This makes the No. 766 over four times as economical as its baby brother. That is why most people buy it.

Its fifteen large cells give 221/2 volts of strong, steady energy day after day. Cells that pour out power the moment you turn on your tubes. Cells that rest well when idle, renewing their vigor for your next demands.

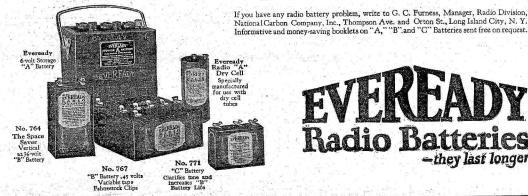
No cells have a bluer-blooded ancestry than these. They are the product of thirty years of dry battery research and development of the world's foremost electro-chemical laboratories. We think that No. 766 is the handsomest battery ever made. But that is a matter of opinion. It is a matter of engineering record, however, that this great standard "B" Battery has proved itself as perfect in performance as we are convinced it is superfine in appearance.

The 45-volt Eveready No. 767 contains the same large powerful cells as the No. 766. For maximum "B" Battery economy, therefore, buy the 221/2 volt Eveready No. 766 or the 45 volt Eveready No. 767, as you prefer. Here is the "B" Battery at its best.

NATIONAL CARBON COMPANY, INC. Headquarters for Radio Battery Information

San Francisco New York

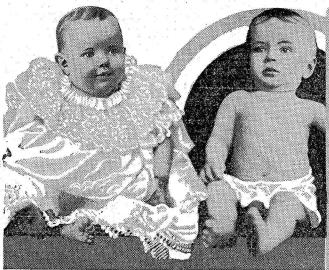
Canadian National Carbon Company, Limited. Factory and Offices: Toronto, Ontario



Radio Batte

BEFORE THEY THOUGHT OF "MIKES"







WHB ON 13 HOURS IN AIR MARATHON

WORLD PROGRAMS MARKS STATION'S BIRTHDAY

Kansas City Plant Starts at 7 P. M. and Ends Program at 8:35 A. M. Next Day

and Ends Program at 8:35

A. M. Next Day

KANSAS CITY.—Precedent for continuous broadcast is believed to have been set here recently, when WHB, the Sweeney Automotive and Electrical School station, was on the air for thirteen hours and thirty-flve minutes.

WHB's widely known siren announced to the world, particularly the United States and Hawaii, promptly at 7 p. m., central time, that the marathon in broadcast was on. Not until 8:35 the next Monday morning, when the minister whose sermon was put on the air the night before at the beginning of the program, was about to arise, did John Schilling, director of WHB, conclude the broadcast.

The event was WHB's Second Annual International Radio program and marked the second anniversury of the dedication of the Sweeney station to the people of Kansas City.

Special Hawaiian Program

Emory J. Sweeney, owner of WHB, opened the long program with an address. Later the services and chimes of a local church were broadcast, followed by a score of diverse entertaining numbers ranging from solos by noted artists to ensembles. An all-Hawaiian program by natives of the southern islands was given at 11:30 p. m., when an attempt was made to reach Hawaii. The numbers included the singing of the Hawaiian hational anthem in the native tongue, and other selections popular in that country.

When the regular schedule of livestock quotations had been concluded at 8:30 Monday morning, Mr. Sweeney came before the microphone and delivered a short address marking the end of the unusual program.

Sailor at Cape Horn Hears WDAP, Chicago

CHICAGO.—Hearing music and news-while off Cape Horn, South America, and each succeeding night, all the trip to San Pedro, Calif., is the distinct record re-ported by a ship operator to Station WDAP here, according to Ralph A. Shugart, chief operator of the Drake-Board of Trade sta-tion.

On the night of February 22, the ship

tion:
On the night of February 22, the ship operator heard the 10 p. m. program from Station WDAP. The airline distance from Chicago to Cape horn is over 8400 miles. This is the greatest distance that reception of music from this station has been reported.

Legionnaires Turn to Radio PHOENIX, ARIZ.—Utilizing Radio for the advancement of the American Legion and Americanization is the latest means adopted by the legionnaires to keep interest up to the highest notch. So successful have the first experiments in this direction proven that plans have been adopted for making it a regular weekly feature of the station here.

Remember that little shaver that kept hold of the picture frame last week so he wouldn't fall out and into your arms? Note the crop of alfalfa he has grown in the week's interval—we mean the sentleman on your right, Arthur R. Herske of WTAM. And the other cuts little fellow hat sit on the rim of the circle is depicted on your left with horn-rimmed spectacles, Richard V. Haller of KGW. Read more below about the two gentlemen. No, the two babies above are not the same nuonucer, with and without his clothing. The one without anything more than necessary on happens to be a popular easterner, born in 1897, and recently promoted to director of broadcasting for his station. Last name begins with E. Can you guess it? Tell you next week. And the more fully clothed pride of his mother's heart is no less than—well, he likes pie and the ladies, plays the piano for his station under any one of several noms de plume, plays chees and dances lots, and is STILL SINGLE. We'll make you wait till next issue for his name, too. By the way, Mr. E of the East is also quite gifted, playing the plano, organ, vocal cords, trumpet, French horn and Mah Jongs.

Richard V. Haller, KGW

IF ANYBODY had told Dick Haller's mother that he would make more noise as he is in the mature picture than he did when he was as old as you see him in the other, his mother wouldn't have used Dick's language to express herself, but she would have been just as emphatic in contradicting the statement.

in contradicting the statement.

Dick, who is director and chief amouncer of KGW, the Morning Oregonian, at Portland, Ore, held the long distance record for bawling (as his last name almost indicates) when he was a youngster. Neighbors several doors away say that he went it once for six weeks without a stop. Some of the same neighbors back in Ohio ought to hear him announce now. Dick makes the most noise during the meeting of the Hoot Owls every Friday night when the formal type of announcing is thrown to the winds and a catch-as-catch-can method is taken on.

In the Hoot Owls he is known as the

method is taken on.

In the Hoot Owls he is known as the Keeper of the Grand Goat, Sweet, William. To the Radio audience for a thousand miles around he is known as Dick and a great many refer to KGW as Dick's station. When you write to Dick, ask him whose baby picture he substituted for his own.

BOX OFFICE SALE BIG FOR AIRPHONE STARS

S. R. O. Signs Disprove Allegations of American Dramatists

NEW YORK.—That broadcasting pays theatrical interests and stars is again proved conclusively by the barnstorming trip of "Roxie" (S. L.) Rothafel to theaters in Providence and Pawtucket, R. I. "Roxie" and favorite entertainers from the Capitol theater here who broadcast regularly, have been greeted by "Standing Room Only" signs at all performances. Washington, D. C., also had a bonanza ticket sale. This success will do much to dispute the action of the American Dramatists' society in attempting to "pinch" broadcasters for funds for the use of plays and productions.

Pacific Steamer Picks Up Chicago on Initial Test

LOS ANGELES.—Installation of a powerful Radio receiver aboard the California coastwise liner Harvard has been completed by the Los Angeles Steamship company. Station KYW, Chicago, was tuned in on the first test.

R. F. Cullen, general passenger agent, explained that the Radio concerts at sea had proved so popular with the traveling public that the company decided to install a large set capable of tuning in on all continental broadcasting stations.

Arthur R. Herske, WTAM

Arthur R. Herske, WTAM

Arthur R. Herske, WTAM

THE SUBJECT of this biographical is ketch has black hair, but if he reads it he will probably be red headed. When Arthur Roy Herske, announcer at WTAM, the Willard Storage Battery company, Cleveland, was born some twenty-eight years ago, his mother planned to make him a doctor. The less important parent wanted him to be a lawyer. Herske did what few men would be able to do. Days he attended Western Reserve university, studying law and medicine. Nights he studied science through correspondence schools to please himself. His hobby won because, unable to get ahead fast enough in either profession, he turned to his hobby for a living. That he succeeded is indicated by the fact that he now has charge of the electrical and steam equipment of the Willard Storage Battery company plant at Cleveland.

When the company built WTAM, Herske was picked as announced. It was his voice, "The Voice From the Storage Battery," that won him the place. The next time you hear "Double-U-Tec-Ay-Em, signing off at 12 p. x., good-night every-body," you will know you have been listening to a good-looking young fellow with his work and his wife and lets her read his mail.

Takes 59½ Words Off Air in Minute

World's Copying Record Broken at Executive Convention in New York

NEW YORK.—The world's speed record for copying of Radiotelegraph code signals was shattered when A. E. Gerhard received straight copy at the astounding speed of 59½ words per minute, at a contest held at the Fourth Annual Convention of the second district Radio council at the Pennsylvania Hotel, recently.

Mr. Gerhard is a commercial Radio operator, and his remarkable feat of raising the former world's record of 56 words, per minute has given him the plaudits of the entire Radio world.

What a remarkable accomplishment this

the entire Radio world,
What a remarkable accomplishment this
is can best be appreciated, perhaps, when
one figures that his record is three times
as fast as the usual speed used in ship
Radio communication. Mr. Gerhard is
here shown holding the treasured trophy
awarded by the second district executive
Radio council to the winner of the contest.

KFAU Uses 150 Watts Well BOISE, IDAHO.—KFAU, the 150-watt station of the Boise High School here is being heard consistently throughout the western and Pacific states. Encouraged by the results already accomplished, KFAU is planning to install a 500-watt set soon. Charlotte, N. C., is the farthest east point reporting KFAU,

FEDERAL OFFICIALS AT CAPITAL EXHIBIT

FIRST SUCCESS MAKES FOR SHOW NEXT YEAR

Attractive Booths Display History of Art and Uncle Sam's Much Heralded Radio Devices

WASHINGTON, D. C.—Washington's first Radio show, March 19-26, was a de-clared success from the standpoint of the Radiophan and the exhibitors. A show

Radiophan and the exhibitors. A show next year is anticipated as a result of this year's success.

The Navy and War departments, and the Department of Commerce had attractive exhibits. Both government and private exhibits showed Radio history in its infancy as compared with the present. During the course of the show, a number of prominent government officials spoke, including Assistant Secretary of War Dwight F. Davis, Assistant Secretary of the Navy Theodore Roosevelt, Secretary of Labor James A. Davis and others.

"Boxe" Entertains Radiophans

of the Navy Theodore Roosevelt, Secretary of Labor James A. Davis and others.

"Boxie" Entertains Radiophans
Prior to the show and during the first day, "Roxie," of the Capitol theater, New York, entertained Washington Radiophans both in person and on the air. Roxie came to Washington to give some performances, the proceeds from which were used for the purchase of radio receivers for disabled soldiers' hospitals near Washington.

Among the interesting government exhibits was shown the little wooden boat that carried Radio apparatus for a party of government surveyors on a 300-mile trip through the roughest waters of the Colorado river. The exhibit of the Bureau of Standards illustrated the important part which it plays in regulating the technical problems of Radio.

The Washington show was conceived, planned and promoted by Washingtonians. It was conducted under the auspices of the Radio Merchants of Washington. The three men who handled practically all of the details were William P. Boyer, president of the association, Fred S. Lincoln, local Radio dealer, and Alfred L. Stern, director of the show.

WTAS, Elgin, Ill., Opens Chicago Branch Studio

Chicago Branch Studio
ELGIN, ILL—Station WTAS opened a
new Chicago studio recently. The W. W.
Kimball company of Chicago, to which the
new wire is connected, donated to the station the use of three rooms, one of which
includes the large auditorium seating 600,
for the use of the station to broadcast at
least twice in each week regularly. In
addition to this every Friday afternoon
between 12:30 and 1:30 p. m., organ recitals of Kimball Hall will be broadcast
by special Western Union wire running,
from Kimball Hall out to Station WTAS
here.

Relay Greetings to England

ROCHESTER, N. Y.—Greetings and best wishes from the mayor of Rochester, New York, to the mayor of Rochester, England, were sent recently on their long trip via the relay stations of the A.R.R.L.

COVER 7,000 MILES IN RELAY RECORD

CONNECTING WIRES NOT USED IN EXPERIMENT

York Dinner Speeches and Music Heard on West Coast and In England

NEW YORK.—An important step forward in the history of Radio occurred recently, when speeches and music presented at a dinner in the Waldorf-Astoriawere broadcast simultaneously by five of America's largest stations, and all plants of the Eritish Eroadcasting company without the use of connecting wires.

The program was made available to a Radio population of 55,000,000 persons, and the extreme separation of the area covered was 7,000 miles.

While this is not the first time that Radio programs have been relayed, it is the first time-the linking of many stations has been attempted without connecting wires and on so ambitious a scale. The occasion was a dinner held at the Waldorf, and the list of speakers arranged for and the musical program planned led the Radio engineers to decide on this event as a suitable one for the experiment, which had been in mind for many months.

EXEMA Heart of Eelay.

MNKA Heart of Relay

"The microphones on the speakers' table," explained the officials, "went directly to Station WJZ and, through powerful line amplifying apparatus, to Station WGY at Schenectady. Station WJZ trans-WGY at Schenectady. Station WJZ transmitted the program on its usual wave length of 455 meters; WGY simultaneously. on 355 meters. The signals from WGX were picked up by KDKA at Pittsburgh on special receivers. KDKA at the heart of the relay system, as not only did this pioneer plant broadcast the music and talks on its customary local wave length of 326 meters, but also sent out a powerfully amplified repetition on its 94-meter relay wave.

fully amplified repetition on its 94-meter relay wave.

"This shorter wave length was the one picked up by Station KFKX at Hastings, Nebraska, and by British 2AC at Manchester, England.

"KFKX is equipped with two transmitters, similar to those at KDKA, one of which broadcasts for its surrounding territory on a wave length of 286 meters, while the other sends out on a new relaywave of 108 meters for stations farther west. Thus it was that Station KGO at San Francisco, the farthest link in the chain, had its choice of two relay waves from which to pick up the story, the 94-meter KDKA and the 108-meter KDKA waves. waves.

All England Hears Program

"In England Hears Program

"In England, Station 2AC at Manchester tuned in on the 94-meter transmission of KDKA. Station 2AC, which is operated by the Metropolitan-Vickers. Electric company, was linked with its seven sister stations and the program broadcast all over England."

It was 10:30 p. m. Eastern time when Toastmaster Ralph H. Howes introduced the first speaker. Radiophans in San. Francisco were tuning in to listen at 7:30 p. m., Pacific time, while the British listeners were listening for the words in this city at 3:30 a. m., Greenwich mean time. Eight hours' difference in time separated those who were at their sets waiting for the faraway words. Agents word dispatch flash telegraph messages to the diners, reporting the audibility of the test.

He Objects to Allowing Bears Eat Little Tots

Canadian Says Those Bedtime Tales Are Too Frightful

SCHENECTADY, N. Y.—From the land where wild game is still plentiful has come a request to WGY, General Electric broadcasting station here, that child-eating bears be deleted from bedtime stories for the children. In a country where bears are a frequent sight such stories, it is explained, put fear in the hearts of children. The letter came from F. J. Lee; a resident of Lee Valley, seven miles from Massey station or New Ontario, Canada. Mr. Lee is the first settler of the place named after him. He is well over seventy years old.

after him. He is well over seventy years old.
"I want to file a protest," writes Mr. Lee, "against the bedtime stories for the children about bears eating up little boys or wanting to. Remember that stuff goes to this new country whore there are bears. There are but few children going to school who haven't seen a bear. Boys eight oo ten years old only laugh at such stuff here but the little tots are made afraid."

Austria to Broadcast

AUSTIA to Broadcast
WASHINGTON, D. C.—The formation
of a company is being undertaken by the
Austrian government to carry on broadcasting in that country, according to a
report from Vienna.

Evening Sermons, Music on WLW Sunday Program

off WLW Sunday Program CincinnNATL—The programs of Station WLW, Crosley Radio Corporation here, will hold universal interest on Sunday evening with its new schedule recently put in effect. The program begins at 7:30 (central time) in the evening with semi-weekly broadcast of agricultural semi-weekly broadcast of agricultural services from the Walnut Hills Presbyterian Church, with Rev. Frederick N. university. The lectures deal with the McMillan in charge. This service will be live problems of the growers and are de-

for 45 minutes, and will be followed by a livered by members of the agricultural program of music by the Western and sollege faculty. The broadcasts are made Southern Welfare orchestra, under the direction of William Kopp.

Cleaning Up the Radio Pirates!

ON MARCH 12th, 1924, the Hon. William Bondy, U. S. District Court Judge for the Southern District of New York, issued a permanent injunction enjoining and restraining the Micadyne Radio Company from making and selling counterfeits of Dubilier Micadon fixed condensers and from using the name "Micadyne" to deceive the public.

By Judge Bondy's sweeping order, not only was the Micadyne Radio Company perpetually restrained from counterfeiting the well known Dubilier Micadon fixed condenser and using the deceptive name "Micadyne," but all the Micadyne Radio Company's finished and unfinished counterfeit condensers, all its dies, tools, drawings, and patterns for the production of counterfeits of genuine Dubilier Micadons, all its books containing the names of jobbers and dealers to whom counterfeits have been sold or delivered, were turned over to the Dubilier Condenser and Radio Corporation.

Warning to the Public

The books of the Micadyne Radio Company, which, by Court order, have been turned over to the Dubilier Condenser and Radio Corporation, disclosed the names of jobbers and dealers who have bought the deceptive Micadynes and presumably sold them as genuine Dubilier Micadons. Among these are some of the largest radio retail stores.

Although the Court order effectually protects the public in the future, it is probable that some Micadyne Condensers on the shelves of dealers will still be palmed off as genuine Dubilier Micadons for a few weeks.

Be sure that the fixed condenser that you buy is a genuine Dubilier Micadon. The name "Dubilier Micadon" appears on the edge of each genuine Micadon Condenser. On the face of one metal clasp appear the type number and the capacity, and on the other clasp, the usual patent notice. The accompanying illustrations will make this clear.

Examine the circuits of the set that you buy and be sure that genuine Dubilier Micadons have been used where fixed condensers are required.

Further Legal Action to Come

The Dubilier Condenser and Radio Corporation has been one of the principal sufferers from patent infringers and trade-mark pirates. It will not relax its efforts to stop the manufacture and sale of radio products that counterfeit genuine Dubilier Devices.

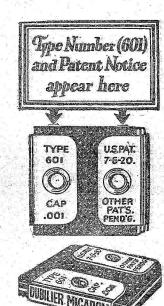
Criminal prosecution is now pending against one offender, who is charged with selling imitations as genuine Micadons; he has been held in bail in the Criminal Courts of New York State. Unfair competition and patent suits will be brought against others.

For the Benefit of Radio

The purposes of the steps taken and to be taken by the Dubilier Condenser and Radio Corporation, is not only to protect its own rights and good will and the public, but also, pursuant to its general program, to purge the radio industry and the radio trade of pirates who wilfully infringe patents and trade marks, deceive the public into buying inferior and often inoperative parts, and fatten on the pioneer work done by able inventors and engineers for the advancement of Radio.

Dubilier Condenser and Radio Corporation NEW YORK 40-50 WEST FOURTH STREET





Name

DUBILIER MICADON

abbears here

"SUPER-HET" ARMSTRONG IMPROVES

(Continued from page 1) mands from seven to nine tubes, the invention is considered valuable from an economic and popular standpoint.

economic and popular standpoint.

Explanation of Super-Set

The system employed in the super-het, as it is commonly abbreviated on account of its cumbersome name, should be explained before attempting to describe the new feature, the "second harmonic."

The incoming signal, for example, may be on a 37s-meter wave, which means a frequency of \$00,000 cycles. The object is to change the incoming signals to a higher wave length, or in other words a lower frequency.

higher wave length, or in other words a lower frequency.

Vacuum tubes, to date, all amplify the lower frequencies much better and give three or four times as much amplification per stage as with the higher frequencies, or shorter waves. Therefore the increase in wave length is desired.

How Wave Length Is Raised

How Wave Length Is Raised

Another tube is incorporated so as to oscillate at a frequency of 750,000 or 850,000 excles per second. When mixed then, the incoming signal frequency and the locally generated frequency cause a differential frequency, inaudible, of 50,000 meters).

This in turn is passed through the Radio frequency amplifier tubes and transformers to the second detector, thence through the customary audio frequency amplifier, if desired.

Now to explain the second harmonic. In the new circuit, the first tube is reflexed; it is first used as a stage of of,000-meter, low Radio frequency amplification, and later as a stage of 6,000-meter, low Radio frequency amplification. The second tube, which is the first detector tube, serves a double purpose in functioning also as the oscillator tube.

The Second Karmonic and Its Use

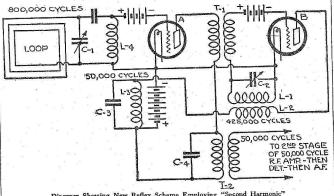


Diagram Showing New Reflex Scheme Employing

Diagram Showing New Reflex Scheme Employing "Second Harmonic" bined oscillator and first detector, or interests.

This is first used as a stage of ordinary low wave length, high Radio prevents detector tube, serves a double purpose in functioning also as the oscillator produced as depicting the School Rarmonic and Its Use

The signals are assumed to be coming in at 800,000 cycles frequency. A "beat," differential or intermediate frequency of 50,000 cycles and add it to one-half the desired beat frequency or 25,000 cycles. The result is 425,000 cycles. The result is the frequency to which the com-former T-1.

The first super-heterodyne was made of French parts by Armstrong who was at the time a Major in the U. S. Army, and his Sergeant assistant, Harry Houck. It was originally designed for direction finding work during the war, and used eight tubes; two in the "frequency changer" which includes what is now called the oscillator and first detector, and three stages of intermediate frequency with a detector and two-stage audio frequency amplifier. In this outfit, the tubes of which were placed on top of the cabinet European fashion, the intermediate amplifiers operated on a frequency of 100,000 cycles.

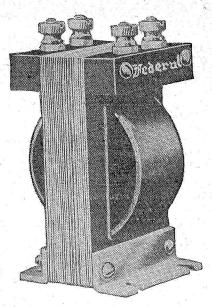
Rouck and Armstrong Work

After their return from the war, Armstrong and Houck experimented for some time with discouraging results. Finally they designed a set for broadcast use. It worked—it worked splendidly but at that time the amplifier tubes on the market drew one ampere each. This fact gave the set its slogan, "The Rolls Royce of Radio Receivers." With a set drawing eight amperes from the battery only millionaires could own it, and think of the frequent tube casualties and replacements.

As a consequence, work on the superhetered for awhile, to be revived when dry cell tubes made their appearance. Then it was thought that eight or nine tubes were too many; the maintenance in dry cells was too high. Plainly some functions had to be combined in the tubes, and here, Armstrong gave all the praise to Houck, who found the solution after the Major had looked for three years. That solution was the "second harmonic."

\$7,500 Loud Speakers for Kansas City Public Hall

KANSAS CITY.—The executive committee of Convention Hall, municipal auditorium, has ordered a public address "loud speaker" system to cost \$7.125, installed in the big hall. Also a \$450 commercial Radio receiving set is to be purchased. Contracts for installation of the loud speaker system and the receiving set were awarded to a company whose bid was \$10,000. George M. Myers, president of the directors, said both instruments would be in place within four weeks.



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

\$7.00



The Sign of Reliable Radio Dealers

The set you build will please you more if you use-



FEDERAL parts are made with but one purpose in mind—to deliver the utmost in radio service. Years of research and hundreds of experiments are often necessary before some of them have reached that standard of perfection demanded of all of Federal's more than 130 parts.

Remember, too, that a set built with a few good parts and some not so good, will only be as dependable as the inferior parts. For unqualified pleasure and satisfaction you must use good parts all through.

Federal will meet these requirements precisely. They are designed and built to work together-all as parts of a single unit-"that set that will please you more."

Federal Telephone and Telegraph Company Factory: BUFFALO, N. Y.

rk Philadelphia Chicago San Francisco Bridgeburg, Canada London, England New York

MUSICIANS WON'T "MILK" STATIONS

REFUSE TO CHARGE FOR PICK UP CONCERTS

Chicago Federation Decides to Turn Down Dictates of Other Forces

-At a recent meeting here of Federation of Musicians it CHICAGO.the Chicago Federation of Musicians it was decided to throw off the yoke pre-sented to them, it is said, by B. C. Mills, "Czar of the Music Trust," and decide for themselves what to do regarding pay for

themselves what to do regarding pay for broadcasting.
Headed by their president, James Petrillo, the musicians refused to be led by instigations of other forces, but will go on the air whenever they so decide, with or without pay.

The musicians will not charge broadcasting stations extra pay when immediate employment is in a dance hall, cabaret, hotel or theater and the music is collected by a broadcaster's microphone.

When playing in a studio especially for a broadcast station, the scale of pay will be the standard union rate.

GIVE R.C.A. SHORT TIME TO ANSWER

Trade Commission Denies Thirty-Day Extension, Gives Only Till April 10

WASHINGTON, D. C.—The Federal Trade Commission has allowed until April 10 for the Radio Corporation of America and other respondents to answer its complaint against the alleged Radio monopoly. This is the second time that the commission has extended the time for an answer. The law requires that the commission allow thirty days after the service of the complaint in which to file answer. The espondent in this case asked first for an extension of thirty days over the regular time allowed, bringing the date to March 25. Another thirty days was asked but

Books

OWN SET

the commission granted only an extension

the commission granted only an extension to April 10.

While the commissioners will not officially discuss the extension it is understood that the second extension was granted on the plea that the commission monopoly report to Congress had not become available in printed form in which are contained many exhibits dealing with the complaint.

Radio to Help Civilize Savages of South Seas

Sauages of South Seas OAKLAND, CALIF. — The American broadcasting station will soon act as a powerful educational influence on the backward civilization of the islands of the southern Pacific, predicts Major General G. S. Richardson, administrator of Western Samoa. This statement was made in a letter from General Richardson to Station KGO, General Electric company here, after he had listened to an entire program as the guest of Quincy F. Roberts, American consul at Apia, British Samoa.

Samoa.

The program came in so clearly 5,000 miles from the sending station that "Vallima," the old home of Robert Louis Stevenson, now the residence of Major General Richardson, has been named a "listening station" of KGO.

1,500,000 Ether Fans Claimed for California

Supervisor Estimates 4,000,000 for West Coast

SAN FRANCISCO.—California, The Golden State, has passed the mark of 1,-500,000 Radiophans, according to a recent statement issued by Col. J. F. Dillon, Radio supervisor for the sixth district. The statement of Col. Dillon reads:

"Radio is growing with leaps and bounds and this department is taxed to its full capacity caring for the situation.

"There are more than 500,000 Radio re-ceiving sets in homes, offices and business places in California, and I estimate that at least three persons listen in at each receiver.

"I can say conservatively that my fig-ures are correct and that there are over 4,000,000 members of the invisible audience on the Pacific Coast."

Colonel Dillon has been months endeavoring to give an estimate on the popularity of Radio for Washington officials and his statement of recent date reveals the first result of this official tabulation.

Fort Leavenworth's Giant Station Nearly Completed

Station Nearly Completed
FORT LEAVENWORTH.—Construction
of the giant Radio control station being
erected here by the war department is
progressing rapidly and the big plant
should be completed and ready for operation some time in April, Capt. H. W.
Webbe, of the United States Signal Corps,
declared recently.
The set has a power of ten kilowatts.
Captain Webbe, who will be in charge of
the station, said that the normal daylight
range for high speed commercial service
will be 1,200 miles.
The set will permit either the use of
code or voice. When used for voice the
set will be operated on five kilowatts.

Ban Lifted In Greece

Ban Litted In Greece
WASHINGTON, D. C.—The revolutionary government in Greece some time ago forbade the operating of private Radio apparatus to prevent the Greek public from being reached with propacanda unfavorable to the revolution. According to advices, the present government has prepared a law by which the operation of private Radio sets belonging to Greek citizens will be permitted.



"ONE SIXTY" NEUTRODYNE RADIO RECEIVER

Selectivity

The FADA "One Sixty" radio receiver is known to thousands as the greatest triumph in radio engineering down to this very moment. It meets all requirements for simplicity of control, selectivity, volume, clarity and ability to bring in distant stations.

Its selectivity appeals to everyone—and to the women folks in particular. You can tune out local stations, even when several are broadcasting, and bring in distant programs. Or, you can tune in any local station you wish and not be bothered with interference from the others.

After any station is picked up with maximum intensity, notations can be made of the dial settings, and if one desires to listen to the same station again it is only necessary to reset the dials in the same positions as recorded.

The FADA "One Sixty" is a fourtube Neutrodyne radio receiver. Our engineers have found by exhaustive experiments that the FADA "One Sixty" with four tubes will produce results at least equal to those of any five-tube set. This means economy in tube and battery costs.

In appearance the FADA "One Sixty" is an attractive piece of furniture. Installed in the home, its chaste, handsome cabinet harmonizes with anv interior. It is a quality product throughout. Made with all the care and skilled workmanship that have made FADA products noted, the "One Sixty" is a radio receiver that anyone may be proud to own.

Price, exclusive of tubes, batteries and phones, \$120-at all dealers.

F. A. D. ANDREA, INC., 1581 Jerome Avenue, New York City





OPERATING AND TROUBLE SHOOTING

For the Owner of a

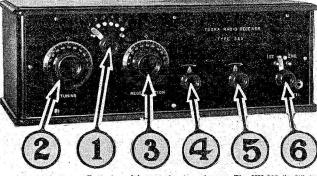


Type 225 Receiver

PERATING 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, 10 and 22 this week, Tuska Type 225 Receiver is described. Radio-phans with other sets will also find these articles worth reading particularly the notes on trouble finding.

THE Tuska Type 225 receiving set does not include the accessories. It is necessary for you to erect an aerial. This requires wire, insulators, lightning arrester, and miscellaneous parts. In addition supply yourself with telephone receivers or a loud speaker, tubes and batteries. There are any number of telephone receivers or loud speakers on the market which are satisfactory.

A 6-volt storage battery of about 80 ampere hours capacity is recommended for



Tubes

Good vacuum tubes in the receiver are as necessary as good tires on the car. At the present time, users of Radio outfits have a choice of several kinds of vacuum tubes. The real difference in these tubes consists of the amount of power which is consumed from the battery. In the main, there are two types; those operating from dry cells and those operating from storage batteries. The storage battery tube is recommended as being the most satisfactory in the long run and producing the best results, particularly in the reproduction of musical selections. Of course, there are places where a storage battery cannot be handled, such as on a farm where charging is difficult or on light weight portable sets. Storage batteries have to be charged about once every week, depending on the amount of time they have been used, and are heavy and difficult to carry around. In certain cases, dry cell tubes have their place.

Of the storage battery tubes there are

use as an A battery. Batteries of lower ampere hour rating are cheaper and lighter but require more frequent charging.

For B battery, three 22½-volt units are recommended, using one of the units of the variable type to adjust the proper voltage for the detector tube.

Tubes

Good vacuum tubes in the receiver are as necessary as good tires on the car. At the present time, users of Radio outfits have

The Tuska Type 225 receiving set is designed to operate with an antenna. Under certain unusual conditions, particu-Under certain unusual conditions, particularly over short ranges, it is possible to operate with a small wire inside of the house, a bed spring or other metallic objects not connected to the earth. However, this is not recommended for a maximum receiving range nor can this system of reception be entirely relied upon. The following antenna specifications have been found to give the best results. Any copper wire will do but it is recommended that sizes not smaller than number 18 be used while number 14 will prove much more satisfactory, as the larger size gives more mechanical strength. Seven strands of number 22 copper wire twisted into a cable makes an ideal aerial. The advantages of the strands of the strands of the strands are strands and the satisfactory as the strands of number 22 copper wire twisted into a cable makes an ideal aerial. The advantages of the satisfactory is sufficiently sufficiently

tage of using several wires in parallel and separated by a spreader at each end is so slight as to be hardly noticeable in many cases. This wire should be erected along the line suggested in the accompanying sketch; in an open space; as high as possible and at least 80 feet long. Also, see that one end of the aerial support is somewhere near where the receiving set will be located. The aerial itself should be from 80 to 125 feet long and the lead-in should not exceed 25 feet. Of course, it will be necessary to vary from this slightly as every antenna represents a new problem and has new dimensions. The important part is to make the antenna at least 80 feet over all and not longer than 150. If the supports are farther apart, it is possible to split the antenna by inserting an insulator at the required length. Very long, high aerials do not receive the short waves very well and although they give loud signals on other waves, the summer atmospheric disturbances and interference from amateur, commercial and navy stations bothers to a greater extent.

If it is necessary to run the antenna over a tin roof, be sure to set it as high above the roof as possible. If it only clears the roof by 4 or 5 feet, the results will not be entirely satisfactory.

Socket plugs that screw in the electric light fixture to take the place of the antenna occasionally give fairly good results but it is hard to predict the results that can be obtained. In rural sections where the power wires are greatly exposed to the radio waves and the houses are made of wood, good results seem to be obtained, while in congested city apartments the wiring is often metal encased and very poor signals accompanied by terrific induction of the sure to make connection to some metal pipe or object which goes deen.

Ground Connections

The ground connection is extremely important. Be sure to make connection to some metal pipe or object which goes deeply into the earth. A rod or pipe driven in the ground several feet is nearly always insufficient as it makes weak signals and poor tuning. Connection to a cold water pipe is best when possible. Follow the pipe layout in the basement to determine the best point to connect the wire to the pipe, keeping in mind that the shortest and most direct line to where the pipe

(Continued on page 19)

(Continued on page 10)

RADIO TALKS

indenser that you use in tuning your set. Who try to do all your receiving with condensers its is about what you are attempting to do when you use blate condensers for broadcast reception. Use 11 plates less and get all that you can out of the antenna to ground J. Thewelling adenser.

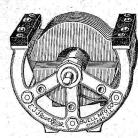
Genuine-**Radio Apparatus** De Luxe

The new Flewelling Condenser is now being supplied. Its capacity test is interesting — Maximum — .0005119 mfd. Minimum — .0000099 mfd. This shows a range of 51.7 to 1 which means that with a certain fixed inductance this con-denser will permit you to tune over a large wave band. It is a genuinely good condenser and you will be proud of the performance of a set built with these condensers as a basis.

BUELL MANUFACTURING COMPANY

2977 Cottage Grove Ave.

Condensers Sockets Tuners





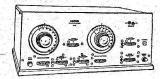
No Outdoor Wires-

The 20-foot silk-covered wire is the only antenna required with

When REBE Broadcast

T HIS wire may be con-cealed behind the picture moulding. There is no un-sightly wiring of any kind, as compartments are provided for all necessary batteries.

Write for "Grebe Radio in the Well-Appointed Home."

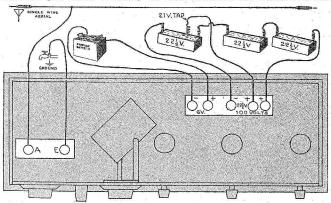


A. H. GREBE & CO., Inc.

Richmond Hill, N. Y.

Western Branch-451 East 3rd St., Los Angeles, Cal.

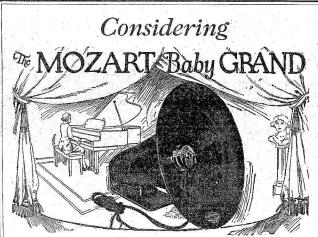
OPERATION, TROUBLES (Continued from page 9)
actually enters the earth is the best. Gas pipes are not recommended for ground connections as they are often insulated near the meter. Pipes of the heating system often give good results if actually considered to the serial and the other of which connects to a ground. For this ground, a water pipe should be used. The wire must not be smaller than the aerial wire and in no case smaller than Number 14. It need



nected to the earth but are liable to take not be insulated wire or held away from a much longer path in getting there. The the walls, This same wire can be used connection to the pipe should be well made for the earth terminal of the receiver if by cleaning a section of the pipe all the way around until it is bright, and then using a standard evanual along the transfer of the connections.

way around until it is bright, and then using a standard ground clamp tightly fitted over this clean place.

The regulations of the Fire Underwriters in regard to the installation of a receiving station are not hard to conform with. An antenna properly installed is more of a protection from lightning than a hazard. The regulations, in brief, say that the aerial shall be put up in a strong and durable manner, at least not run over or under any wires carrying more than 500 volts, kept five inches away from all elec-



UR new reproducer is now under consideration by thousands of radio enthusiasts throughout the country. Singularly, many of the most expert are making quick decisions and below we quote from an opinion, entirely unsolicited, given us by Mr. C. E. Mattson, Baltimore.

"I gave the sample a test at one of the radio stores. About 15 eustomers crowded round and all agreed it was equal to the \$35.00 — and won by several lengths against the \$30.00 — My own opinion is that the M-G is going to be the greatest hit in radio this and next season -

Within five days (date of going to press) from receiving above, we have had orders for immediate shipment, aggregating exactly 146 complete reproducers and a large quantity of extra units for other makes of horns and phonographs from Mr. Mattson and his customers.

PRICES. An Explanation

We have been reluctantly obliged to slightly increase our price, and to prospec-tive purchasers a full explanation will be mailed on receipt of a postal card.

West of the Rockies. 12.65
Unit only (gold plated) with cord ready for attaching. 5.00 Unit only (nickel plated) with cord ready for attaching...... 4.00

THE MOZART-GRAND CO.

Manufacturers of Fine Instruments

NEWARK, N. J.

terminal with respect to the negative lead. The positive pole of the battery should be connected to the plus binding post and the negative pole of the battery to the minus binding post. The whole connection is shown in the figure and you should have no difficulty in following this diagram.

The next step is to insert the vacuum tubes in the sockets, making sure that a satisfactory connection is made and that the bayonet catch locks the tube in. Occasionally, a tube will not be inserted correctly in the socket and a loose connection means noises and poor results. After the tubes have been inserted, the telephone receivers should be connected to the jack by means of a plug.

Turn the rheostat Number 4 from left to right, as shown by the arrow in the first diagram. Turning the rheostat increases the current flowing through the vacuum tubes. The amplifier rheostat Number 5 can be turned almost fully on while the detector rheostat Number 4 must be adjusted to give the most satisfactory results. The method of adjusting is as follows: First, start with a detector voltage of 22½ for the UV-200 tube and with the regeneration knob Number 3 set as zero, turn the rheostat Number 4 to the right until a slight noise is heard in the telephone re-

SUPER VALUES

WHAT'S NEW IN RADIO?

Farrand's Super-Pliodyne

NINE TUBE RECEIVER

Uses Six Stages of Tuned Radio Frequency with but Two Controls

Write for complete details and price list of parts to build this new receiver

HANES-ZENER

Located at 42nd St. and Broadway, New York City Always first in marketing the **NEW THINGS in RADIO**

Resistances

ORIGINAL and GENUINE P. L.

100,000 OHMS, 30,000 OHMS, 80,000 OHMS, 25,000 OHMS, 50,000 OHMS, 9,000 OHMS, 48,000 OHMS, 1,000 OHMS, 48,000 OHM

DEALERS! WRITE FOR OUR DISCOUNTS

COCKADAY Four-Circuit Receiver 3000 MILES

Parts as specified by Mr. Cockaday

- Parts as specified by Mr. Cockaday
 1-Cockaday Coil
 2-Amsco Zo-Flate Condensers
 2-Amplex Grid-Densers
 1-Bradley Leak, ¼ to 10 meg.
 5-Miclo Sockets
 Rheostat
 3-Amsco Zo ohm Rheostat
 1-Pacent Single Jack
 2-Pacent Double Jacks
 2-Pacent Double Jacks
 2-Amertran Transformers
 1-Come Push-Pull Transformer—Input
 1-Come Push-Pull Transformer—Output
 2-Switch Levers
 1-Switch Foints
 1-Switch Foints
 1-Dubliler Condenser—0005
 1-Dubliler Condenser—0005
 1-Dubliler Condenser—48,000 ohms
 1-Lurham Variable Grid Leak
 3-Lavite Resistances—48,000 ohms
 1-Ax24 Panel
 1-3*x2¼ Sub Panel
 1-1-3*x2¼ Sub 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

- INCLUDING

 1 Panel 7x10

 1 Cabinet
 2 Sockets
 1 Rheostat
 7 Erby 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

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"

1480 Broadway, Corner 42nd St., New York City

What's Wrong with Your Receiving Set?

Chapter VI—Tuning Out Interference

By Peter J. M. Clute

Having previously considered in more or less detail the principal causes of reception interference, it is expected in the ensuing paragraphs to outline the suggested methods of reducing or eliminating, either at the source or at the receiving end, some of this interference. Radiophans experience considerable difficulty at times in eliminating interference due to broadcasting stations heterodyning each other or to a commercial or an amateur spark station, with a low decrement, forcing its impulses into the receiver by "shock excitation." Such conditions may exist even with a highly selective receiver, with much more interference, however, if the set is not so selective. Although some interference may be so slight as to not be discernible during the reception of a broadcast program, it will still cause distortion.

It has been pointed out that the carrier waves of two or more broadcasting stations operating on approximately the same wave length will heterodyne each other, producing interference to reception in the form of whistling. This is especially true when nearby stations are broadcasting at At this been pointed out that the carrier waves of two or more broadcasting stations operating on approximately the same wave length will beterodyne each other, producing interference to reception in the form of whistling. This is especially true when nearby stations are broadcasting at wave frequencies close to that which it is desired to receive. The whole matter of cutting down interference from one stations are broadcasting at the research of the state interference in broadcast reception.

In view of these considerations, in order to prevent interference from a nearby broadcasting station, the nearer the receiver is to that station, the higher must be its selectivity. Also, the greater the distance it is desired to receive, and consequently the more sensitive the receiving outfit is, the more highly selective it must be to avoid interference. Proceeding on this basis, the following types of receivers are listed beginning with the most selective equipment, the relative rating being governed not only by the character of the circuit but also by proper design and construction: (a) superheterodyne; (b) tuned. Radio frequency amplification with regeneration; (c) tuned Radio frequency; (e) two circuit regenerative receiver; (e) two circuit regenerative receiver; (f) single circuit regenerative receiver; (g) antuned Radio frequency amplification with regeneration; (n) non-regenerative receivers.

With hundreds of broadcasting stations

With hundreds of broadcasting stations With hundreds of broadcasting stations on the air at the same time, it is quite difficult to receive broadcast programs and at the same time tune out the numerous heterodyned noises, unless a very selective outfit is employed. It must be borne in mind that a poorly constructed superheterodyne may be less selective than a good single circuit regenerative receiver.

Atmospheric Static

Viewed from its many aspects, the interference problem is undoubtedly one of the most important propositions that Radio engineers are called upon to solve. Obviously, the present chaotic condition of the ether demands some sort of immediate attention. While it is generally admitted that the growth of Radiohas been an unhealthy one, the facilities for controlling the ether traffic have not kept pace with the tremendous increase in the number of transmitting stations. The interference caused by the thousands of naval, commercial and amateur telestraphic code stations in addition to the multitude of broadcasting stations has dampened somewhat the enthusiasm with which the present popular form of Radiohas been met by the more sensitive the receiver, and consequently the more sensitive the receiving one of the most interference. Proceeding on this asia, the following types of receivers are listed beginning with the most selective in the station of the lightly selective it must be to avoid interference. Proceeding on this basis, the following types of receivers are listed beginning with the most selective interference. Proceeding on this basis, the following types of receivers are listed beginning with the most selective interference. Proceeding on this basis, the following types of receivers are listed beginning with the most selective interference. Proceeding on this basis, the following types of receivers are listed beginning with the most selective interference. Proceeding on this basis, the following types of receivers are listed beginning with the most selective interference. Proceeding on this basis, the following types of receivers are listed beginning with the most selective interference. Proceeding on the static interference, more are listed beginning with the most selective interference. Proceeding on the proceeding of receivers exaggerates the imprise of receivers exaggerates the imprise of the same any factor inherent in the atmospheric disturbances themselves. In other properly associated the excitation is to properly operate the existing equip-

ment.
There is no reason why Radio frequency amplification should filter out static interference to an appreciable extent, because static is not an audio frequency

Directional Aerial Systems

With due regard for the physical characteristics of the receiving equipment and with proper manipulation of controls, considerable improvement will be obtained in reception through static by using sharply directional aerial systems. In addition to the wave antenna, fairly good results muy be obtained with a loop aerial. It should be borne in mind, however, that such a directional system is in general effective only when the static itself is chiefly confined to a narrow sector of the compass, which sector makes a large angle with the direction of the station broadcasting.

While it has been broadly claimed that much of the interference in the air, in the form of whistling and howling, is caused by single-circuit receivers, it can generally (Continued on page 12)

How I Average \$12 a Day in RADIO WORK

By Howard Houston

"YES, Mr. Crosby, I'll have the set installed tonight yes, all ready to 'listen-in' sure you'll be able to get Washington by 9 o'clock." Another hour and a half job! And another ten dollar bill in my pocket! It all seems like a dream. But let me tell you the whole story from the very start.

me tell you the whole story from the very start.

A few months ago, I was driving a bread wagon, selling bread to retail stores. I had a good route though, and if I do say so myself, I had built up a pretty good business. But try as I could, thirty-five dollars a week was all I could make that job pay. I'd be working there now if it hadn't been for Mary. We'd been 'keeping company' for about two years, and everything was all set for our getting married as soon as I would be earning more money. But the old job didn't hold out much promise—and I didn't see how I was qualified for any other work that would pay more.

It was Mary who gave me the tip. "You can't earn big money," she said, "unless you're some kind of a specialist. Learn some line of work—become an expert in it." But what business, profession or trade was there that wasn't overcrowded? Where could an ambitious fellow stand a good chance to earn big money and get ahead. Stenographers, accountants, clerks—all down the line—every well established line of work was overcrowded, and the pay was small. Then Mary said, "Why not find a new field?" That was a good thought. The men who went into the railroad business early "leaned up." The same was true of the month of the work was a sour common to the change of the promising industry?

We both jumped to our feet.
"RADIO."

"RADIO."

"RADIO."

Why hadn't we thought of it before? All around us was the evidence of the tremendous development of Radio. The broadcasting statuting plants—everybody talking about the latest radio program. Radio had captured America almost overnight—and thousands of men who were on their toes were due to make fortunes out of it.

Thousands of Men Needed

The very next day after I had fusished my

Thousands of Men Needed

Thousands of Men Needed
The very next day after I had finished my
route, I went to several radio business firms.
"Sure, there was an opening. Oh, they'd pay
big money—but did you know Radio?"
That was my cue. Learn Radio. Become
a Radio Expert—and I did!
Well, that really is my whole story. I've
only started. I've followed the path of least
resistance. Sort of built up a business of my
own installing, building, and repairing radio
sets. Any small job pays me at least \$5to \$100' a week—and mere as I get my work
systematized.

What Mary and I have got to decide after
our honeymoon—oh, yes, we are soon having
a very quiet wedding—what we must decide



after that—is which end of Radio will be best. You see, there are dozens of different kinds of work in this field, it's so big. The already had several offers—one to take charge of a radio department, another with a broadcasting station, another to give radio entertainments, and a good offer as superintentant of to decide on is which will not only pay the most money now but will lead to the most rapid advancement in the future.

Easy to Learn Radio at Home in Spare Time

in Spare Time

Just a word about this Radio business. Some fellows think you've got to have some training before you start to learn Radio. That's bunk. I didn't know the difference between an amplifier and a doorknob before I started. But I ct me give you at in. Don't experience between the property of the property o

Send for Free Book "RICH REWARDS IN RADIO"

"RICH REWARDS IN RADIO"

Incidentally, the National Radio Institute publish a mighty interesting book on Radio. They send it out without cost to anyone who wants to learn about Radio. It is filled with facts, photos, and figures on the Radio Industry, and tells all about its course which quickly prepares you right at home in spare time for one of the big pay positions in Radio.

Take my advice—and Mary's—and send for that, no matter how little you know of Radio, or what your plans are. Just mail the coupon for it now. Address the National Radio Institute Dept., Washington, D. C.

NATIONAL RADIO INSTITUTES, Dept. 55DA, Washington, D. C. Plouis-seni line without cost or shiligation your Froe Look, "Rich Reteards in Radio," which lelfs time study at home will quality me for a life paring radio poci

| Name | | | | | Age |
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BRISTOL SINGLE CONTROL RADIO RECEIVER



Most Simple to Operate

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

Does Not Interfere With Your Neighbor

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

Choice of Aerial or Loop

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

Mounted in solid mahogany case with walnut finish, the Bristol Single Control Radio Receiver is handsome in appearance. The price is \$199.00. Bulletin AY-3013 describing this set will be mailed



BRISTOL-AUDIOPHONE

Loud Speaker

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

Made in three models:

Audiophone Senior Price, \$32.50 Audiophone Junior Price, 22.50 Baby Audiophone Price, 12.50

THE BRISTOL COMPANY, Waterbury, Conn.

continued from page 11)
be traced to the lack of tuning experience on the part of the operator. The improper manipulation of controls will result in similar disturbance from any receiver of the regenerative type.

Many operators of regenerative receivers make use of the so-called "heterodyne search" or the beat note method of reception to locate stations of unknown wave length. When using this mode of procedure, the vacuum tubes are thrown into oscillation, and by adjusting the grid and plate circuit controls at the same time, the circuits are kept in oscillation while the wave length is varied over quite a wide range. With the tubes in an oscillating state, the receiver circuits will behave as a generator of Radio energy, some of which will be radiated from the receiving antenna system. The presence of this reradiation interference is manifested in nearby receivers by whistling noises of varying pitch. It is evident that when several neighboring regenerative receivers are being adjusted simultaneously to the same distant station, it is practically an impossibility for any one of them to receive the program from the distant station in a satisfactory manner.

To acquire the knack of proper tuning requires no more effort on the part of the operator than the highly undesirable method just mentioned. If the antenna system is kept approximately in resonance with the tube circuits, and the incoming signal strength is adequate to give audible tones, the broadcasting station may be tuned in by a simultaneous adjustment of both the grid and the plate controls. During this operation, the relative settings of the two control dials should be maintained to such a degree that the circuits are just below the oscillating point.

Modulated Signals

Modulated Signals

Modulated Signals

During the reception of a broadcast program or any other form of modulated signal, it is positively unnecessary to have the vacuum tube in an oscillating condition. Clear, modulated signals cannot be received when the set is in a state of oscillation. The uncalled-for method of throwing the detector tube into oscillation in order to intercept the carrier wave of a distant station, sets up a continuous barrage of reradiation interference. If operators would strive to forego this method of endeavoring to locate stations much of the present interference would be at an end.

operators with strice of the present interference would be at an end.

While it is, undoubtedly, true that the single circuit receiver, using tickler coil feedback, produces the strongest interference from reradiation, the substitution of a variometer in the plate circuit, instead of the tickler coil, will aid materially in cutting down this interference. When using the inductively-coupled types of regenerative receivers, in order to obtain DX signals with sufficient intensity, the coupling must necessarily be close. If under these conditions the set is accidentally thrown into an oscillating state, it will reradiate generously for that amount of energy. In a single circuit set, the initial signal energy applied to the grid of the detector tube is about 25 per cent greater than for a two circuit receiver, with the result that the regeneration does not have to be so far advanced. The fundamental rule to be followed for obtaining best results in tuning is to thoroughly comprehend just what the function of each control is and to manipulate them in a systematic and not in a haphazard manner. A complete understanding of the general operating principles of the set and its control is essential to getting good results consistently.

Operating Single Circuit Receiver Inasmuch as the single circuit regenera-

the set and its control is essential to getting good results consistently.

Operating Single Circuit Receiver
Inasmuch as the single circuit regenerative receiver is undoubtedly the most popular type with the Radiophans, it will not be amiss to detail the proper method of tuning such a set. Three controls are generally provided, the wave length control, the regeneration control and the filament rheostat. The filament should be operated at the lowest current which will give satisfactory results. This may be determined by slowly increasing the filament tomperature until a hissing sound is heard in the phones and then cutting down the filament current just sufficient to cause this noise to cease. Having the regeneration control set at zero, the wave length or tuning control should be gradually turned until signals are heard. The regeneration control is then slowly adjusted until maximum strength of signal consistent with good quality is obtained. Advancing the feedback control too far will cause the set to oscillate and reradiate interference from the receiving antenna. If the regeneration cannot be controlled the addition of a potentiometer across the filament battery will materially reduce the howling. First, however, it will be advisable to carefully regulate the filament temperature, reduce the plate potential and adjust the feedback control to as near zero as possible.

Tuning Inductively-Coupled Receiver In tuning an inductively-coupled regeneration.

Tuning Inductively-Coupled Receiver

In tuning an inductively-coupled regenter in the incoming wave. If a free in the incoming wave in the incoming wave. If a free in the incoming wave in the incoming wave. If a free in the incoming wave in the incomi

FIXING WHAT'S WRONG

(Continued from page 11)

be traced to the lack of tuning experience on the part of the operator. The improper manipulation of controls will result in similar disturbance from any receiver of the regenerative type.

Many operators of regenerative receivable was a control of the plate variometer will furnish the required amount of feedback energy. Careful regulation of the filament temperature will bring in the signals loudly and clearly without any howling or distortion.

tortion.
Under stable conditions, the local oscillations are of the same frequency as those radiated from the broadcasting station. If the tuning is varied either way from this state of synchronism, called "zero beat" reception, a high-pitched whistling note will result, the pitch gradually becoming lower until it is replaced by music or speech. Further variation will pro-

duce a low whistling note, gradually increasing to a shrill sound.

Inasmuch as the tuning adjustments for any regenerative outfit are so extremely critical, it will well repay the operator to consider the use of vernier condensers and vernier filament rheostats. This permits of very minute variations in the tuning adjustment of the circuit and in the regulation of filament current. In this manner the point of maximum amplification may be easily found and the resulting reception will be free from any distorting effects.

ulation may be used as an aid in tuning. Radiophans with regenerative receivers Radiophans with regenerative receivers can greatly increase interest in the Radio game by endeavoring at all times to do their level best to keep control of their circuits.

(TO BE CONTINUED.)

the point of maximum amplification may be easily found and the resulting reception will be free from any distorting effects.

A vacuum tube regenerative set, using only one tube, will bring in signals from any the same distance as a set having an allow of signals brought in by the detector tube, for the purpose of operating a loud speaksemploy critical tuning. The regeneration is easily controlled and with proper manip.

says- DE LUXE NEUTRO JACK SHACK

EVERY ONE KNOWS THAT THE NEUTRODYNE IS THE BEST SET IN THE TODAY. No other set compares with it in distance, clearness, volume or sweetness of tone without squeals and howls, PROVIDING YOU USE GENUINE LICENSED PARTS, LICENSED UNDER
THE HAZELTINE PATENTS. It has

to you the Neutrodyne DE LUXE, made up of the best obtainable parts and using only GENUINE LICENSED NEUTRODONS AND NEUTROFORMERS. Besides, the De Luxe is the most beautiful set in the world today and is the only set in the market using Genuine Radion Mahoganite Panels and Dials Engraved in Gold, Gold Plated Jacks and Pointers, etc. Better than the best at any price. Fully guaranteed.

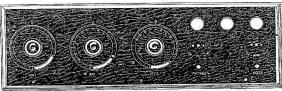
remained for THE RADIO SHACK to bring

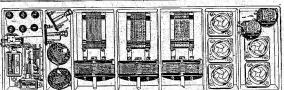
The Set You'll Be Proud of TI-FF. DE LUXE



Uses Genuine Comsco Condensers

PACKED IN ATTRACTIVE BOX





5 Tube Kit Includes:

- Drilled and Fully Engraved in Gold Mahog

- 1 Drilled and Fully Engraved in Gold Mahoganite Panel
 3 Radion Mahoganite 4" Dials Engraved in Gold
 1 Gold Plated Jack, Single Circuit
 1 Gold Plated Jack, Double Filament Control
 3 Genuine Hazeltine Licensed Neutroformers
 1 Genuine Hazeltine Licensed Neutroformers
 2 Genuine Hazeltine Licensed Neutroformers
 3 Standard Bakelite Sockets
 1 6 Ohm Amplifier Rheostat
 1 30 Ohm Detector Rheostat
 1 30 Ohm Detector Rheostat
 1 30 Ohm Detector Rheostat
 1 7 Genuine Hegehog or Shielded Killark Audio
 1 Transformers
 1 MOUZ Freshman Fixo with
 1 Tubular Grid Leak
 1 MOUZ Freshman Micro
 1 Moe Freshman Micro
 1 Offer Bus Bar
 1 Full Size Base Board
 1 Complete Set Engraved

- Complete Set Engraved Binding Posts

1 FULL SIZE BLUEPRINT SHOWING BOTH PANEL AND BASE MOUNT-INGS

Additional Accessories

These accessories, added to the above list of parts, are absolutely all the parts necessary for a complete set in operating condition.

- Ing Collution. \$19.50
 2 45 Volt Extra Large Variable "B" Batteries 6.50
 1 60 Ampere Hour Storage Battery, Guar.
 2 Yrs. 11.25 1 Pair Turney 3000 Ohm Head Phones and Cord 3.75
- SPECIAL

FREE

Send in your order NOW for

THE DE LUXE **JUNIOR**

- Genuine Hazeltine Neutroformers, mounted on Condensers
- 2 Genuine Hazeltine Neutrodons
- 3 Brass Bushing 4" Dials
- 1 Full Size Blueprint of Instruction

LIST \$24.50

PRICE



Using COMSCO Condensers

SEND NO MONEY WE SHIP



NOTE NEW ADDRESS

In order to facilitate de liveries and service, address all mail to our

Executive Offices
55 VESEY STREET

30 Minute A-B-C Lessons for Radio Beginners

Chapter III—How Radio Is Broadcast

By P. E. 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-five chapters, of which the five next will be: Chapter IV—What Radio Inductances Do. Chapter VI—Uses of Resistance in Radio. Chapter VII—Essentials of Radio Electricity, Chapter VIII—Essentials of Radio Electricity, Chapter VIII—The Key to Radio Circuits.

THE broadcast listener may regard the term "ether" as meaning space. In such sense, ether exists everywhere, surrounding the earth, in it, and in everything in it. Material things which appear solid in reality contain ether or space voids. Consider two bushel baskets, both said to be full, one containing carrots and the other sand. Obviously there are air spaces in the basket containing carrots. Though apparently full there are certainly voids or spaces and pockets of air in the basket containing sand. Going further, one can regard any material thing, as a piece of wire for example, as containing more or less ether or space. Dense materials have less ether voids in such a sense. It suffices here to regard ether or space as extending everywhere.

What Is Meant by Electrons

Explanations of Radio are based on the term of electrons. The term electrons theory of electrons. The term electrons can be understood as meaning electricity in its smallest unit. Electrons are intimately related to material things and can be moved if proper force is applied. In Radio circuits they are moved rapidly back and forth and comprise Radio curvents. The enormous number of electrons Explaining Modulation Modulation is important in broadcasting. A well modulated small station is preferable to an incompletely or poorly modulated station of larger power. A Radio curvents. The enormous number of electrons are intimated in the control of the

Electrons in a Wire

Electrons in a Wire

Take a look at Figure 13. The motion of electrons through the wire constitutes an electric current. If too much current is sent through the wire, the molecules are made to push out and the wire expands. The number of molecules and electrons present in any material varies according to the kind of material. It is difficult to comprehend how tiny an electron really is, by itself. Although the molecule just mentioned is the smallest physical particle unit, it is comprised of chemical units still smaller, called atoms. Some electrons attach themselves to atoms and govern the nature of the molecules formed, others are free to fly about in and near the molecule. The view is sometimes taken that all mater is made up of electric particles, of which electrons are the atoms of negative electricity. But the picture of Figure 13 is intended merely to fix the term "electrons" in mind. The important point here is that it requires force to move electrons in mind. The important so that the motion is an electric current. Another thing is that the action of vacuum tubes depends on a certain type of electron flow.

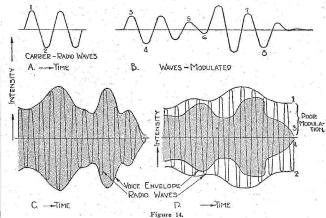
The reason a listener is concerned with the broadcasting is because it controls what is heard. If the modulation is poor a strong carrier may be recognized as a whistle but the voice may be scarcely recognized. In Figure 14, Radio waves are pictured in the diagram.

Modulation is important in broadcast.

Explaining Modulation

time is carried on within a range of wave lengths amounting substantially to 300 to 550 meters, with a few lower. Some re-broadcasts are conducted on about 100 me-ters. Seldom do the broadcasting sta-

This aerial consists of a span of wires insulated from the earth. When the aerial is charged and discharged rapidly by high frequency alternating currents, electrical compressions are set up between it and the



tions adhere strictly to the assigned or supposed wave lengths and in some cases a station stated to operate at 380 meters will vary some ten meters either way. Some stations give much attention to careful maintenance of radiated frequency.

Transmission in Brief

Radio, it will be recalled, is in a sense, another form of light. It would be possible to set up an oscillating circuit in back of a parabolic reflector, much like a searchlight. But for broadcasting, an aerial is used. Transmission in all directions is here desirable.

This compression sends waves traveling outward in all directions, much like the waves from a stone thrown into water.

water.

The alternating current used to charge the aerial must be of high frequency, and is termed "Radio frequency." For comparison, two common frequencies are here tabulated, with the corresponding wave largeth. length:

Wave Length 300 meters 200 meters 856,628 cycles - 1,499,100 cycles (Continued on page 24)

CROSS SECTION OF COPPER WIRE

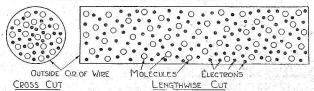


Figure 13.

Figure 13.

The mendous speed when such a driving force is applied.

If you have looked at a razor blade under a microscope, the supposed sharp edge would be seen as a series of rough flaked teeth. If there was an instrument so that one could look into a piece of copper wire and recognize what was there, acrowd of material particles or molecules would be seen intermingled with electrons. If more electrons were poured into this wire the molecules would be moved about violently, and this motion is the same thing as heat. That is what happens when you use an electric toaster.

Figure 13.

Figure 13.

For example, 600,000 cycles. At B the carrier wave is shown with the same frequency, but with intensity varied or modulated. At C a voice wave envelope is shown modulating a series of rough flaked teeth. If there was an instrument so that D poor modulation is illustrated. At the polit in the voice envelope 1-2, Many broadcasting stations now operating have good radiation, as their carrier wave can be picked up clearly at great distances, but the modulation is imperfect is that poor modulation with better modulation, and the quality is imperfect.

The main broadcasting at the present

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

| (| SEE | INSTRU | CHON | FOR | JSE BEL | .OW) | 5 | |
|---|------------|----------------------------|---|--|---------------------------|----------------------------|--|--------------------------|
| Station and City | Met. | Monday | Tucsday | Wednesday | Thursday | Friday | Saturday | Sunday |
| CFCN, Calgary, Alta CKAC, Montreal, Que CKCD, Vancouver, B. C | 440 | 12:00- 1:00 | Silent | 11:00- 2:00 | Silent | Silent | 11:00- 1:00 | Silent |
| CKCD. Vancouver B C | 425 | Silent 10:30-11:30 | 6:00-10:30 10:30-11:30 | Silent | 6:00-10:30 | Silent | 6:00-10:30 | 3:30- 4:30 |
| CKY, Winnipeg, Man. | 450 | Silent | 8:15-10:00 | 10:30-11:30 Silent | 10:30-11:30 8:15-10:00 | 10:30-11:30 8:15-10:00 | Silent Silent | Silent 7:00-10:00 |
| CKY, Winnipeg, Man. CYB, Mexico City, Mex. CYL, Mexico City, Mex. | 425 | Silent | 7:00- 8:30 8:30-10:00 | Silent | 7:30- 9:30 | Silent | 7:00- 8:30 | Silent |
| KDKA, E. Pittsburgh, Pa. | 510 326 | Silent 5:00- 9:00 | 8:30-10:00 5:00-11:30 | Silent 5:00- 9:00 | Silent 5:00-11:30 | 8:30-10:00 | Silent | Silent |
| KFAE. Pullmon Work | 330 | 9:30-10:30 | Silent | 9:30-10:30 | Silent. | 5:00- 9:00 9:30-10:30 | 5:00- 9:00 Silent | 6:30- 7:30 Silent |
| KFAF, Denver, Colo KFOA, Scattle, Wash | 360 | 9:00-10:00 | 9:00-10:00 | Silent | 8:30- 9:00 | 9:00-10:00 | 9:00-10:00 | Silent |
| | 455 | 10:30-11:30 12:00- 1:00 | Silent 8:45- 1:00 | 10:30-11:30 8:45- 2:00 | Silent 8:45- 1:00 | 10:30-11:30 8:45- 2:00 | Silent 8:45- 2:00 | Silent |
| KENE, Shennndooh In | 265 | Silent | Silent | 7:30- 9:00 | 7:30- 8:30 | 7:30- 8:30 | 7:30- 9:00 | 8:45- 1:00 6:30- 7:30 |
| KGO, Oakiand, Calif. KGU, Honolulu, Hawaii | 312 | Silent | 10:00-11:00 | Silent | 10:00-11:00 | Silent | 10:00-11:00 | Silent |
| A.G.W. Portland, Ore | 492 | 12:00- 1:30 10:00-11:30 | 9:45-10:30 | 12:00- 1:30 10:00- 1:00 | 10:00- 1:00 | 12:00- 1:30 10:00- 1:30 | 12:00- 1:30 12:00- 2:00 | 9:00-10:00 |
| KHJ, Los Angeles, Calif | 395 | 8:45- 2:00 10:00-12:00 | 8:45- 2:00 | 8:45- 2:00 | 8:45- 2:00 | 8:45- 2:00 | 8:45- 2:00 | 10:00-12:00 |
| KLX, Oakland, Calif KPO, San Francisco, Calif | 509 423 | 10:00-12:00 | 10:00- 9:30 | 10:00-12:00 10:00- 1:00 | 9:00- 9:30 10:00- 1:00 | 10:00-12:00 Silent | 9:00- 9:30 10:00- 2:00 | Silent |
| KQV, Pittsburgh, Pa. KSD, St. Louis, Mo. KYW, Chicago, Ill. | 360 | 9:00-10:00 | Silent | 9:00-10:00 | Silent | 9:00-10:00 | Silent | 10:30-12:00 Silent |
| KYW Chicago III | 546 536 | 8:30- 9:30 | 8:00- 9:00 | 7:00-10:00 | 8:00- 9:00 | Silent | 9:00-10:00 | Silent |
| NAA, Radio, Va | 435 | Silent . 5:45- 7:20 | 7:00- 9:30 6:05- 7:20 | 6:25- 7:40 | 7:00- 9:30 5:45- 7:40 | 7:00- 2:00 7:05- 7:40 | 7:00- 9:30 Silent | 7:00- 8:00 Silent |
| PWX, Havans, Cuba WBAP, Fort Worth, Texas. WBAV, Columbus, O. WBZ, Springfield, Mass. WCAE, Pittsburgh, Pa. WCAL, Northfield, Minn WCAP, Weshington, D. G. | 400 | Silent | Silent | 7:00- 2:00 6:25- 7:40 7:30-10:00 7:30-10:45 | Silent | Silent | 7:30-10:00 | Silent- |
| WBAV, Columbus O. | 476 390 | 7:30-10:45 7:00- 9:00 | 7:30-10:45 *Silent | 7:30-10:45 Silent | 7:30-10:45 Silent | 7:30-10:45 7:00- 9:00 | 7:00- 7:30 Silent | 11:00-12:00 Sil ent |
| WBZ, Springfield, Mass | 337 | 5:00- 8:00 | 6:30- 8:00 | 5:00- 8:00 | 6:00- 8:00 | 5:00-11:00 | 6:00- 8:00 | 5:45- 8:00 |
| WCAL Northfold Minn | 462 360 | 5:30- 9:00 | 5:30- 9:00 | 5:30- 9:00 | 5:30- 9:00 | 5:30- 9:00 | 5:30- 9:00 | 2:00- 5:30 |
| WCAP, Washington, D. C. | 469 | Silent | Silent 6:30- 9:00 | Silent Silent | 9:00-10:00 6:15-11:00 | 8:30- 9:30 Silent | 12:00- 1:00 6:15-11:00 | 8:30- 9:30 6:20- 9:00 |
| WCAP, Washington, D. C. WCBD, Zion, Ill. | 345 | 8:00-10:00 | Silent | Silent | 00.01-00.8 | Silent | Silent | 2:30- 5:30 |
| WCX, Detroit, Mich. WDAF, Kansas City, Mo | 517 411 | 7:30- 9:00 | 7:30-11:00 11:45- 1:00 | 7:30- 9:00 | 7:30- 9:00 11:45- 1:00 | 7:30- 9:00 8:00- 1:00 | Silent 11:45- 1:00 | 6:15- 7:15 4:00- 5:00 |
| WDAP, Chicago, Ill | 360 | Silent | 7:00- 1:00 | 7:00- 1:00 | 7:00- 1:00 6:30- 7:00 | 7:00- 1:00 | 7:00- 1:00 | 9:15-11:15 |
| WEAF New York N V | 395 492 | 6:30-10:00 6:30- 9:00 | 6:30- 7:00 6:30- 9:00 | 6:30-10:00 6:30- 9:00 | 6:30- 7:00 | 6:30-12:00 | 6:30- 7:00 | Silent |
| WEAY, Houston, Texas | 360 | 6:00- 7:00 | 6:00- 7:00 | 6:00- 7:00 | 6:00-11:00 6:00- 7:00 | 6:30- 9:00 8:00-10:00 | 6:30-11:00 8:00-10:00 | 6:20- 9:00 8:00-10:00 |
| WDAP, Kansas City, Mo. WDAP, Chicago, Ill. WDAR, Philadelphia, Pa. WEAF, New York, N. Y WEAY, Houston, Texas. WFAA, Dallas, Tex. WFI, Philadelphia, Pa. | 476 | 8:30- 9:30 5:30- 6:00 | 8:30-12:00 | Silent | 8:30- 9:30 | 8:30- 9:30 | 8:30-12:00 | 6:00-11:00 |
| WGL Medford Mass | 395 | Silent | 5:30-10:10 | 5:30- 6:30 | 5:30- 8:00 | 5:30- 6:30 | 5:30-10:10 | 6:30- 7:30 7:30- 9:00 |
| WGR. Buffalo N Y | 319 | 5:30-12:00 | 6:00- 7:30 5:30- 7:45 6:45- 9:00 | 6:30- 8:00 5:30-12:00 | 6:00- 7:30 5:30- 7:45 | 6:30- 8:00 5:30-12:00 | 6:30- 8:00 5:30- 7:45 8:30- 9:30 | 2:00- 4:00 |
| WGY, Schenectady, N. Y WHA, Madison, Wis | 380 360 | 6:45- 9:00 7:30- 8:30 | 6:45- 9:00 Silent | Silent 7:30- 8:30 | 6:45- 9:00 Silent | 6:45-10:30 7:30- 8:30 | 8:30- 9:30 Silent | 6:30- 7:30 Silent |
| WHA, Madison, Wis. WHAS, Louisville, Ky. WHAZ, Troy, N. Y. WHB, Kansas City, Mo. WHK, Cleveland, O. WHN, New York, N. Y. | 400 | Silent | 7:30- 9:00 | 7:30- 9:00 | 7:30- 9:00 | 7:30- 9:00 | 7:30- 9:00 | 4:00- 5:00 |
| WHR. Kansas City Mo | 380 411 | 8:00-10:00 7:00- 7:45 | Silent 7:00-10:00 | Silent | Silent 7:00-10:00 | Silent 7:00- 7:45 | Silent | Silent |
| WHK, Cleveland, O | 283 | 5:00- 5:30 | 5:00- 5:30 | 7:00- 7:45 5:00- 5:30 | 5:00- 5:30 | 5:00-10:00 | 7:00- 7:45 5:00- 5:30 | 8:00- 1:00 7:00- 9:30 |
| WHN, New York, N. Y WIP, Philadelphia, Pa | 360 | 6:30-11:00 | 8:30-11:00 | 6:30-11:00 | 8:30-11:00 5:00-10:00 | 8:30-11:00 | 6:30-11:00 | 8:30-11:00 |
| | 509 360 | 5:00- 6:30 Silent | 5:00-11:00 6:00- 7:00 | 5:00- 6:30 6:00-11:00 | 5:00-10:00 Silent | 5:00- 6:30 6:00- 9:00 | 5:00-11:00 Silent | 8:30-11:00 Silent |
| WJAX, Cleveland, O | 390 | Silent | 6:30- 8:30 | Silent | 7:00- 9:30 | Silent | Silent | Silent |
| WJAR, Providence, R. I. WJAR, Cleveland, O. WJAZ, Chicago, III. WJY, New York, N. Y. WKAQ, San Juan, P. R. | 418 | Silent Silent | 10:00- 2:00 6:30- 9:30 | 10:00- 2:00 Silent | 10:00- 2:00 6:30- 9:15 | 10:00- 2:00 6:30-11:00 | 10:00- 2:00 Silent | 6:00- 9:00 7:15-10:00 |
| WJZ, New York, N. Y | 455 | 6:00-10:30 | 6:00-10:30 | 6:00-10:30 | 6:00-10:30 | 6:00-10:30 | 6:00-10:30 | 6:00- 9:30 |
| | 360 417 | Silent 8-15- 7-00 | 7:00- 8:30 | Silent - | Silent | 7:00- 8:30 | Silent | Silent |
| WIW Cincinneti O | 309 | 6:15- 7:00 8:00-10:00 | 7:00- 8:30 6:15- 7:00 t0:00-12:00 | 9:30-10:45 8:00-10:00 | 6:15- 7:00 | 9:30-10:45 Silent | 9:30-12:30 Silent | 7:45- 9:15 7:45- 8:45 |
| WMAQ, Chicago, Ill | 448 | Silent | 7:00-10:00 | 7:00-10:00 | 10:00-12:00 7:00-10:00 | 7:00-10:00 | 7:00-10:00 | Silent |
| WMAQ, Chicago, Ill. WMC, Memphis, Tenn. WNAC, Boston, Mass. WOAI, San Antonio, Texas. | 500 278 | 8:30- 9:30 5:00- 9:00 | 8:30-12:00 7:00- 9:00 | Silent 5:00- 9:00 | 8:30- 9:30 7:00- 9:00 | 8:30-12:00 5:00- 9:00 | 8:30- 9:30 8:00- 9:00 | 6:30- 8:30 |
| WOAL San Antonio, Texas. | 385 | 9:30-10:30 | 9:30-10:30 | Silent | 7:30- 8:30 | Silent | Silent . | 9:30-10:30 |
| WOAW, Omaha, Neb WOC, Davenport, Ia | 526 484 | 6:00-11:00 8:00-11:00 | 6:00-11:00 Silent | Silent 8:00- 9:00 | 6:00-11:00 9:00-10:00 | 6:30-11:00 8:00- 9:00 | 6:00-11:00 9:00-10:00 | 9:00-11:00 7:00-11:00 |
| | 509 | 6:30-10:00 | Silent | 6:30-10:00 | Silent | 6:30-10:00 | Silent | Silent |
| WOQ, Kansas City, Mo WOR, Newark, N. J | 360 405 | Silent 5:15-10:00 | 8:00- 9:30 5:15- 6:30 | Silent | 8:00- 9:30 5:15- 6:30 | Silent | 8:00- 9:30 5:15-10:00 | 7:00- 7:45 |
| WOS, Jefferson City, Mo | 441 | 8:00- 9:30 | Silent | 5:15-10:00 8:00- 9:30 | Silent | 5:15- 6:30 8:00- 9:30 | Silent | Silent 7:30- 8:30 |
| WOS, Jefferson City, Mo WRC, Washington, D. C WRM, Urbana, Ill | 469 360 | Silent Silent | 7:00-10:00 | Silent | 7:00-10:00 | Silent | 7:15-10:00 | Silent |
| | 309 | Silent | 7:00- 0:30 7:00-10:00 | Silent | 8:30- 9:30 8:00-10:00 | Silent Silent | Silent 10:00- 1:45 | Silent |
| WSB, Atlanta, Ga. WSY, Birmingham, Ala. WTAM, Cleveland, O | 420 | 8:00-12:00 | 8:00-12:00 | Silent | 8:00-10:00 8:00-12:00 | 8:00-12:00 | 8:00-12:00 | 7:30- 2:00 |
| WTAM, Cleveland, O | 360 | Silent | Silent Silent | Silent 7:00- 9:30 | Silent Silent | Silent Silent | Silent 8:00-10:00 | 8:00- 9:00 Silent |
| WTAS, Elgin, Ill. WTAY, Oak Park, Ill. | 286 | 8:15-12:00 | 8:15-12:00 | 8:15-12:00 | 8:15-12:00 | 8:15-12:00 | 8:15-12:00 | 8:15-12:00 |
| WWJ, Detroit Mich. | 283 517 | Silent 7:30- 8:30 | 6:15- 8:15 7:30- 8:30 | 6:15- 8:15 7:30- 8:30 | 6:15- 8:15 7:30-11:00 | 6:15- 8:15 | 6:15- 8:15 6:00- 7:30 | Silent 6:30- 7:30 |
| In oferiations for Tree | 4.77 | 17 . 7 | 7. | | | 7.00. 6.00 | 3.50. 1.00 | 0.000 1.00 |

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58 PROGRAMS FOR EIGHT DAYS

Tuesday, April 1

OKAG, Montreal, Can. (Eastern, 425), 7:00 p. m., Kidden's stortes in Fronch and English; 7:30, Rex Battle and his Mount Royal Motel Concert Orchestra; 8:30, Raoul Vennat and his actists; 9:30, Talk on Dange Chemical Court; 9:30, Joseph C. Smith and his Mount Royal Hotel Dance Orchestra (Swigerior Court; 9:30, Joseph C. Smith and his Mount Royal Hotel Dance Orchestra (Kr. Winnigage Can, Central, 460), 8:45 p. m., "The Scientific Court; 9:40, Concert, Kiwanis Club Parti; KDKA, E. Pittsburgh, F. E. (Eastern, 236), 12:20 p. m., Lenten services Trinity Clurch Dr. Frank It. Nelson; KDKA, E. Pittsburgh, F. C. (Eastern, 236), 12:20 p. m., Lenten services Trinity Clurch Dr. Frank It. Nelson; 7:15. "Pittsburgh, F. Coreat Inhalm Port," William H. Stevenson; 8:30, "Modernion," from the Autor Deversy R. St. U. et Pritsburgh, St. Scientific Court C

Brackenridge Gies Cluu; 11:00, Concess General Corchestra.
(FAE) Paul mans, Wesh, Plensfig. 330), 7:36 p. m.
(FAE) Paul mans, Wesh, Plensfig. 330), 7:36 p. m.
(FAE) Paul mans, Wesh, Plensfig. 330), 7:36 p. m.
(FAE) Paul mans, Wesh, Plensfig. 10:00, 7:36 p. m.
(FAE) Paul mans, Wesh, Plensfig. 10:00, 12:

Lieut, A. B. Pencer Mining talk, Dean L. O. Howard;

"The Bilance of Power and Wart." Prof. Carl Manuels.

KFI. 1 bs Angeles, Calif. (Pacific, 489), 6:45-7:39 p.

m. Concert program by George L. Birkel Co., 5:00-9:00,
Concert, 2mbinsandar-Lyman's Occount Grove Ochestra; 2m-10:00, Berger Concert, 10:00-11:00,
Concert, 2mbinsandar-Lyman's Occount Grove Ochestra; 10:00-11:00,
KFKR, Milford, Kansas (Central, 266), 8:05 p.

Making Cheese of the Farm. Prof. N. E. Olson;
S-30, "Culling the Farm Farm." Prof. N. E. Olson;
S-30, "Culling the Farm Farm." Prof. N. E. Olson;
S-30, "Culling the Farm Farm." Prof. N. E. Olson;
S-30, "Culling the Farm." Prof. N. E. Olson;
KFNF, Shenandoah, Ia. (Central, 266), 12:39 p. m.,
Noon-day concert for well-Preside, 279, 3-30-4-39 p.
KFSG, Los Angeles, Miller Preside, 210, 3-30 p. m., Part. I.
S-30, Miller Miller Conservation of America. "Security Scouting of America." Prof. N. E. Olson;
S-30, Miller Security of America. "Security December 10 p.
KFSG, Charles, Charle

Headliners of the Week

PENING with All Fool's Day, April

PENING with All Fool's Day, April 1, the week need not be considered all tomfoolery. A number of stations have special features on, but at WDAF, E. O. Moffat will give the fifth of his second series of travelogues, while at KDRA you can hear an excellent program by the Brackenridge Glee club.

An evening with lovers of old tunes, old songs and old dances is promised Wednesday by WZAM. All and Mrs. Otis C. Arroid will play Money Muse, and "Arkansas Traveler" as they lid before the Civil War. WLA has an author's program this night and will include talks by Stewart Edward White and Frederick O'Brien.

Chief Yowlache, Indian baritone of no mean ability, will sing Thursday evening from KFI. WFI, across the continent, will have Philaselphia boy scouts "do their stun."

Friday night Prince Isaac Yonan, Assyrian prince, talks on Near East conditions, while the Orleo orchestra at WJAZ plays select dance numbers to the distant accompanyment (?) of Weell Hall at WBAY with his ever-present wkule. WDAF dedicates this evening to "Novelty Night" wherein amateurs

may tryout before the mike.

Cornell university vs. Iowa State college in debate on "The Bok Peace Plan" will go on the air at WOI Saturday evening. Scots should tune in KHJ in the afternoon to hear the "Old Scot-land" program.

Sunday presents the many usual high class sacred programs, but KFNF sounds exceptionally good. They promise old-fashioned hymns sung by the townspeople over one of those old-fashioned organs. Sunday's also a good night to dial KPO and hear Rudy Seiger's Fairmount Hotel orchestra.

The famous Missouri State Prison band, directed by Virgil Combs, will again be heard from coast to coast Monday algat when WOS has this unique organization as their guest. Another good band for band lovers this evening is that at WOAW, the 17th U. S. Infantly band.

Aha! Opera at KGO Tucsday, April 8. The KGO Grand Opera company promises "Il Trovatore." And to the other extreme, lovers of the silent drama will have an oportunity to hear motion picture stars in program at KFI the same night.

orchestra; Pianologues, Mrn. Stanley Thompson; pianologue, Mrs. Lee Gibson; Reading, An Interesting Historical Episode. Mo. (Central, 411), 2:00 p. m., Ladies hour of popular music by Sweecey Radio Orchestra; 7:00, W. C. T. U. talk; Piano solos, Genge Varianis, 8:00, Program, Manard girls class of Literature, 10:00, W. C. T. U. talk; Piano solos, Genge Varianis, 8:00, Program, Manard girls class of Literature, 10:00, Program, 10:00, 2:15-2:30, Edw. Jack Morise and Louelle Du Mont, popular songs; 2:30-2:45, Richard Douglass, tenor; 2:15-3:30, Edw. Prive'; 5:00-5:10, Al Novins and Clinion Sommer, Songsters; 9:30-9:45, Fletcher Henderson's Alabam Club Orchestra; 10:30-10:16, Marie Reeve, soprano; Meiamora Restaurant, 1:145-12:00, Degmor Godowsky, motion picture star.

WiP. Philaddelphia, P. (Eastern, 519, 1:00 and Moriamora Restaurant, 1:145-12:00, Degmor Godowsky, motion picture star.

WiP. Philaddelphia, P. (Eastern, 519, 1:00, Degmor Godowsky, motion picture star.

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WiP. Philaddelphia, P. (Eastern, 519, 1:00, Degmor Godowsky, motion picture star.

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WiP

July 2-93, "The Youndard Auth." of Endities Williams of the Carle Lydge of the Castern, 390, 7:30 p. m., 1913 p. m. Ted Weems and his Cafe Lydgen Orchestra. Wild. Castern, 390, 7:30 p. m., Program arranged by the Cherchan Carle Sews-Ledger Carton, Don Palmer: Songs, Carabell Johnson's Quartette; Solos, Joseph D'Angelo, bartone; Dance program. Epp-1srael Orchestra. Wild. Chicago, Hi. (Central, 400, 190, p. m., 1-300 st.) and the Carton, 190, 190, p. m., 1-300 st.; Hazel Sims, planist; O'fole Orchestra. Wild. Chicago, Hi. (Central, 417), 190, p. m., 190,



Austrie: Twingur Tales for "Andries"; Home Fea-Ches. Louis, No. Coartal, 54(9), 54(9) p. m., Studio Corporation, McIharmontic Society of St. Louis; Address, C. W. Page, Address Frof. E. T. Rermolds. KYW, Chicago, Ill. (Central 536), 11:35 a. m., Table talk, Aira, Aima J. Peterson; 2:35 p. m., Studio pro-gram; 6:50, Children's bedtime story; 7:00-7:30, Din-ner music from the Congress Hotel, Joska DeRabary? O'chesta; Ciyle Doerrs Orchestit; 8:00, Program; Speakers, E. R. Cogswell; "The Hasis of Wholesale Prices of Butter," C. L. Pier; 8:48, Chicago Musical College.

Program by Arihur Hoffman's Knickerbocker Novelty Orch.

Onch.

Omaha, Neb. (Contral, 389). 8:00 p. m. Leader agrees by Zion Lutheran Church of Omaha, the Rev. K. M. E. Nigraman, pastor.

WBAH, Minneapolis Minn. (Central, 417), 12:30-1390 p. m., Missical Program—Margaret Ruthess Leenhuis, whistical From March Minneapolis Bay Scouts, WBAP, Fort Worth, Texas (Central, 479), 7:30-8-30, m., Concert, Municipal Band of Alvarado; 930-10-45, Nantette Wester, State (Central, 476), 7:30-8-30, m., Concert, Municipal Band of Alvarado; 930-10-45, Nantette Wester, State (Central, 476), 7:30-8-30, m., Concert, Municipal Band of Alvarado; 930-10-45, Nantette Wester, State (Central, 476), 7:30-8-30, m., Concert, Municipal Band of Alvarado; 930-10-45, Nantette Wester, March (Contral, 476), 7:30-8-30-10-45, Nantette Wester, Minneapolis (March 1998), Nantette March (March 1998), Nantette March (March 1998), Nantette March (March 1998), Nantette March (March 1998), Nantetal Program, Girly Glee Club of U. of Pitts model. (March 1998), Nantetal program, Girly Glee Club of U. of Pitts (March 1998), Nantetal program, Girly Glee Club of U. of Pitts (March 1998), Nantetal program, Girly Glee Club of U. of Pitts (March 1998), Nantetal program, Girly Glee Club of U. of Pitts (March 1998), Nantetal program, Girly Glee Club of U. of Pitts (March 1998), Nantetal program, Girly Glee Club of U. of Pitts (March 1998), Nantetal program, Girly Glee Club of U. of Pitts (March 1998), Nantetal program, Girly Glee Club of U. of Pitts (March 1998), Nantetal Program (March 1998), Nantetal Progra

numbers, Ben Fields; Thelma Fields, planist; 8:30, Mustcal program, Girls Gloc Club of U. of Pitts-burgh.
Northeld, Minn. (Central, 380), 9:45 a. m., St. Olaf college chapel services.
WCX, Defroit, Mich. (Eastern, 517), 6:60 p.m., Dinner convert, Hotel Tuller; 10:00, Red Apple Club, Woseh, Ellacits, Sexton. Carls Orchestra; 6:400. Travelogue, E. d. Modtal, Information man: Fritz Handelin's Trianon Ensemble; 11:43, Nighthawks.
Drake Concert Ensemble; 11:43, Nighthawks.
Drake Concert Ensemble and Blackstone String Quintetic, S:00:8:30, Barton Organ Recital, Ralph Enserson; 10:00. Royal Whitmey: Heefn Louise Schaffer, Rosemary Empley Prederack W. Agard, 560 Cougle, WAR, Philadelphia, Pa. (Eastern, 395), 11:55 a. m. Daily Almanac; 12:02 p. m., Stanley Theater organ, Daily Almanac; 12:02 p. m., Stanley Theater organ, Carls and Carls (Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 9:30, Features from Stanley Theater (10:10). Huward Lamin's Arcadia Carle Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 9:30, Features from Stanley Theater (10:10). Huward Lamin's Arcadia Carle Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 9:30, Features from Stanley Theater (10:10). Huward Lamin's Arcadia Carle Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 9:30, Features from Stanley Theater (10:10). Huward Lamin's Arcadia Carle Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 9:30, Features from Stanley Theater (10:10). Huward Lamin's Arcadia Carle Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 9:30, Features from Stanley Theater (10:10). Huward Lamin's Arcadia Carle Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 9:30, Features from Stanley Theater (10:10). Huward Lamin's Arcadia Carle Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 9:30, Features from Stanley Daddy's bedtime stories; 9:30, Features from Stanley

Musicale, VGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00. The Radio Dealers' Musical program; 6:00-7:30, Chamber music recital.

recital.

**MGY, Schenectaly, N. Y. (Eastern, 780), Chamber music WGY, Schenectaly, N. Y. (Eastern, 780), 2:09 p. m., Music and address, "Celor and Harmony in House Decorations," Mrs. C. W. Ashworth; 6:30, Dinner music by Instrumental Type of Hold Ten Sprk, 1748, Eadlo dramm, Commedy, "Snowball," by WGY Flayers WHAA Janes Cities.

and WGY Orchestra.

WHAA, Iowa City, Ia, Central, 484), 8:00 p. m., Address, "New Developments in Summer Study." Prof. Charles H. Weller.

WHAS, Leuisville, Ky, (Central, 400), 4:00-5:00 p. m., Solections, Strand Theater Orchestra; Selections, Walmit Theatter Orchestra; Selections, Alamo Theater organ; 7:30-8:00, Concert, Henry M. Schilling and his

Chorus, S. V. Elfert, director; 10:30, Half hour of April Foolishness, Alvin Plough, director; 11:00, Entertainment, Wadsworth Watch-case Dance Orchestra.

& Healy program; 4:29, Heas of interest to women; 4:39, Pupils, Glem Dillard Gunn School of Music; 5:09, Weekly Child Life talk for children; 7:00, Debate, Crune Tech. and John Marshall Kiph Schools; Humorous reading, Clinton Jerone; 8:09, Filk, Harry Downstan, School, Child Control of the Company o

Wednesday, April 2

CKAC, Montreal, Can. (Eastern, 425), 1:45 p. m., Classic concert, Mt. Royal Hotel Orchestra; 4:30, Mt. Royal Hotel Danes Orchestra. CKCH, Ottawa, Canada (Eastern, 435), 8:00 p. m. "Nationalization of Canadan Railways." by D. E.

Calloway.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 12:20 p. m.,
Lenten services, Trinity Church, Dr. Frank H. Nelson; (Continued on page 16)

TEMPTING ARRAY OF FEATURES GRI

Where to Hear Concerts

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

thing from Jazz to opera.

Tuesday: KDKA, KFI, KFSG, KGO, KHJ, KPO, KSD, KYW, WAAM, WAAW, WBAH, WBAP, WBZ, WCAE, WCX, WDAF, WDAF, WDAF, WFAA, WFI, WGI, WGY, WHAS, WHB, WIP, WJAX, WJAZ, WJY, WJZ, WLAG, WLW, WWA, WMAQ, WMC, WOAW, WOO, WOR, WSB, WTAS, WWJ.

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Wednesday: KDKA, KFAE, KFI,
KFNF, KFSG, KGW, KHJ, KPO, KSD,
KYW, PWX, WAAM, WAAW, WBAP,
WBZ, WDAF, WDAP, WDAR, WCAE,
WCX, WEAF, WEAO, WFAA, WFI,
WGI, WHAS, WHB, WIP, WJAZ, WJZ,
WLAG, WLW, WMAQ, WOC, WOO,
WOR, WOS, WSB, WTAM, WTAS,
WJJ.

Thursday: CKAC, KFI, KFSG, KGO, KGW, KHJ, KLZ, KPO, KSD, KYW, WAAM, WBAH, WBAP, WBZ, WCAL, WCAL, WCBL, WCAL, WCAL, WCAL, WGA, WHA, WDAP, WDAR, WEAF, WEAO, WFAA, WH, WGI, WGY, WHAS, WHB, WIY, WJAX, WJAZ, WJY, WJZ, WLAG, WLW, WMAQ, WMC, WOAW, WOC, WOO, WOR, WSB, WTAS, WWJ.

Friday: KDKA, KFAE, KFI, KFSG, KHJ, KGW, KPO, KYW, WBAH,

(Continued from page 15)

WBAP, WBAV, WBZ, WCAE, WCAI, WCX, WDAF, WDAR, WBAF, WEAO, WFAA, WFI, WGI, WGX, WHAS, WHB, WHAK, WIP, WJAZ, WJY, WJZ, WJAZ, WMAQ, WMC, WOOW, WOO, WOB, WOS, WSB, WTAS, WWJ.

WOO, WOR, WOS, WSB, WTAS, WWJ.
Saturday: CKAC, KDKA, KFI,
KFNF, KFSG, KGO, KHJ, KPO, KSD,
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WDAF, WDAP, WDAR, WEAF, WFAA,
WFI, WGI, WHAS, WHK, WIP, WJAZ,
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MONDAY: KDKA, KFAE, KFI, KPO, WAAM, WAAW, WBAH, WBAP, WBAY, WBA, WCAE, WCBD, WDAF, WDAR, WEAF, WFI, WGY, WHAZ, WIP, WLAG, WLW, WMC, WOAW, WOC, WOO, WOR, WOS, WSB, WTAS.
THESDAY, KPO, WHAS, WOAW, WAAW, WDAF, WIP, WOO, WLW, WGY, WSB, WTAS.



Novelty piano playing, losson 8, Henry Rolnert; 8:30.

Mugloal program, Brecht's Family orchestra.

Mugloal program, Brecht's Family orchestra.

Mox.

Pen Women; 9:00, Concert, direction of A. Royce Girm.

With the Concern of the Co

ties flour of popular music by Sweeney Orchestra; ten's poems usis by Dillard's Orchestra; Walt File-ken's poems. Walt File-ken's poems. Well File-ken's poems. Well File-ken's 260-260; Kenor, and Nettle Harsher; 280-380; End Well File-ken's 280-480; File-ken's 280-4

Hack and White Program; 10:15-16:30 Mary L. Morphy, Soprano, and Kalherine Connolly, Maristi, Morphy, Soprano, St. (Eastern, 509), 1:30 D. m., 1918. St. (Eastern, 509), 1:30 D. m., 191



Russell; 6:30, Sandman's visit; 7:00, "Orchard Sprayling, "Louis James; 7:15, "Some Interesting Facts on
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Thursday, April 3

son; 6:15. KDKA Little Symphony Orchestra: 3:09. Farm program, National Stockmun and Farmer; 8:30. Color of the control of the

Ground Mandoin Orchestra, and Gail Mills Dhumit, so-KPO, San Francisco, Calif. (Fas-fie, 43), 1.00-2.00 m. m. Selger's Orchestra; 2:30-3:30. Mathine program, U.S. Army Band; 4:30-3:30. Selger's Orchestra; 5:30-6:30. Children's hour, "Big Brother' of KPO; 5:40-6:30. Children's hour, "Big Brother' of KPO; 6:40. Children's hour, "Big Brother' of KPO; cellar, "Two-children's programs, 10:30-11:00. Cal-and Bell Club, Dr. Hoft, director; 10:30-11:00. Cal-max Bradfield's Versatile Band.

KOV. Pittsburgh. Pa. (Eastern, 360), 11:00-11:30 a. m., Minust. 1:00-1:30 p. m. Noon Musical program; 3:45-73 p. m. Noon Musical program; 3:45-74 p. m. Noon Studies and Studi

A. Prittshurgh, P. A. (Castern, 860), 11-90-11:30 a. m., 41:5 p. m., Music, 5:00-5:20 p. m., callerger, "Polither Tale" for "Kitdies"; Home features. "Tollight Tale" for "Kitdies"; Home features. "Tollight Tale" for "Kitdies"; Home features. "Tollight Tale" for "Kitdies"; Home features. "An experiment of the features. "Tollight Tale" for the features. "An experiment of the features. "Tollight Tale" for the features. "An experiment of the features. "Tollight Tale" for the featur

10:90, Luke Forest School of Music, Jack Chauman's Orchestra.

WDAR, Philadelphia Pa. (Eastern, 335), 11:45 s. m. Daily Almanac; 12:02 p. m., Organ recital, Standey Theater; 12:30, Aradia Cafe Concert Orchestra; 2:30, 18:45 s. m. Daily Almanac; 12:02 p. m., Organ recital, Standey Theater; 12:30, Aradia Cafe Concert Orchestra; 2:30, 18:01, 18:02 p. m., Organ recital, Stander Cafe Concert Orchestra; 2:30, 18:01, 18:02 p. m. Daidy's bed-lime storics.

Wm. Hotel Carleton Terrace Orch; 5:30-5:15, 7alk by Mrs. N. D. Chauman; 5:16-5:45 Berdal Rowland, soprano; 7:00-7:39, N. Y. Federation of Charletes; 18:04-5:00, Gendline Stander, 18:04-5:15, 18:15-18:15 Berdal Rowland, soprano; 7:00-7:39, M. Y. Federation of Charletes; 18:04-5:00, Gendline Bross; 8:350-9:00, Hunter College Musical Provam; 9:00-0:10, Pank of Amperica; 9:10-9:20, Bunter College; 9:350-9:45, Columbia Phonograph Co.; 9:45-10:45, Chiefel Program.

George Chandler (#f) and I WDAP, Chicago. The hat is hearing his own maise. No the cast of "Lollippn," as my lile be broadcast from WIY noted dancer before the min on "The Body Beautilul." station on April 42-Morry F on the afternoon programs wicked fingers when DANCING

AND DRAMATICS

WHERE and when to dial to dance:

Tuesday.

CKAC, KHJ,

KPO, KYWH,

WDAP, WFI,

WHAZ, WIP,

WHAZ, WIAS,

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Wednesday.

CKAC, KG W

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THURSDAY,

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Saturday
KFI, KHJ, KPO
KGW, KYW
WDAP, WFAA
WFI, WGY
WHN, WIP
WLAG, WOR
WTAM, WWJ.
Monday: CKAC
KPO, WEAF
WHAZ, WOS
WTAS.

DRAMA NOTES

DRAMA: NOTE:
Tuesday: WGY
"Snowball." a y
KGO, Advertise.'
KGO Players.
Tuesday: KGO
Grand Opera, "I
Trovatore," KGC
Players; WGY
One Act Pla y
"Rosalie," "HME
Finafore," WGY
Light Opera Company.

(Contended Anne Service, State Management of American Orthosome, 2009, Program, United Synapogue of American Chemistry, 2009, Program, 2009,



REET MANY MID-SEASON LISTENERS



er (left) and his musical saw are regular Friday night features at to. The hat is for no reason and the earmuffs to prevent him from n music. Next to Mr. Chandler is Ada May, one of the stars in ellipop," a musical comedy new papearing on Brondway, which st from WHY, New York, en Appril. Olive Ann Alcorn (above), efore the microphone at KFI, giving me weekly lectures Beautiful? Miss Alcorn's next lecture will segiven from this in the Morry Harmon (right), pianist, appears and along a bunch of fingers when it comes to getting music out of the Forcies

ANCING AND AMATICS

HERE and when to dial nce:

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A C, K H J,
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MA NOTES

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WEAO, Columbus, Ohio (Eastern, 360), 8:00 p. m., Doncert, double quartet, St. Paul's Eniscopal Church; Doncert, double quartet, St. Paul's Eniscopal Church; Prof. Fatth Jamman, head of department of Home Economies; Carl Bug, violists, 12-20-1400 p. m., Fatth, Dallas, Texas (Contral, 470) (Knish; S. 28-20-20) The Texas Orchestra, R. L. Keith, manager. WFL, Philadelphia, Pa. (Eastern, 355), 1:00 p. m., Bigue Daris Bolleros Strufford Goucert Orrhestra; W. Morgan; Mrs. Davis M. Patterson, reader; 6:90. Stories by Sunny Jihn; 0:30, Moyer-Davis Bolleros Concert Company of Trenton, Elliel, Mac Sinclair, soprano; Eurroughe Hunt, bartone; D. Harrley Singer, Concert Company of Trenton, Elliel, Mac Sinclair, Soprano; Eurroughe Hunt, bartone; D. Harrley Singer, March Concert Company of Trenton, Elliel, Mac Sinclair, Soprano; Burroughe Hunt, bartone; D. Harrley Singer, M. Medford Hillidde, Mass. (Eastern, 300, 7:00 p. m., Talk, "The Radio Movie Man," by Geoffre Level, March Mac March Marc

WGR, DanasGeorge Albert Bouchard, organic 5:00-7:00, Chamber musical program; 6:00-7:00, Chamber musical program; 6:00-7:00, 2:00 p. ni., WGR, Schnecttdy, N. Y. (Castern, 790), 2:00 p. ni., Music and talk, "Club Life in California". Mrs. Andrew Blesser, Jr.; 6:30, Dinner music by Romano's Orchestra, New Keumore Hotel; 7:15, Musical program, Plano solo, J. Reid Callana: Reading, Pluma Maclatosh; Soprano solos, Mrs. Hayanond N. Fort; Vtolin solo. Claud J. Holding; Cuntrallo solo, Mrs. Horatio Solo. Claud J. Holding; Cuntrallo solo, Mrs. Horatio Solo. Claud J. Holding; Cuntrallo solo, 4:00-5:00 p. m.

Orchestra, New Kemmore Hotel; 7:45, Mussical program, Plano solo, J. Reit Callanan; Reading, Pluma Macplano solo, J. Reit Callanan; Reading, Pluma Macsolo, Claud J. Holding; Contratlo solo, Mrs. Horatto
solo, Claud J. Holding; Contratlo solo, Mrs. Horatto
When Chester Cochestra; Walnut Theater Grechestra;
7:30-9:39, Senior Class of the Louisville Conservatory
of Muric, George T. Piggott; Four-minute digest of
Radio Formmant.
WHB, Kansas City, Ms. (Central, 441), 12:35 p. m.
Fogular music by Sweeney Radio Orchestra; 2:00,
17:00; Program by Facal music by Sweeney Chelastra
17:00; Program by Facal music by Sweeney Orchestra
19:00; Program by Facal music by Sweeney Orchestra
19:00; Program by Facal music by Sweeney Orchestra
19:00; Program by Facal music by Sweeney Orchestra, vocal numbers arranged
by Herbert Frathes.
Mrs. By Sweeney Orchestra, vocal numbers arranged
by Herbert Frathes.
Shapiro Bernstein Music Co.; 3:00-3:15, 1ra La Shaw
and Henry Heine, duetz 4:30-5:30. "The Original
Charleston Fire." Whm F. Semerville, director 9:3010:10, Zara Jay, Gramatic soprano; 10:30-11:00, Sara
10:10, Zara Jay, Gramatic soprano; 10:30-11:00, Sara
Richard Douglas, tenor; 11:30-11:35, Jack Morisse and
10:10, Zara Jay, Gramatic soprano; 10:30-11:00, Sara
Richard Douglas, tenor; 11:30-11:35, Jack Morisse
10:10, Uncle Wip's bedtime stories; 3:00, Camillo
2-eckwer, distraguished Philadelphia Composer; 9:003:30, Relations sorvices, auspices Philadelphia Branch
17:00, Uncle Wip's bedtime stories; 3:00, Camillo
2-eckwer, distraguished Philadelphia Composer; 9:003:30, Relations sorvices, auspices Philadelphia Branch
18:00, May Pelled Miller, soprano for Program 10:30-11:30-30, May
18:00, May Pelled Miller, soprano for program of the control of prayer by Rabbi Samuel Fredman, 10:30,
19:00, May Pelled Miller, soprano for prayer by Rabbi Samuel Fredman, 10:30,
19:00, May

maii Conservatory of Music, Leone Granstaff, rocalist; Alice Husbner, accompanies; Milred McLachian, Emerson Hoffman, accompanies; Milred McLachian, Emerson Hoffman, accompanies; Milred McLachian, Edger, collist; Popular dance program, Debett's Melody Boot, State of the Conservation of March 1997, 1998, 1

Friday, April 4

Where to Hear Talks

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

Tuesday: KDKA, KĠW, KHJ, KYW, WAAM, WCAE, WCAL, WDAF, WDAR, WEAF, WFAA, WGI, WGY, WHB, WIP, WJY, WJZ, WKAR, WLAG, WMAQ, WMC, WOC, WSE, WWJ.

WMAQ, WMC, WOC, WSB, WWJ.

Wednesday: KDKA, KPAE, KFKB,
KGO, KGW, KPO, KYW. WAAM,
WBAH, WBZ, WDAF, WDAR, WEAF,
WEAO, WGI, WHA, WJZ, WHAR,
WLAG, WMAQ, WOC, WOR, WOS,
WWJ.

Thursday: KDKA, KYW, WAAW WAAM, WAAW, WBZ, WCAE, WDAP, WDAR WEAF, WEAO, WFAA, WGY, WHAS, WHB, WIP, WJAX, WJY,

WJZ, WKAR, WLAG, WMAQ, WOC, WOR, WWJ.

Friday: KFAE, KGW, KHJ, KYW, WAAW, WEZ, WCAL, WDAF, WEAQ, WFAA, WGI, WGY, WHA, WHE, WIY, WJZ, WLAG, WMAQ, WOC, WOS, WWJ WJZ, WWJ.

Saturday: KYW, WBAH, WBAP, WDAF, WFAA, WFI, WGI, WIP, WLAG, WMC, WOAW, WOC.

Monday: KFAE, WAAM, WBZ, WDAR, WEAF, WFAA, WGR, WGY, WHAZ, WIP, WLAG, WOC.
Tuesday: WDAF, WHB, WIP.

KLX Concert Trie; Solos, Harold Dana; Parodles, Ned

KLX. Concert Tric; Solos, Harota Dana; Paroutes, Ava. Wicholson.

KLZ. Danw. Cab. (Meanthin, 360), 750-550 p. m.,

KLZ. Danw. Cab. (Meanthin, 360), 750-550 p. m.,

KLZ. Danw. Cab. (Meanthin, 360), 750-550 p. m.,

KLZ. Danw. Cab. (Meanthin, 360), 750-750,

bers, with Miss Luamna Leanus, of anonaco, Fe., soloist, Louis, Mo. Carttan, 240, 3.90, m., ProSeria, children under fourcen bysec of sec. 8.30,
Missouri Theater Orchestra and specialized.
W. Ohleage, III. (Central, 536), 11.35 a. m., Table
talk, Mira, Aman J. Petcoron; 6:00 p. m., Spanish
tessens, Frod. A. A., Brazhlic, 6:50, Children's bettime
tessens, Frod. A. A. Brazhlic, 6:50, Children's bettime
tessens, Frod. A. A. Brazhlic, 6:50, Children's Destinate
tessens, Frod. A. Brazhlic, Frod. A. Brazhlic

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

chestra; Clyde Deerr's Orchestra; 7:35, "stace Police
Organizations," P. L. Mather; 10:392-200, Midnight
WAAW, Omaha, Neb. (Central, 360), 8:30 p. m., Lessons in bridge by Mrs. Guy U. Purdy; musical prosons in bridge by Mrs. Guy U. Purdy; musical proWEAH, Minneapelis, Minn. (Ocentral, 417), 12:30-1:30 p.
p. m., Diek Long's Trich and solosis; 7:00-7:30 p.
Dayton Music Department program; Style talk.
WAAW, Omaha, Neb. Contral, 417), 12:30-1:30 p.
Dayton Music Department program; Style talk.
WAAW, Omaha, New York, 10:00-10:00, 10:00-10:00
WAAW, The Ward, Mrs. (Central, 400), 12:30 m.
Dayton Music Department program; Style talk.
WAAW, Omaha, New York, 10:00-10:00
WAAW, Omaha, 10:00-10:00
WAAW, Omaha, 10:00
WAAW, Omaha, 10:0

Drehestra, New Kommon Hoof; 7:2h, attuwed programs, the control of the property of the propert

Walnut Theater Orchestra; Strand Theater Orchestra; 7:30-9:09, Crane and his orchestra; A. V. B. Sherilock, bartinos; Racking, An Interesting Historical Episode WHB, Kansas Civ. Mo. (Central, 411), 12:35 p. m., Fopular models by Sweeney Radio Orchestra; 2:00, Sweeney Orchestra; 2:00, Sweeney Orchestra; 7:00, Sweeney Orchestra; racking propher subsections by Sweeney Orchestra; 7:00, Sweeney Orchestra; racking propher subsections of the propher subsec

chostra; 7:09, Sweeney Orchestra rendering popular numbers; WHX, Gievaland, Ohio (Eastern, 283), 3:00 p. m., Concert program, arranged by Cleveland Radio Dealers' Association; Music, Louis Rich's Orchestra; Har-WHN, New York, N. Y. (Eastern, 360), 2:15-2:00 p. m., "Original Indiana Five"; 4:39-5:00, Snappy Trio; 11:00-11:15, Fred Whitchouse Review; 11:15-11:30, Al Novins and Clint Sommer, songsters; 12:00-12:15, Ross Fowler, bartione. WIP. Philodelphia, Par. (Eastern, 309), 1:00 p. m., Glubol Broberts' Tea Room Orchestra; 3:00, First of Clinbol Broberts' Tea Room Orchestra; 3:00, First of Clinbol Broberts' Tea Room Orchestra; 3:00, First of Association of Philadelphia, Mrs. Edith X Cliffont, 6:05, Dilmer music, Jordan-Lewis Dance Orchestra, direction, Bob Lewis; 7:30, Uncle Why's bedding States.

stories.

WJAZ, Chicage, III. (Central, 448), 10:00 p. m.-1:00
a. m., Program, Mid-West Concert Management.

G. 20. Dilliner music, Jordan-Lawis, Dance Ordestin, direction, Bob Lewis, 7:30, Unelle Why's bedtline girection, Bob Lewis, 7:30, Unelle Why's bedtline girection, Bob Lewis, 7:30, Unelle Why's bedtline girection, and the control of the control o

ment.
WWJ. Detroit, Mich. (Eastern, 517), 12 m., Dunce music,
Goldkett's Orchestra, Graystone bellroom; 3:90 p. m.,
News Orchestra; 7:00, Anne Campbell, News Poet;
Leona Hoffman, planist; Mrs. Beatrice Brown, coprano.

Saturday, April 5

CKAC. Montreal, Can. (Central, 425), 7:300 p. m.,
Kiddites' stories 'in French and English; 7:330, Rex
Battle and his Mt. Royal Hotel Concert Orchestra:
Hardwert Spencer, organist; 8:30, La Frence studio
Hardwert Spencer, organist; 8:30, La Frence studio
Royal Hotel Dance Orchestra; Tetaley Brown, surcephonist.
Pittsburgh, Pa. (Eastern, 256), 12:29 p. m.,
Lenten, services, Trinity Church, Rev J. C. Sathert.
1:30, Dausterty's Orchestra; 6:15, Dinner concert,
Westinghous Band; 7:30, The Story, Dr. David-Lang;
Secondary Classes, Carman C. Johnson; 8:15, "International Relations in the Light of History," Prof.
Secondary Classes, "Carman C. Johnson; 8:15, "International Relations in the Light of History," Prof.
KFI. A. Cleven; 8:58, Chamber of Commerce Dinner.
KFI. Cleven; 8:58, Chamber of Commerce Dinner.
KFI. Cleven; 8:58, Chamber of Commerce Dinner.
KFI. 1:30, 12:30,

Fischer's Cocoanut Grore Orchestra, KFNF, Shenandeah, la. (Central, 266), 7:30 p. m., Program of old-fashloned music. KFSG, Los Angeles, Calif. (Paolife, 278), 3:30-4:30 p. m., Special musical program; 7:00-7:30, Children's hour.

hour, K60, Oakland, Calif. (Pasific, 3/2), 8:00 p. m., "It Pays to Advertise," K60 Players; Arlon Trio. K6W, Portland, Ors. (Pacific, 492), 3:30 p. m., Chil-drul's program; 10:00, Dance musts, George Olsen's Metropolitan Orchestra. (Continued on page 18)

Saturday, April 5

(Continued from page 17)

St. Olaf College chapet services; 12.000, analogo portrollege College Chapet Services; 12.000, analogo portrollege Chapet Chapet Services; 12.000, Dinner Concert, Hotel Tuler, WDAF, Kaness City, Mo. (Contral, 411), 3:30 p. m., Hilley Christer Corcelerts, 5:00, Address by Edgar Ass. Philosophical College Chapet Chape

Rotel Tuller.

Rotel Tuller.

Rotel Tuller.

Rotel Tuller.

Richy-Ental Occlesters: 2009. Address by Edgar A.

Lincoln, writer-lecturer, children's story, information man, Fritz Hanlein's Trianon Engemble: 11-45. Night
Rotel Tuller.

Rotel Tull

dies' hour of popular selections by Sweeney or-WHN, Rew York, N. Y. (Eastern, 860), 215-2:10, p. m., Fred Whitehouse Review: 245-3:15, Tom Banks of the Company of the Com

Sc20e-S:30, Tom Bracken, tenor; 8:30e-3:30, Metropolitan Dance Orch, and Entertainers; 10:00-10:15, L. B. Ger., tenor; 11:00-11:15, T. Pitspatrick Bress, song-tenor; 11:00-11:15, T. Pitspatrick Bress, song-tenor; 11:00-11:15, T. Pitspatrick Bress, song-tenor; 11:00-11:15, T. Pitspatrick Bress, song-tenor tenor tenor

soph Church of Newark, assisted by an orchestra of the process under direction of Edward Boyd Smack. We process the process of the process of

Daire Orchestra; Solo numbers by tavorité calestrainers.

(WI, Detroit, Mich. (Eastern, 517), 12:00 m., Edward Barnes, bartione; LeRoy De Turk, tenor; 3:00 p. m., News orchestra; 7:06, News orchestra.

Sunday, April 6

CKAC, Montreal, Can. (Central, 425), 4:30 p. m., Sacred

CKAC, Montreal, Can. (Central, 425), 4:39 p. m., Sacred concent.

CKY, Winnings Can. (Central, 460, 7:300 p. m., Church CKY, Winnings Can. (Central, 460, 7:300 p. m., Church CKY, Winnings Can. (Central, 460, 10:30-10:45 a. m., Service by L. A. Church Federation, 4:00-5:00 p. m., Vesper service by Federated Church Musicians: Church Service Church Church Church Church Church Service Church Church Church Service Church Church Church Service Church Church Church Service Church

Selected Orchestra. (Central, 1898). 11-09 a. m., Central, Church, Language, Dr. R. R. Shannon, 2:39 mm., Studio Chapel service, Chicago Church Federation; 7:00, Chicago Sunday Evening Cub, Speaker, Francis 7:00, Chicago Sunday Services, First Methodist Church; Rev. J. W. Borgin, pastor; 6:405-500 p. m., Marraret Rev. J. W. Borgin, pastor; 6:405-500 p. m., Marraret Southern Seronaders Orchestra. (Chicago Services, Services, Services, Property of Services, Property Servi

Park Securious Control, 484), 9:00 a. n., Wolfold Securious Control, 484, 9:00 a. n., Sacred Chlines concert; 1:30, Orchestra concert, P. S. C. Orchestra; 7:00, Musical program; 8:00, Church service; 1:30, Musical program, Erwin Swindell, conductor.

Actors, Assass Cify Mo. (Central, 369), 11-0-0 a, un, unwishes services from Central Methodist Chiron, 100 p, m, Evening church service trom Central Scholdist Church, screen music by WOQ Orchestra, S, Jefferson Gity, Mo. (Central, 440.9), 7:30 p, m, untern Service, Methodist Church, Rev. J. E. McDonhurch Service, Methodist Church

directors.

WWJ, Detroit, Mich. (Eastern, 516), 2:00 p. m., New
Orchestrar, 7:30, St. Paul's cathedral services, Dear
Warren L. Rogers.

Monday, April 7

CKAC, Montreal, Can. (Central, 225), 1,45 p. m., Mt.
Royal Hotel Concert Orchestra, 24:40, Mt. Royal Hotel
Dance Orchestra.

KFAE, Pullman, Wash. (Pacific, 330), 7,30 p. m.,
"Modern Cantalization—a Cause of War." Prof. F. R.
Yoder: All-High-School-Program, Pullman High
SCHOR, Miller (Kanasa, Contral, 226), 8:26 p. m.,
CRISSES for Passines. Prof. J. W. Zahmier: "Cattle
Management," Prof. B. M. Anderson, Vocal solos.
Otts Gruber: Gladys Warren, piantst; Edna Ellis,
vocalist.

KHJ, Les Angeles, Calif. (Pacific, 395), 12:30-1:15
p. m., Concert.
KLM, Canthali, Calif. (Pacific, 423), 1:00-2:00
p. m., Seiger'a Orchestra; 2:30-3:30, E. Nickerson,
plantst; Raymond Nealan, Incore; Elvira Valdes, pianist; Marjórie Sayles, seprano; Mme. Homa, accom-

anist; 4:30-5:30, Selger's Orchestra; 5:30-6:30, Chil-ren's storles, "Big Brother," of KPO: Dyrothy ustadd, planist; 7:00-8:30, Selger's Orchestra; 8:00-:00, Organ recital, Theodore J. Irwin; 9:40-10:40, herman & Clay night; 10:00-11:00, E. Max Brad-eld's Versatilo Band.

SD, St. Louis, Mo. (Contral, 546), 8:30 p. m., Music program, Grand Central Theater.

Degram, Grand Control 1974, 8230 p. m., Music Degram, Grand Control 1974, 824 p. m., Music WAAM, Benyari, M. 1, Grand Edition, 1975, 1976,

1015-11:10, Deltamut.
Miller's I. 11:5-11:30, Vincent Roswell Stortz, concert
WAAW, Omaha, Neb. (Central, 360), 7:50 p. m., Vocal
and instrumental aclos by Mrs. E. F. Morenty,
WBAH, Minneapolis, Minn. (Central, 417), 12:30-1:30
p. m., Diek Long's Trio and soloist; 9:30-1:100 p.
m. Diek Long's Trio and soloist; 9:30-1:100 p.
MACP, Counted, Donald Remybord, soloist,
7:30-8:20
p. m., Concert, Brooks Morris, violinist; Guy Elimen,
plamist; 9:30-10:45 p. m., Concert, Walter Wylle and
its little shoole caded band.
WBAY, Columbus, Ohio (Eastern, 390), 12:00 m., Plano
WBAY, Columbus, Ohio (Eastern, 390), 12:00 m., Plano
WBAY, Columbus, Ohio (Eastern, 390), 10:00 m., Plano
WBAY, Columbus, Ohio (Fastern, 390), 10:00 m., Plano
MBAY, Columbus, Ohio (Fastern, 390), 10:00 m., P

"Mich. Finders" 1987. "Not between "a "30" 1 "second "a "10" 1 "Not between "a "10" 1 "Not

Priano music, Hi. Lorbach Ovens.

WOAL Northfield Minn. (Control., 380), 9:45 a. m.,

St. Onl.

WDAF. Kennas-Citying Services. 441, 360 p.,

Johnnie Campbell's Kansas City Club Orchestra;

6:00, E. O. Moffatt travelopus, children's Story, information man, Fritz Hanlein's Trianon Ensemble:

11:45, Nighthawks.

Filament Heating Transformer

wo.6. Dresport, lows, Gerthal, 484), 12-30 m. Chines; 5:30. P. m. Lecture; 5:45. Chines; 5:30. Sandman's Synchold Lecture; 5:30. Sandman's Synchold Lecture; 5:30. Sandman's Synchold Lecture; 5:30. Musical program. Event Wood, Philadelphia, Pa. [Eastern, 5009, 11:30. a. m., Ornan recital, Mary E. Vect. 7:30. discleding Concert Orchestra. A. Candelphi, Concert Orchestra. A. Candelphia, Concert Orchestra. A. Candelphia, Concert Orchestra. A. Candelphia, 10:30. Havana Casino Dance Orchestra. Hold Sylwood, Ramas City, Me. (Central, 360), 7:30. p. m. Music by Sichman's Society Orchestra: Political tails; Work, Newark, N. J. (Castern, 603), 2:30-3:30. p. m. John Steels and Frank Tours, composer; 3:30-4:00. While the property of the strain of of the str

Meditations by the Inventor of King Miloplex

Part XXVI—Construction of Loop Wave Trap

By the Mystery Man

SIDE VIEW OF LOOP

his positive reply is "Not I." words, keep your wave trap out of induc-tive relations to such tuning inductances tive relations to such tuning inductances as your set may employ. The primary reason for doing this is not only to eliminate self-induction, but an even worse effect; that of electro-static coupling, and now that Maggie has re-read the above, her comment was, "You must have copied that out of a book." This merely goes to show she insists upon the "King" being himself, even though some of his readers would much prefer that he stick close to the serious and sublime, rather than to inter-

They tell me that the only way to build a tuner is to make it this-a-way or that-a-way; couple it tight or couple it loose; stand it upright or let it lay horizontal, but few, if any, of the journal articles which I have read in the past have taken up, for description, the elimination of electro-static coupling or that which you ordinarlly know as back-coupling. Nor have they gone into detail relative to the percentage of coupling that should be employed for either Radio frequency or regenerative circuits, and while it is my intention to keep you fellows, who have been going out nights because you haven't had any circuits to build, busy with a couple or three circuits which might interest you. In order to help a great many of you plough through local, which is even more important than wave traps, is the use of an efficient right-constructed tuning device.

ing device.

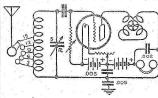
Man, man! How I tear my hair as I float around the country and see offered for sale, and also incorporated in receiving sets, doo-dads which are supposed to be tuning devices. I haven't enough blood to spare for boiling purposes, but if I had, believe me, the first job I would give Maggie would be that of presenting me with a dozen of these so-called couplers or tuners, and I'll say my blood would boil.

boil.
"Rawdeo is certainly maddening," yet Examples is certainly maddening," yet parts and apparatus are getting better every day; therefore, we have hopes of some day being reasonably certain of going into a dealer's store and not buying other than merchandise which will do the trick, Get me riskt on this—I don't blame the dealer, that is, all dealers it is a new basiness. We are getting the same that takes a mighty elevisible to the dealer parts which will not step into the dealer parts which will not step into the dealer of "good" merchandise, and now that I have this out of my system, suppose I give you the last of the wave traps and propers you ha a goodly measure for a few directive which with me as promised last week.

Loop Wave Tray

Loop Wave Trap

Very often, particularly where the con-ditions are unusually severe, the use of a



the length of each side. For illustration, the two build the loop having 30 inches to the side, as it is quite generally understood that the larger the loop the greater its efficiency. Follow as closely as possible the general design of the drawing by winding on 12 turns of number 18 dec. wire, spacing each turn % of an inch apart. Approximately 125 feet of wire will be required to complete the above windings. Connect a wire at each start and finish of the winding and connect them to a variable condenser, having a capacity of approximately .00025 mfd. This, then, becomes the trap or acceptor circuit. As I have previously outlined, the Eaton circuit, comprised of inductance and capacity, has a rather regular habit of contiguing to oscillate at a given frequency, conditional upon the setting of the variable plates.

Hams, or members of "My Gang," report having built their selection of the wave traps which I have published, and with but few exceptions, found them quite efficient in operation. The usual cause of failure being that some few have attempted to use the trap through mounting inductions as they might have incorporated in their set.

Tou can't do this, Bill: a wave trap is such an exclusive little "ense" that wave trap is such an exclusive little "ense" that when the date in you attempt to associate him or even ask him to sit close by a tuning inductance.

The vernacular of the day. Methinks, and results that are almost uncanny. Quite the vernacular of the day. Methinks, and results that are almost uncanny. Quite onstructed by outside source.

True, loops nhe more or less expensive to construct and I would not advise all of you to build the loop trap which I am about to describe, but rather file this issue and the hypothesis of an undivided wave, and should they be able to understand it, then I shall have served tuning inductions as they might have incorporated in their set.

Tuning Device

The day are leaded from an results that are almost uncanny. Quite true, loops nhe more or less expensive to construct and I would not advise all of you to build the loop trap which I am about to describe, but rather file this issue and but to describe, but rather file this issue about to describe, but rather file this issue about to describe, but rather file this issue about to describe, but rather file this issue to do this, but no order to do this we must, in order to do this we must, in order to do this we must, in order to do this that are almost uncanny. Quite on secults that are almost uncanny when its inductance is energized from an outside source.

Trom the above it is quite apparent that we must, in order to make this circuit operate, energize it from an outside source, and in order to do this we will inductively couple it to the primary circuit. This primary circuit may be constructed by starting at the beginning of the 4th turn of your loop and winding on six turns of number 18 dec., passing this wire through the same slot or hole as the first winding. In other words, it may then follow with and be within the slot or opening with the 4th, 5th, 6th, 7th, 8th and 9th turns, but not physically connected in any manner. One end of this primary should go to the antenna wire, the other end to the antenna binding post on the receiver.

This finishes the construction, and, if you will but glance at it carefully, it will be apparent that we have built an inductively coupled loop wave trap whose primary is what is known as untuned or amperiodic, or, as I have called them, masmodic, which has not only many of the desirable features of traps previously described, but the further ability of assisting you toward the elimination of interfering stations through the directional properties which loops possess.

More Circuits to Come

This happens to be my busy day—I

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.



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Vol. VIII

Chicago, Saturday, April 5, 1924

The Radio Trust

The Radio Trust

Who Is Going to Settle the Radio Business?

Y WHAT divine right does the powerful and majestic Bell system step in to settle Radio's business? For no reason except that "might makes right." Radio can take care of itself—the problem of who shall pay for broadcasting will be settled by the Radio industry and the Radio public. Either a levy on set manufacturers or a sales tax on essential parts—and one of a dozen excellent ways are available for securing funds to pay the finest talent in the world.

The phone company's position is reported to be that there is bound to be a radical change in broadcasting because it is furnishing something for nothing. It applies to its own broadcasting particularly, as it is in the business of transmission and does not sell Radio receiving sets, nor do its subsidiaries, except for certain parts developed from telephone use.

The company argues that when the extraneous interests that have flocked into Radio on the boom die out will still have to handle Radio transmission, and therefore it must stabilize the industry.

Why will it have to handle broadcasting? No law compels it to and it has implied no obligation to do so by the sale of Radio apparatus. The manufacturers have and they will see that there is plenty on the air to listen to. The phone company must stabilize the industry! Why? Are not the executives of some of the companies doing business in the field big enough to accomplish this at the right time? Have they appealed to this great divinity to come in and by a magic sweep of the wand make a thorny path over into a garden of roses?

roses? Two events at Washington have important bearings on the subject. One was the hearing on the White bill which contains a clause providing for the ending of monopolies, and again, on April 10, will be opened the Federal Trade commission hearing of the investigation of a Radio trust.

Court Rulings

Judge Favors Boys in Putting Up an Aerial

CINCINNATI justice to whom was referred a
case of two boys wishing to construct an aerial on their home against the wishes of the landlord, who
objected strenuously to having a couple of poles attached to the roof of a dwelling owned by him, decided in favor of the two youngsters.

In making his decision, after asking the property
owner various questions, the court said: "Radio is
one of the most beautiful and helpful influences a boy
can have. It is a great factor in broadening their
minds and I hope I will be able to help the young boys
appreciate the advantages of a Radio receiving set."

Education by Radio

Country Places Get Most from Broadcasts

THE educational value of Radio to families in their homes and on the farms is becoming more fully appreciated. From a western-broadcasting station people in many cities and towns and thousands of farm homes in the country enjoy daily entertainment.

Lectures from great educational centers scattered over thirty-one states are heard from one super-station. The pleasure that a whole family gets from a nation-wide music and lecture broadcast is intensified by the fact that they have been deprived of these things until the discovery of Radio.

Speed of Waves

Speed of Waves

Sound Leaps Distance with Amazing Quickness
IF YOU are 186 miles from a broadcasting station, I when you listen in, you hear each sound 1/1,000 part of a second after it is produced in the broadcasting station. This is because Radio waves travel at the speed of 186,000 miles per second, so fast as to be instantaneous over all normal broadcasting ranges. If you were in a studio and with one car heard a note struck on the piano, and at the other ear could hear the same note transmitted 1,000 miles by Radio, your ears would be unable to distinguish between the two. They would sound like a single note.

RADIO INDI-GEST



You Can't Make Love by Radio

I OU CAN'T Make Love by You can't make love by Radio, It simply can't be done, It simply can't be done, It has its limits and I'm sure. That love-making is one, You can-sing songs, I grant you Of passion and of youth, But when the World is listening in You can't express love's truth.

You can't make love by Radio,
It lacks the soul's pure eyes
That, mirror-like, reflect its joy,
The joy that satisfies,
You can, upon the ether
Tell people how to live,
But to make love 'tis lacking
That thrill it needs must give.

The constructed make love by Radio, The microphone is dead, No rosy lips to press a kiss And kisses can't be said, It has no silken tresses fine, No dointy, hands to hold, No checks inviting love's caress, No tears to be consoled.

You can't make love by Radio,
The World's too large, by far,
You need a cosy little room
Where two and no more are,
You can't have any listening in,
There's no fun if you do,
The Radio is NOT the place
To send my love to you.

CHARLES L. H. WAGNER.



Soozie and Mama Haymes Please Write

Soozie and Mama Haymes Please Write

Dear Indi: Seeing as how Mama Haymes put several
little crosses on one of her letters to you (Dec. 15), I suppose you know her rather intimately and can answer my
questions. Has Mama Haymes a steady meal ticket? (I
don't know how steady.—Indi.) Can she cook as good as
King's Maggie? An how about Soozie; is she a her or a
hymn? (Yes.—Indi.)

My offer of March 15 (object matrimony) is still open and
as a greater inducement for the accepted matrimonial worse
half, I will grant the full and exclusive rights to my receival
ing set one night each week (Sunday night). Love's worderful isn't it?

I. No. Lorz.

P. S. Herewith is an appendix to my recent encyclopedia.

I. N. L.

Encyclopedia Indi-Gesticana (Compiled by I. Noa. Lott)

(Compiled by I. Noa. Lott)

Crystal.—The small, octagon shaped piece of glass that your friend declares to be a diamond.

It is a small proper of the state of the small proper of anything used to purchase Radio applications. Lightning streets—A detour for lightning, but lightning usually goes by too fast to read the sign. Plug.—A wooden stopper for a beer (I mean, vinegar) keg bunghole.

Potentiometer.—An instrument called for in most Radio circuits for the purpose, evidently, of absorbing electricity, running down batteries or any other called the state of the control of the state of the called sign.

Berkaddating.—The action of an improperly operated set that causes howls (the neighbor's quesils).

Spark.—The end of a cigar farthest from your mouth.

Tickler.—Woolen XYZ.

Mrs. Partington Speaks Out

Dear Indi: Mrs. Parting-ton says she's heard some Dear Indi: Mrs. Fartington says she's heard some
oil men, or other greedy fellers is claiming a patented
right to the Air, as well as
on all the machinery they
send it and we receive it
with, and they seem to think
all listeners is for is to buy
patent machines to hear
patent programs out of
patented air.
She says, "First thing
we know we'll be listening
out of the little end of the
horn, and paying the fiddler
for that." She bolieves
listeners had better get busy
and send some applause
letters to their congress members just to let them know
that the Ether ain't got no Tea-pot Dome, and is not
for lease, public nor private."

Signing Off.

Bet He Owns R. C. A. Stock Too

Dear Indi: There's a guy in our block who's so tough he ews vacuum tubes and spits electrons.

FIDDLE D. DIAL.

Bigger Than the Government?



Condensed

By DIELECTRIC

It is unfortunate that so good a Radio bill as that sponsored by Congressman White and approved by the proper government departments should be slated for a long "silent period." Such a bill might go a long way to clear the air in these days of Radio monopoly. Again we have forced upon our attention the spectacle of a tube "shortage"!

Contests carried on by broadcasting stations are not so numerous as at one time, yet they flourish in spots. Of course, every such feature creates an added reason for selecting that particular station to listen to, also it helps the A. T. & T. increase their receipts from telegrams—some of which travel considerable distances. Not long ago WJAX and WJAZ announced contests on the same evening, though the latter was to be held at a later date. While listening for Chicago's announcement many a fan failed to win a prize from the Union Trust Company.

At last! After the various organizations opposed to giving the mass of music lovers in this country a chance to hear artists of renown, had performed their skit, we are about to be blessed with hearing classical nusic rendered by musicians, who stand at the top of their profession. The Radio and Music Fund Committee, in New York, have announced their intention to begin broadcasting this class of programs and WEAF will donate their station to its use. Judging by the letters received, the idea has appealed to those in every walk of life who express their gratitude for fostering such a desirable plan. Send in your check.

Debates formerly were entirely confined to three judges, who were present in the hall in which the debaters held forth, for decision as to the winners. More recently such intellectual calisthenies have been staged before thousands of self-appointed judges. Except in a few instances, however, the three judges decided the case. WJAZ asked the Radio listeners to be the judges in a debate on the "wet" or "dry" question, debated before the microphone in their studio. The majority of listeners were "wet"—that is, they so voted. Being Saturday night—. Saturday night-

Some of the American broadcasting stations have no difficulty at all in reaching England with their programs, where they are relayed for the benefit of those unable to pick them up direct. But when the British stations attempted to reach our listeners last month the result was far from satisfactory. Only a comparatively few with super sets were able to catch more than the carrier wave. Not that they have any programs superior to curs—possibly not so good, but it would be very interesting to fans on this side to tune in an English station once in a while. It has been explained that the power used by their stations is not as great as used here. Put on more juice, England, and let's hear you!

A year ago broadcasting stations were guilty of keeping their Radio listeners waiting several minutes between numbers before announcing their call letters. Some even announce a half-dozen numbers without giving this information. This is seldom found to be the case today. The person at the dials wants to know to whom he is listening, at the earliest opportunity. Aletter to RADIO DIGEST from Dorothy MacIntosh complains of the inability of listeners to church services knowing the location of the church to which they are tuned. Announcements at the beginning and close of a tuned. Announcements at the beginning and close of a service are usually the only ones given. Preachers might preface the sermon with a statement which all fans would welcome.

The Latest in Super-Heterodyne Hook-Ups

Part IV—Seven Tube and Filter Circuits

By H. J. Marx

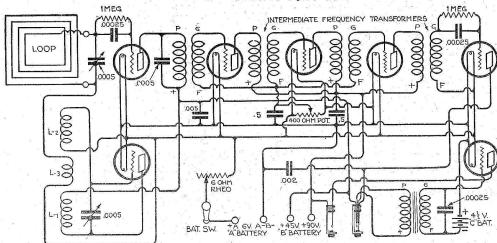


Figure 9.

A serious a long letter asking which is best, the super-heterodyne or the neutrodyne. There is little doubt on the subject, the super-heterodyne circuit when the apparatus is properly designed, constructed and assembled will be far superior to any of the circuits at present known. But the problem of proper dent known. But the problem of proper design and construction still retains a few kinks for complete solution. In addition,

properly designed very high or low wave longths cannot be received without distortion or possibly not at all. It may often be found advisable to remove some of the rotating plates if the capacity is too large. If it is too small it may be easier to add a few turns to the inductance.

Seven Tube Circuit

seven Tube Circuit

A seven tube circuit is shown in Figure

9. This has four stages of super-audible
amplification and one stage of audio frequency. Either the three or six volt tubes,
can be used. Changing the tubes around
will soon indicate the arrangement giving
the best results. All tubes are not good
oscillators—likewise all tubes are not
good detectors—so some changing around
will help matters decidedly.

L-1 is the oscillator plate coil, which consists of 24 turns of number 22 dsc wire on a 34-inch tube. L-2 is the oscillator grid coil, with 42 turns of the same size wire on the same tube spaced about 1/2-inch from the plate coil winding.

%-inch from the plate coil Winding.

The pick-up or grid coupling coil, L-3, has 18 turns of the same wire on a 2%-inch rotor between the two fixed coils.

The four super-audible transformers should be of the 6,000 meter type. The oscillator circuit should be well shielded from the rest of the circuit to prevent interference.

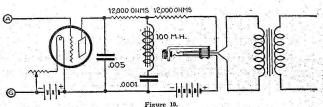
Once the wave length settings on the tuning condenser are determined—tuning of this receiver becomes a simple matter. The oscillator condenser will have two points for each station. The potentiometer controls the volume of reception. An improvement would be to use a separate rheostat for the two detector and the oscillator tubes, as the setting of the single rheostat is somewhat critical.

Filter Circuit

A filter circuit developed by Mr. Francis R. Ehle of Philadelphia, is shown in Figure 10. This is added between the second detector tube and the primary of the audio frequency transformer. It is desirable to use a separate 22½-voll B battery for this plate circuit in order to permit a complete elimination of stray impulses into the audio stages. The values of the various component parts are given in the diagram.

Keep Lead-In Free from Metal

Even though the lead-in wire is insulated, never let it touch against any metal. This means the cornice around the edge of the roof, the metal window screens or weather strip, or any other metal. In spite of the insulation, there will be leakage here, and trouble will surely result. Leakage will be greater during storms or damp weather and considerable difficulty may be encountered tuning in. It usually manifests itself, by constant whistling and inability to clear up a station altogether.



the assembly of a set with the numerous range of the two variable condensers tubes required is one of the most difficult should be available for tuning the stations problems that the average fan has ever as desired. If the condensers are too large or have too much dead tuning area, the apparatus on a flat board, hook it up and make the necessary changes until it it is too small some stations can not be is working right. Then start figuring on received. If the transformers are not

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22

OPERATION, TROUBLES (Continued from page 10)

Tuning

Continued from page 10)

Tuning

The next step is the tuning. The Tuska receiver is tuned in a very simple, easy and obvious manner. First, the switch in the center, Number 1, which is labeled 1, 2, 3, 4, 5, 6, is almost an indication of the wave length, Number 1 being 100 meters, Number 2 being 200 meters, etc. The dial marked tuning, Number 2, controls the variation between each switch point and enables much finer tuning to be obtained. In some cases, the figures on the dial will really indicate wave length, However, it is not designed to do this. If you want to listen for a broadcast station on 360 meters, set the switch Number 1 to point 3 and then slowly turn the tuning fial Number 2 throughout its range. As you turn this dial with the left hand, use the right hand on the regenerative knob, Number 3. Leaving the tuning dial X to the right hand on the regenerative knob, Number 3. Leaving the tuning dial X to the right hand on the regenerative knob, Number 3 click or dult thud. When the click point is reached, the vacuum tube detector starts to oscillate. This means not only interference for all of your Radioneighbors, but it will also bring about distortion of music in the receiver. To overcome this, turn the regenerative knob Number 3. This will stop the oscillating and you will be receiving at the most sensitive adjustment.

For every setting on the tuning dial Number 2 bring the regenerative dial Number 3 up to the point where it does not hiss but is almost at the hissing or regenerative point. This is best accomplished by working the dials with both hands. The left hand controls the tuning dial, and the right hand, the regeneration. To describe this in slightly different language, we would say that there is certain synchronizing action for tuning and regeneration. Some stations will be heard with the switch Number 1 set on tap 4 and sometimes on tap 5 if the aerial is short. Occasionally, a station can be picked up with two sets of adjustments, as for example with the tuning dial Number 2 stone maximum

Trouble Shooting

Trouble Shooting

Sooner or later, every radio outfit in the hands of a novice gives some kind of trouble. As a general rule, it might be said that this trouble is almost invariably located in something other than the receiving set itself. The first trouble is aprice be a storage battery being discharged or in heed of charging. Perhaps the drycells have done their work and need replacing. Sometimes the B battery will break down as they wear out from old age. Occasionally some of the wires to the binding posts are disconnected or the telephone receivers become disconnected from the set. We have heard of cases where the lightning arresters became stopped up and caused the Radio current to go to

the ground instead of to the receiving set.

There are many causes of trouble indeed and we recommend that you first test the various batteries. Examine the 6-volt storage batteries. Examine the 6-volt storage battery or your dry cells. Look various batteries. Examine the 6-volt storage battery or your dry cells. Look over the B battery and see that it is up to the proper voltage. If you do not have a voltmeter go to your dealer, who will gladly test it for you. Sometimes the vacuum tubes are the cause of the trouble. First look for the little obvious things such as a wire falling off or the antenna falling down. The ground wire may be broken. The tubes may not light. Vacuum tubes burn out with age or abuse. Look for the more complicated causes last.

Receiving Ranges

Receiving Ranges

Some operators claim to hear 500 miles every evening. We cannot refrain from mentioning a word or two about receiving ranges. Range, in the very first place, depends largely upon the transmitting station. You cannot hear farther than a person can talk to you. Neither can you receive broadcast stations farther than the broadcast station will transmit. As a general rule, the reliable range of the average broadcasting station is about 100 miles. This range will be affected by daylight and by varying weather conditions. However, at night and especially in the winter time, the ranges go up greatly and often exceed 3,000 miles. The results which you obtain depend largely upon the carefulness with which you tune your set and hours when you listen. Good tubes, phones and aerial all help, of course. Do not think that you are not receiving as far as the other fellow if he tells you these wild stories about the distances he has heard. Remember this does not mean a reliable range nor is it possible to receive these distances every night.

(ANOTHER SET NEXT WEEK)

(ANOTHER SET NEXT WEEK)

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long distances. Price, \$8.

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

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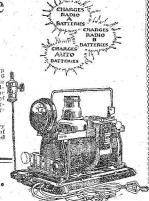
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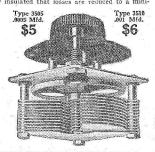
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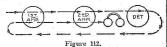
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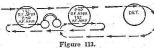
Simple Explanation of Radio for Everybody

Chapter XV—The Inverse Duplex

By M. W. Thompson



HE inverse duplex is an improved reflex developed by Mr. David Grimes
flex after considerable theoretical calculation and much experimenting. As it was
added by the strong Radio frequency and
addiof frequency energy which puts a low



Dirst announced in the press this excellent method of connecting amplifiers was not a startling success but further work by its inventor resulted in a circuit called the improved duplex.

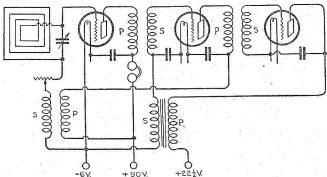
Duplex

In Figure 113 is shown a schematic drawing of a duplex. The incoming signal passes through the tubes in the same way as in the reflex and, as usual, to the detector. Then, instead of going to tube number one as audio frequency, it is passed to tube number two, from which it loops back to tube number one as the second audio frequency amplifier. This system has the important advantage that both amplifier tubes are loaded equally and the total amplification possible is much higher. The Radio frequency energy is weak in the first tube where the audio frequency energy is first tube where the audio frequency energy is strong; Radio frequency energy is

strong in the second tube where the audio frequency energy is weak.

There is, in this case, but one stage of audio frequency amplification between the antenna and the phones, and far less of the bothersome noises of electrical equipment in the vicinity will be noticed.

The first duplex hook-up was as shown in Figure 114. It should be noted that small fixed condensers were connected from the lower ends of both windings of the Radio frequency transformers and they permit the energy at Radio frequencies to pass directly back to the tube filaments after having performed their work in the transformers instead of having to go (Continued on page 24)



+ 90 V.

Figure 114. Straight Reflex Hook-Up
Figure 112 shows, schematically, the use of three tubes in a straight reflex hook-up. Third, the detector is not between the anther tubes in 1-2 order, and then to the detector and finally back through the complifier tubes in 1-2 order at audio frequencies. Such an arrangement has three land cannot be eliminated.



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time on a lowe 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.

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

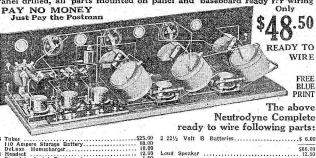
All goods prepaid. These instruments are easy to build, easy to operate. Everything clearly shown

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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 manogany with beautiful mallogany disla—a set fitted for the most exclusive. home Panel drilled, all parts mounted on panel and baseboard ready for wiring



| 1 ds Volt B Battery 5.50 The above parts and equipment complete would cost you \$147.00! | Our Price \$125.00 |
|--|---|
| It Works-NEUTRODYNE-All St | andard Parts |
| densers, and 2 halancing condensers. 20.00 4 Bezels 1 Potentiometer, 1850 ohms. 1.85 3 Dinis 3 Jacks, Carter 2.70 f Basebaard 1 Condenser 40 24 ft. Square Bus Gifd Leak 5 Sockets, Kellogg's 5.00 | 10 Posts 8.55 Panel 3.64 - 4.50 - 5.00 - 10 Wire 5.00 - Total \$53.89 |
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RADIO FOR EVERYBODY

(Continued from page 23)

through the windings of audio frequency transformers or the condensers shunting important as the great circuit to

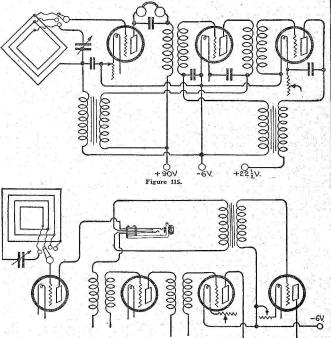


Figure 116. them. This was the circuit which functioned so well with the old 201 tubes. | which they were added. The head phones thave been changed from their former post-

> Wonder Set of Radio "Getting Pacific coast stations strong with loud speaker on type F," writes E. S. White, Lowell, Mich. "Heard concerts from Hawana, Cuba, Forth Worth, Texas, Atlanta, on a loud speaker,"Austh Rhemerwrites from Chicago. W. E. Culver, Savannah, Ca., says, "Igetstations from allower the country loud and clearly," Picked up 72 stations—ten in Canada, and get them back any time I want them," writes Jas. Berne, Aberdeen, So. Dak, Like this hundreds certify the genuine sent the highest permanent quality, and offered at nomical and districted.

Four Tube— (Loud Speaker Set)

Guaranteed Under Seal

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

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14 Cortlandt vic., Phone Cortlandt cog.

(THE END.)

THIRTY MINUTE A-B-C

(Continued from page 13)

(Continued from page 13)

The cycles are sometimes expressed in units of a thousand cycles, called "kilocycles." It is even possible to produce Radio wave lengths of only ten meters (frequency 29,882,000 cycles), and for laboratory purposes, down to a fraction of one inch. But the higher powered stations all use the lower frequencies. Strictly speaking there is no sharp boundary between Radio frequencies and audio frequencies as the transcontinental high powered telegraph stations use frequencies as low as 10,000 cycles, closely within the range of human ears.

Suppose, for discussion, that only a low frequency 60 cycle alternating current was applied to an aerial. Then each time the aerial is charged, there is an electrical strain between the aerial and the earth, and during discharge, this strain would be thrown back again. At a slow rate, the

tion below the primary of the first Radio frequency transformer to the lead from the plate to the primary. This materially aided stability.

The potentiometer was removed in favor of the tapped loop, which has several advantages. The potentiometer shorts the A battery and cuts down its life. A resistance in a Radio frequency circuit broadens the tuning and makes good selectivity impossible. This new circuit should be one of the sharpest known and nearly the equal of a Neutrodyne. This tapped loop method contains no resistance and so sharp is the tuning with a good loop that the condenser should most certainly be of the vernier type.

An important point is that the audio transformers be of low ratio, not more than 3½ to 1 and, preferably lower than that. A third step of power audio can readily be added to this set as shown in Figure 116. A two circuit jack is inserted where the phones were shown in Figure 116, the inner leads going to the primary.

Of an audio frequency transformer. One of the secondary terminals is connected to the grid of the power tube, the other to the minus A battery wire.

(CHEE END.) How Radio Waves Are Set Up

But by increasing the rate of charge and discharge, such ether strains occur at high frequency, and it is impossible for any one of the strains to collapse before the current has discharged and is again building up. The new strain can then oppose and push off into space what is left of the first one that did not have time to collapse. This effect continues rapidly in a continuous series of ether or space compressions which travel outward as Radio waves with the speed of light, namely 186,000 miles per second.

These waves travel outward, losing amplitude as the energy becomes dissipated and absorbed. A very small part of the original energy reaches a receiving aerial or receiving set, at the same frequency it was transmitted.

The high frequency is used then because it causes a large part of the applied energy to be thrown off from the aerial as Radio waves. The important point to remember is that each particular frequency of Radio waves continuously while it is on the air, and that it is the sound waves to be transmitted which govern the modulation or intensity.

Why Transmission Varies?

Why Transmission Varies?

It is well established that transmission is better at night time than during the day, and that it varies from time to time, season to season, and in different localities. Thus transmission over water is usually better than over land. In the far south Radio is less reliable than in the middle north. In some mountainous districts or near mines, distant stations from certain directions can scarcely be heard, while others much further away are very distinct. In cities, the Radio results an outfit can give will vary from one section to another. There are certain districts termed "dead spots" where reception is very difficult. The reason for variations is being studied slowly and is thought to be due to atmospheric and natural changes, (Continued on page 26)

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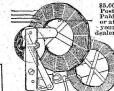


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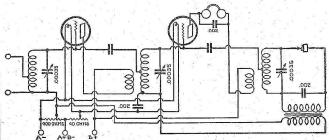
Reflex Neutrodyne Uses Crystal for Clearness

Two R. F., Detector and One A. F. on Two Tubes

By John T. Mathews

RERE'S a circuit that has only two tubes with two stages of neutralized Radio frequency, crystal detector, and one stage of reflex audio frequency amplification. A circuit of this type permits the maximum amount of selectivity and volume with a minimum amount of money invested in required apparatus. The circuit itself is standard in every form and should present no difficulties in operation. The values of the various parts are indicated in the diagram. Three standard neutrodyne variable condensers are required. Two of the neutroformers are the sual two-coil air core transformer types. The third, used as the initial tuning unit, consists simply of the secondary winding siving a single circuit effect thus increasing the volume.

One rheostat controls the two tubes and a potentiometer of 400 ohms resistance permits close adjustment of the grid potential on both of the tubes. Care should be taken to see that the audio frequency transformer doesn't have a higher ratio



than five to one and in addition that its condensers is again advised here. Many position is such that it doesn't come within the magnetic field of the neutroformer coils. The usual recommendation of 5% to 6-inch spacing between the variable receiver.

your set will be just that much harder to handle. It will require experience to learn how to tune it. I should not advise any beginner to try it until he has acquired considerable experience with a single tube

considerable experience with 6 supported to the control of the con

One Stage Audio Frequency

One Stage Audio Trequency

If a powerful broadcasting station is operated within 10 or 15 miles and comes in with good round volume in the receivers, one stage of audio frequency amplification should enable one to use the loud speaker. One should not, however, expect he is going to hear the music blare all over the house like a phonograph, although persons sitting in any part of a fairly large room will have no difficulty in enjoying the music. One or two stages of amplification are necessary in order to use a loud speaking horn. It cannot be used on a crystal nor single tube get without amplification.

on a crystal nor single tube set without amplification.

I should advise a subscription to some good Radio publication and a study of the general technical points governing the operation of the different kinds of sets.

—Albert E. Jones, East Melton Mass.

for

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Practical Remarks for Beginners in Radio

Beginners in Radio
The ordinary beginner in Radio starts
with a "listen in" on some friend's receiving set. If he has happened to hear a
good program he decides to join the happy
throng and build a set of his own.
His first investigation whether in buying one already assembled or putting it together is confusion, much of it—single
circuits, double circuits, three circuits,
Radio and audio frequency amplification,
regeneration and the like. No wonder he
is confused; yet through all this he has
a definite idea of what he wants. Generally he wants a set that will give him
results as good as are averaged by those
in his vicinity, without having to go into
technicalities to find the difference in the
many kinds of circuits.

Atmosphere and Location

Atmosphere and Location

To begin, let me say that atmospheric conditions and location play a very important part in how well or how much you can receive. Night is better than day, winter is better than summer, and there

THORDARSON

will be a great variation from day to day. Stations will come in better from one direction than another; during the next night conditions may be reversed; yet through all these variations there is a rough ayerage distance that the set may be relied on to cover except under the very worst circumstances. For a crystal set this average will be from 15 to 20 miles, with a single tube set from 75 to 100 miles. Yet under favorable circumstances the crystal set known to receive from distances greater even than 200 miles, single tube set distances up to and more than 1000 miles. By this it will be seen than one cannot say off-hand how far a set will receive.

Sets constructed in like manner when lo-

set will receive.
Sets constructed in like manner when located a few miles apart will show vast difference in the distance of reception. This
is due to location. As to the set itself
Radio frequency represents volume. Reseneration has, practically speaking, the
effect of Radio frequency and audio frequency on the set; that is, it makes the
set receive from a greater distance and also makes it louder

Comparison of Circuits

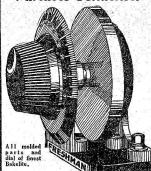
Comparison of Circuits

Bearing these facts in mind we will now consider comparison of circuits. The single circuit is to my mind best adapted to general use, regardless of whether one is a beginner or an old hand at the game. After using all kinds of circuits I have come back to the standard single as the most reliable and easy to operate. The difference in the distance between single circuit, double circuit and triple circuit receivers is so slight that it should not be considered. The double and triple circuit tuners will tune a little more sharply than the single. That means they will be a little more impervious to interference circuit tuner is preferred by those who find it necessary to work frequently through more or less serious interference.

When Radio frequency amplification is

When Radio frequency amplification is added to the set it is advisable to use not more than two stages; each time a stage of this amplification is added it means that

"Freshman Selective" Variable Condenser



brings in distant stations thru the most powerful of local sta-

increases the selectivity of your set fully 50%.

permits unusual volume.

No Leakage
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With 3-Inch Dial With 4-Inch Dial, 50c Extra

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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

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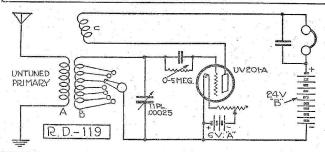
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a circuit to increase selectivity. It is is nothing more than a standard circuit with the addition of an untuned or a "periodic" primary which will respond to practically all the wave lengths used by broadcasting. This circuit gives very satisfactory results without the addition of any extra controls.

The secondary is wound with 70 turns of number 22 dec. on a 2%-inch rotor ball. There are but two the addition of any extra controls.

The secondary is without the addition of any extra controls.

The secondary is wound with 70 turns of number 22 dec. on a 2%-inch rotor ball. There are but two controls, the secondary condenser and the tuner without the additional controls.

Using this hook-up with one UV-2014 tune. Yet voits on the plate and an aerial 125 feet long, I have heard WFAA, WBAP, WSB, PWX, WOAW, WDAP, and many others. These have been received with a minimum of interference and distortion. Nearer stations, such as WGY and KDKA come in very loud and clear.—Sidney Bamford; Hammondsport, N. Y.

THIRTY MINUTE A-B-C

(Continued from page 24)

(Continued from page 24)
changing reflections and refractions, location of clouds, or other particular causes.
Owing to variables, the operation of Radio or a particular outfit cannot be reliably predicted for a locality not previously tried. This is the basis for the distance claims made for tests under favorable circumstances and the opposite disappointment with poor results from the same equipment elsewhere.

Receiving apparatus uses colls to provide electrical springboards called "inductance," and the next thirty minutes in this series will relate what inductances do.

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SHAMROCK for Selective Tuning

LONG DISTANCE ON CRYSTAL SET

I have tried out the crystal hook-up using the split variometer as given by Chas. P. Lee in the March 1 issue of Radio Digest and have received a program from the Queen City Orchestra from KDKA this evening (February 26), getting good reception immediately. Thank you.

Lucian C. Miller,

Lucian C. Miller,

Minneapolis, Minn.

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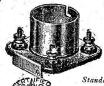
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How to Make Set with Double Crystal

Louder Reception With Two Crystal Detectors

The crystal receiving set is one of the oldest, most generally known, and most reliable types of receiving sets, and hundreds, if not thousands, of crystal sets have been described in printed literature,

WORKSHOP KINKS? EARN A DOLLAR-

HERE 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 interseted 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

but, strange to say, I have not yet seen any crystal set that is perfect, or, rather, as nearly perfect as it is possible to make it. I am submitting to the readers the following specifications, and ask them if this is not as nearly perfect a set as it is possible to produce:

The crystals which are now available serve only as rectifiers and not as amplifiers, and must obtain all their energy from the aerial. This great absorption of energy results in broadness of tuning, so that a tapped inductance will be amply sufficient, without any additional provision for fine adjustment. A small fixed condenser may be used in the aerial, and the ground connected directly to the switch arm, as shown in the circuit diagram.

Tapping the Inductance

Tapping the Inductance In tapping off the inductance, instruc-

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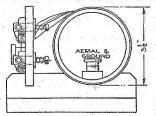
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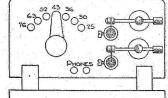


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LOCATION OF PARTS ON PANEL





portional to the square of the number of turns of wire, it follows that the wave length is directly proportional to the number of turns of wire (assuming that they all have the same diameter). The coil should therefore be tapped off so that the total number of turns of wire increase by the same fraction each time, and not by a fixed number of turns. For a crystal set the tuning will be sufficiently fine if each successive tap increases the number of turns by about one-fifth or one-sixth, while if a variable condenser is used in series with the aerial, the increase may be as much as one-third or one-half the total number of turns.

Number of Turns on Coil

Number of Turns on Coil In the set shown in the illustrations, I have designated the dimensions and number of turns which have been found most

(Continued on page 28)

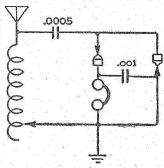
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tions usually tell you to tap off the coil at regular intervals, as every ten turns, for instance. This is wrong. The proper way



to tap off a coil is to have successive taps increase the wave length by the same frac-tion. Since the wave length is propor-tional to the square root of the inductance and the inductance is approximately pro-

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Split Variometer Used To Make a Wave Trap

I have tried various types of wave traps and find that some climinate the interference together with all other signals, and others climinate too many of the desired stations with the interfering ones. The most satisfactory way, I find, is to split a variometer, put a 23 to 43-plate variable condenser across the rotor and put the stator in series with the antenna. If the type of variometer permits, a center tap should be tried, as in some cases less inductance in the antenna circuit is an advantage.

To use this trap, first tune in the station to be eliminated, then parallel the windings of the variometer and adjust the variable condenser until the interfering station is very weak. Now turn the rotor slightly and the station will fade out entirely. You can then go ahead and tune your receiver and never hear the station tuned out on the trap.

With this arrangement I have been able to tune in Chicago, Kansas City, Denver and Pittsburgh on a Reimartz, only five blocks from WOAW, when they were going full blast—Ray Blain, Omaha, Neb.

Look out for the blue glow in a detector tube. This is a sure sign that the B battery voltage is too high, and it is apt to paralyze the tube.





HE 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 re-ceiving conditions. Other-wise head phones should be used for distant reception.

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DOUBLE CRYSTAL SET

(Continued from page 27)

satisfactory. The construction, as shown, is easy to build, and many of the details are left to the ingenuity of the builder, but one hint must be given, and that is, to solder the wires to the switch points before the coil is secured to the base, as otherwise it will be difficult to get the soldering iron in between the coil and the panel.

There are two crystal detectors used in this circuit. These are arranged in reverse order, as shown in the circuit diagram, and will be found to make the set much more reliable than if only one were used. Since a crystal acts only as a recti-

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fier, each crystal can use only one-half of the wave. Now, if the conductivity of the crystal in the other direction would be absolutely zero, then the energy from the other half of the wave would merely be sent back into the oscillatory circuit to add to the energy of the next wave. But actually the conductivity of a crystal is not absolutely zero in either direction. It is merely greater in one direction than in the other. If, now, another crystal could be arranged in reverse order so as to utilize that half of the wave which the first crystal cannot use, then substantially all the energy of the waves would either be rectified to addio frequency or returned to the oscillatory circuit. This may be done in the manner shown on the illustrations.

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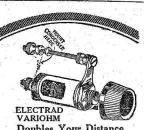
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Louder Reception

If the crystals are properly adjusted, reception will be perceptibly louder than if only one crystal is used, and even if one of the crystals is not very sensitive, so as to serve merely as a resistance, the set will still function as well as the ordinary single crystal receiver.

Each crystal detector consists of a central pivot drawn in by a spring, a cat-whisker stem slidable through a transverse hole in the end of the pivot, and a ring or washer of insulation material surrounding the pivot and having a transverse slot for the catwhisker stem to rest in.—Carl F. Krafft, Washington, D. C.



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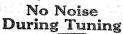
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A crystal detector set should have a long aerial, for the crystal detector relies exclusively on the strength of the incoming signal for its operation, as it has no local battery to assist it. The sounds heard in the telephones are the strength of the actual signals coming through after rectification by the crystal. The longer the aerial is, the better the results should be on the crystal detector.





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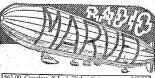
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Poorly Designed Tube Bases Cause Current Loss

Prevention of Small Losses Increases Range

By Henry Stockdale

NE of the indications of the progress of the Radio art is the increased attention which is being paid to the design of the individual parts which are used in Radio receiving sets. Until the progression of the colls and conclensers alone. However, it is now realized that there are mile-wasting losses in poorly designed tube bases, tube sockets and other parts, as well.

A modern fairly efficient Radio receiver will receive signals which have as low a pressure as .001 volts. Even in a very good antenna this will not produce an energy of more than .0000001 watts. It is hard to imagine such a small quantity of energy, but forty million receiving sets would produce just about power enough to light one ordinary 40-watt tungsten light.

New Tube Construction

New Tube Construction

New Tube Construction
The oldest manufacturer of vacuum tubes has recently greatly improved its product by eliminating the traditional metal shell which surrounds the base of their tube. This change reduces the internal capacity of the tube and at the same time eliminates the losses from eddy currents in the metal shell itself. While the saving of power thus accomplished is quite small when expressed in figures, it becomes, of importance when compared with the minute currents received on the antenna.

Importance of Vacuum Tube Socket

Importance of Vacuum Tube Socket
Second only in importance to the
vacuum tube itself, is the tube socket, for
all the energy must pass through the
socket before it reaches the tube. Indications are that the metal shell socket will
soon become obsolete as the single slide
tuning coil. The best Radio engineering
practice of today calls for the elimination
of as much material as possible in the
neighborhood of the parts of the Radio
set which carry the Radio frequency current. This applies not only to metalia
substances, but to insulating materials
as well. The socket of the future will
undoubtedly consist merely of a comparatively thin shell of some high grade
insulating material, and a base only sufficiently large to accommodate the neces-

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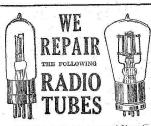
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No Noisy B Batteries
A further interesting fact that has been developed through research conducted by one of the largest battery manufacturers, is that the "hissing" and "frying" noises often attributed to B batteries are in reality caused by poor connections, usually between tube terminals and the socket contacts. Their research shows that there are no noisy B batteries.



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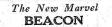
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To prevent such noises and the shortening of many otherwise good concerts there are manufacturers who have not only provided sockets with the high insulating properties, but have devised contacts that are of a wiping nature, with dependable tension for each and every type of tube. In certain instances they have also provided dual wipe contacts on both ends and sides of the tube terminals, eliminating all possibility of trouble from this score. It is interesting to realize that only a

an possibility or trouble from this score. It is interesting to realize that only a few years ago, we were thrilled at the thought of receiving broadcasting at distances of a few hundred miles, while today coast-to-coast reception is by no means uncommon. While a large part of this

Do not forget to solder every joint in the set and antenna, otherwise joints will corrode and will offer resistance to the very feeble currents which try to flow in the antenna.

There are 250,000 persons directly or indirectly connected with the Radio industry in the United States.



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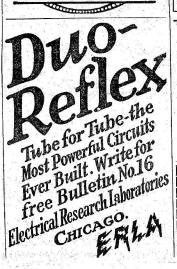
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Questions and Answers

(07100) SCM, Grayville, Al. We wish you would advise us on a case of malicious interference that we have been having here of late.

Some one here in town is hooking up a spark coil to his aerial and completely spoling all Radio reception while this is

This has happened twice in the last week. Will you inform us some way in which we can trace or detect from whose aerial this is coming? We have a suspicion of who is doing this, but off course cannot be sure of it. Can you advise us some test whereby we can trace this out and run down the offender?

In case we find out who is doing this, to whom should we report the case for action, and what would the penalty be?

A.—We are advising in your inquiry that the source of the interference to which you are subjected can be traced by

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Give your set a chance. Why choke it with an
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tion of transmitter of offending party.

Reception Trouble (06971) GEH, Kirkland Lake, Ont., Can. Have often wanted to ask for advice on trouble F have been having with my set, which is a single circuit WD-11 set, with a 2-stage Hamilton amplifier attached. My trouble has been this: At intervals

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means of a portable set and loop aerial, using the directional properties of loop to locate the position from which it emanates. This matter should be reported to the United States Radio Inspector, 575 Federal Building, Chicago.

The first penalty imposed for violation of regulations is a notice to desist, and a second notice will be followed by confiscation of transmitter of transmitter of the regulations and the second notice will be followed by confiscation of transmitter of offending party.

you advise?

I am in an apartment where the question of an aerial is a difficult one, having only room enough for a 50 foot single, wire about 30 feet high. I made a frame 6 by 3 and wound about 400 feet of annunciator wire around this, putting it in series with the outside aerial. This, I might say, gives excellent results.

A.—The action encountered in the oper-



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Storage Battery ... \$8.00

Stor

Storage Battery ..., \$8.00 [6 Volt. 100 Amps. 16.00 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. WORLD BATTERY CO.

WORLD BATTERY CO

B' Ballery
and Huckometer

60 E. Reservelt Road
Chicago, Ill.



ation of the receiver is undoubtedly due to the fact that some connection in the circuit has been disturbed and loosened. Hitting the table, as cited, jars it together temporarity until the current flowing through it will cause it to break. A review of connections is in order.

LONG-DISTANCE CRYSTALS Every one tested on stations from 300 to 1,000 miles away.

Those remarkable crystals give lond and clear reproduction without tubes or condensers. Send-fifty cents (30c) by check, stamps, coin or-money order, for three (3) Lour-Distance Crystals, with complete instructions and hook-ups.

Long-Distance Crystal Set—"The Little RED Set with the Long Range," only \$4.50, including Long-Distance Crystal.

LONG-DISTANCE CRYSTAL CO. 1951 Mears Avenue, Cincinnati, Ohio Desk 20

800 Miles with ROLL-O CRYSTAL ON A COMMON CRYSTAL SET



ROLL-O CRYSTAL CO. Desk 290, Mt. Washington, Cincinnati, O.

FAHNESTOCK'S

RADIO PRODUCTS



Improved Ground Clamp

Equipped with Fahnestock Pat-ent Wire Connec-tors Easily Attors I

No Soldering-For Radio Use Only

Our name stamped on all our products. Noue genuine without it. FAHNESTOCK ELECTRIC CO.

Long Island City, N. Y. Dealers can obtain Fahnestock Products from following distributors: NEW YORK Spartan Elect. Co. BOSTON

Spartan Elect. Co.

Working Co.
F. D. Pitts Co.
DETROIT
Detroit Electric Co.
CHIGAGO.
MICHARLERE
Julius Andrac & Sons Co.
PHILADELPHIA
H. C. Roberts Elec. Supply Co.
LITESPURC CO.
VIESTEREN DISTRIBUTIORS
Marshall & Co., Los Angeles, Cal.



Radiophone Broadcasting Stations

Corrected Every Week--Part I

AA3, Denver, Colo. 440 meters. Fitzsimmons Gen. Hospital. (Educational Dept. U. S. Armyl. Thurs, 7:30-8:39 pm. music, entertainment. Mountain. A66. Canton. 0. 425 meters. Heduts. 135th Field Arfillery O. N. 649 meters. 64b Inf. Minn. A77, St. Paul. Minn. 409 meters. 64b Inf. Minn. Coultain.

NRIL GURTH, O. Fast Fast Control, Control, AWG, D. McCook Field, U. S. Army. Experi-AWG, Del work only. BEI, Taccoma, Wash, 400 meters. 50 watts. Camp Lewis, U. S. Army, Third Signal Corp. Discontinued indefi-

D. S. Army, Third signal Corp. Discontinuous indeases of the Calculus and A50 meters. 650 walks, Calculus Health Daily ex Sun, 1 pm, 3:30-4;30. Times, Wed. Frf. Sat. 7:458-5485 Mon. Thurs. 9-10 pm; Frl. 11 pm, music, entertainment, news, market, weather. Dance or chestra Sun, 11 am, 7:30 pm, Church services. Mountain. 60 meters. Twonato Star. Daily ex Sun, 12 m, weather, news, stock; 5:30-6 pm, pm; 6:50-7 pm, church services.

GFGA, Toronto, Ott., Can. 100 meters. covolor of the control of th

6.35-11 µm, music. Sun, 9.15-10-45 µm, sucred music.

Föll V Mencouver, B. G., Can. 450 meters, 10 watts.

Radio Specialities, Ltd. Mon, Thure, Sat, 7:30-8 pm,

Music. Tues, 7:30-8 pm, children's evening. Wed,

4-5 pm. Music. Sun, 8:30-9:30 pm, classical music.

Föll R. Suddury, Ont. Cen. 410 meters. 200 watts.

Laurentida Air Serrice, Ltd. Diemeters. 200 watts.

Laurentida Air Serrice, Ltd. Diemeters. 500 watts.

Hadio Shop, Tues, Pri, 8:30-9:50 pm. Eastern.

Föll, Namimo, B. C., Can. 450 meters. 10 watts.

Föll R. Sun, 11:30 pm, 70-9-8 pm, watts. The

Bictric Shop, Ltd. Slogan, "The Bith City of the

West Where No. 1 Notthern Hard Wheat Grown."

Dally ex Sun, 11:33 pm, 70-9-9 pm, news, reports,

markets, entertainment. Sun, 9-9-345 pm, church

gerices. Mountain. Sun, 9-9-345 pm, church

gerices. Mountain.

Grid, Montreal, P. Q., Can. 450 meters. 10 watts.

Radio Engineers. Sca., 40-9 meters. Univ. of

GHBC, Claigray, Alter, Can. 450 meters. White
GHBC, Claigray, Alter, Can. 450 meters. Devatic,

Radio Engineers. Sca., 40-9 meters.

GHBC, Claigray, Alter, Can. 450 meters. Devatic,

Radio Engineers. Sca., 40-9 meters. Canadian Wire
less and Electric Co. Mon., 130-9 pm, news, solor

GHCD, Quebe, Que. Can. 410 meters. Canadian Wire
less and Electric Co. 20 meters. 10 meters.

OHOC, Service, Gue. Can. 410 meters. Canadian Wire
less and Electric Co. 20 meters. 10 meters.

Western Canada Radio Suppl. Ltd. Slogan. "The

Western Canada Radio Suppl. Ltd. Slogan."

The Vancouver, Economic Econ.

GHO, Calexy, Alta., Can. 440 meters. 2000 watts.

Riley & McCamick Ltd. Thurs, 7:30-8:30 pm.

GHYG, Montreal. Que., Can. 310 and 400 meters.

Western Canada Radio Suppl. Ltd. Slogan. "The

Workern Canada Radio Suppl. Ltd. Slogan."

The Vancouver, Econ. Ltd. Thurs, 7:30-8:30 pm.

GHYG, Montreal. Que., Can. 310 meters. Con. watts.

GHYG, Montreal. Que., Can. 310 meters. 500 watts.

Radio Contreal Radio Suppl. Ltd. Slogan. "The

Sol Watts. Montreal. Que., Can. 310 meters. Sol watts.

GHYG, Montreal. Que., Can. 340 meters. S Fastern. CFGQ, Vancouver, B. C. Can. 450 meters, 10 watts. Radio Specialites, Ltd. Mon, Thurs, Sat, 7:30-8 pm. Music, Tues, 7:30-8 pm. fulldren's evening. Wed. 4-5 pm. Music. Sun, 8:30-9:30 pm. classical music. Partic.

GHYC, Montreal, Que., Can. 341 meters, 300 Watts. Northern Bisc. Co. Wed, 5:30 pm, Sun, 7 pm. East-Northern Bisc. Co. Wed, 5:30 pm, Sun, 7 pm. East-Northern Gournal, Ldd. Slogan, "The Sumilest Spot III Sunday Sun

Easiern.
C18G. Toronto. Ont., Can. 430 meters. The Evening C18G. Toronto. Ont., Can. 430 meters. L206 watts. C18G. Account. C1

enfortalmment. Sun, 7-8 pm, church services. Easteft, Winnings, Man. Can. 450 nattern, 2,060 yatts.
Alantiola Zuspanen. Baily ex Sun, 12:30-130 pm,
Baily experiments, 400 pm,
Baily experiments, 70 pm, church story; 8:29-10,
Busen, Tono. Tues, Sal, 7:30-9 pm, Thurs, 8-10 pm,
Councut, Mexican time.
Solo meters. 510 watts. La
CYX. Mexico City, Mexico. 500 watts, ExcelsiorParker.

CYI. Maxico City, and Control Control

Southern Elec. Co. Slogan, "At the End of the Trail," Daily ex Sun, 1:30-2:30 pm, 6:00-6:45. Wed, 5:00-1:00 pm, Sun, 1:00-1:130 am, Facilic. Agri. College. Mon, 8:3 pm. Thurs, 5-9 pm. Facilic. State, 5:00-1:00 pm, Sun, 1:00-1:130 am, Facilic. Agri. College. Mon, 8:3 pm. Thurs, 5-9 pm. Facilic. Newblouse Hotel. Slogan, "Better Radio." Daily ex Sun, 6:30-8 pm, news, music, entor-tamment. Mountain, Newblows Photel. Slogan, "Better Radio." Daily ex Sun, 6:30-8 pm, news, music, entor-tamment. Mountain, Saroy Thatester, Mon, Wed, Fil, 8-10 pm, music, entor-tamment. Pacific. Saroy Thatester, Mon, Wed, Fil, 8-10 pm, music, entor-tamment. Pacific. State of the Mountain of the Mountain music, entor-tamment. Pacific. State of the Mountain of the Mountain music, entor-tamment. Pacific. State of the Mountain of the Mountain music, entor-tamment. Pacific. State of the Mountain of the Mountain music, entor-tamment. Mountain music, entor

Mountain. KFAJ, Boulder, Colo. 360 meters. 100 watts. Univ. of

breen & Sunsan Tand of a Milnon Sunsan Constitution ("Land of a Milnon Sunsan Constitution of the Constitu First Baptis Chircus. Sun, 1 and 10 water S. D. State College of Agril. & Mech. Arts. Tues. 11 am. State College of Agril. & Mech. Arts. Tues. 11 am. Central Chira. Sun. Masc. tectures. Central KPDZ. Minneapolis. Minn. 231 meters. 5 watts. Harty O. Iverson. Sun, 6-7 pm, pipe organ. Central

KFÖL, Münnenpolis, Münn. 231 meters. 5 watts. Harry O. Iresson. Sin, 6-7 pm, pipe organ. Central, Cent

Statu. Daily, 5-15-5-45 pm, Tues, 9-10 pm. Central KFIF, Portland Oro. 560 meters, 260 watts. Benson Feed. Sunderly KFIF, 280 meters, 250 watts. Benson Feed. Sunderly KFIF, 280 meters, 29 wests. Windseh Elec. Farm Equip. Co. Wed., Sat, 8-10-30 pm. Sun, 11-12 m. church services. Central. KFIO, Spokane, Wash. 52 meters, 50 watts. North KFIO, Spokane, Wash. 52 meters, 50 watts. North KFIO, Takima, Wash. 24 meters, 50 watts. Valvina Valley Broadcasting Assn. Slogan, The Station That Will Make 242 Firmur. Mon. Wed. Fri, 730-330 pm. music. Pendic. See meters, 10 watts. Alsaka Elec. Light & Power Co. Mon. Wed, Fri, 8-p pm. Albaka, 264 meters, 10 watts. Albaka Elec. Light & Power Co. Mon. Wed, Fri, 8-p pm. Albaka, 240 waters, 250 watts.

KFU, Juneau, Alaska. 226 meters. 10 watts. Alaska Elec. Light & Power Co. Mon, Wed, Fri, Se Dm. Elec. Light & Power Co. Mon, Wed, Fri, Se Dm. Elec. Light & Power Co. Mon, Wed, Fri, Se Dm. Kristan.

KFM. State Co. State Day Saints. Tues, Thurs, 9 pm. Sun, 11 am, 7:30 pm. Commonwealth and Occar A. Hucisman. Daily ex Sun, 5 pm. music news, markets, weather. Central Co. State Day Commonwealth and Occar A. Hucisman. Daily ex Sun, 5 pm. music news, markets, weather. Central Co. State Day Commonwealth and Occar A. Hucisman. Daily ex Sun, 5 pm. music news, markets, weather. Central Co. State Day Commonwealth and Central Co. State Day Commonwealth and Liberty Therester. Daily ex Sun, 3 pm. concert. Commonwealth and Liberty Therester. Day or watts. E. E. Marsh and Liberty Therester. Daily ex Sun, 350-7:30 pm.

RF11, Astoria, Ore. 222 meters. 10 watts. E. E. March and Liberty Theater. Daily ex Sun, 6:30-7:30 pm. Radio & Eloc. Co. Daily ex Sun, 6:30-7:30 pm. Radio & Eloc. Co. Daily ex Sun, 6:30-7:30 pm. hundred & Eloc. Co. Daily ex Sun, 3-4 pm. music. Radio & Eloc. Co. Daily ex Sun, 3-4 pm. music. Radio & Eloc. Co. Daily ex Sun, 3-4 pm. music. Full. Rev. Co. Daily ex Sun, 3-4 pm. music. Rev. Co. Daily ex Sun, 3-4 pm. music. Sun, 7:30 pm. church errices. Central. 242 meters. 10 watts. Hardsoog Mfg. Co. Club. "Boiled Bugs." Mont. Wed. Ft. 7:30-8:30 pm. Central. D. 280 meters. 100 watts. KF10. Grand Forks. N. D. 280 meters. 100 watts. KF10. Grand Forks. N. D. 280 meters. 5 watts. Vallov Radio Div. of Eloc. Constr. Co. watts. Ashlov. Cr. Club. "Boiled Bugs." Mont. Wed. Ft. 100 Kr10. Grand Forks. N. D. 280 meters. 5 watts. Vallov Radio Div. of Eloc. Constr. Co. watts. Ashlov. Cr. Club. "Boiled Forks." In 1234 meters. 100 watts. Thomas H. Eloc. Constr. Co. watts. Ashlov. Cr. Club. Thomas H. Co. March. Co. Watts. Low. Cr. Club. Thomas H. Co. March. Co. Watts. Low. Cr. Club. Thomas H. Co. Watts. Co. Watts. Low. Cr. Club. Co. Watts. Co. Watts. Co. Watts. Co. Watts. Co. Watts. Co. Watts. Co. Club. Co. Watts. Co. Watts. Co. Watts. Co. Watts. Co. Club. Co. Watts. Co. Watts. Co. Watts. Co. Watts. Co. Club. Co. Watts. Co. Watts. Co. Watts. Co. Watts. Co. Club. Co. Watts. Co.

Monk, Jr. KFNF, Shenandoah, Ia. 266 meters. 500 watts. Henry Field Seed Co. Slogan, "A Friendly Station in a Friendly Town." Dally ex Sun, 12:30-12:35 pm, Wed, Sat, 7:30-9 pm, concert. Sun, 0:30-7:30 pm, sacred song service. Central (NOTE-The second part of the station data list will appear next week.)

CHALLENGE!

NE DOLLAR will be paid to the Radiophan submitting the most errors in any most station's listing. Letters must reach Radio Digest office not later than one week from date of issue corrected. Readers are not limited to correcting one station. Turn in corrections for as many stations as you can find—if you can find errors! In case of tie, duplicate awards will be made. Use separate sheets of paper for each station submitted and place name and address on each sheet.

That's just how sure Radio

each sheet.

That's just how sure Radio Digest is that this Radiophone station directory is correct! To make the challenge fair for everyone, broadcasting stations and their employes are barred from this offer. Why? Because the broadcasters are the source of all the data given herein They are (or should be) interpulry sent them every the data on their station appears. This inquiry contains a proof of their last listing and must either be corrected or oked as correct and returned to the Digest. Never-

theless, sometimes the stations are careless and mistakes are made. But Radio Digest is so sure of the exactness of this directory that this challenge is made unconditionally.

with reference to the directory it appears in four parts, serially continuously; the first three parts are station data list-ings, arranged alphabetically; the fourth part is a state, clip index of stations. The information contained in each station data listing is given in the following order: Call letters, city, state, wave length used, watts antenna input, owner's name, slogan used if any, name of listener in "club," schedule of operating hours, and kind of time used, as "Central," "Mountain," etc.

etc.
Four successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable. This service is original with this publication, and has been maintained from the start. Right of reproduction without permission of any or all of the data contained herein is denied.

Colo. Tuez, Thurs, Sat, 9 pm, time, music, addresses by faculty. Sat, 2:30-5 pm, football. Mountain KFAN. Moscow, ida. 366 meters. 50 watts. The Electric Shop. KFAR, Hollywood, Calif. 280 meters. 100 watts. Stu-dio Lighting Service Co.

KFAN, Moscow, Ida. 369 meters, 50 watts. The Electric Shop.
KFAR, Moscow, Ida. 369 meters, 100 watts. StuKFAR, Daviewook Calif. 380 meters, 100 watts. StuKFAU, Dolise, Ida. 270 meters, 150 watts. Bolsa H. St.
Dalty ex Sat, Sun, 3:30-4.15 mm, markets, weather, noww. Mon, Wed, Fri, 8-9 pm, concect. Mountain,
KFAW, Santia Ara, Calif. 280 meters, 10 weatts, Rudel,
Mon, Thurs, 6:30-7:30 mm, concert. Paufille.
KFAY, Medford, Ore. 283 meters, 50 watts. W. J.
Virgin. Temporarily discontinued.
KFAY, Medford, Ore. 283 meters, 50 watts. W. J.
KFBC, San Deleco, Calif. 275 meters, 20 watts. W. K.
Azbilli. Thurs, Sun, 8-9 pm, Bible lesson, sermon.
Fredie.

KFBS, A. Digeominate. 978 metup. 1878 metu

Presistretian Church, Sun, 11 aur. 100 valts, Kim-Pacific, Secrement, Calif. 253 meters, 100 valts, Kim-ball-Unson Co. Storm, Heart of California. Daily second control of California. Daily components of the California of California of California um, concert. Pacific, Second California of California of California (FBL, Errert, Wash. 224 meters, 10 waits, Lesses Bros. Daily ex Sun. 7:15-8:15 pm. Sun. 2-3 pm. Pacific.

Bros. Dally ex Sun. 7:15-8:10 pm.
Padific.
KFBS, Trinidad, Colo. 360 meters. 10 watts. Chronicle
Nows & Gas & Elec. Supply Co. Mon. 8-10 pm.

KFBS. Trindad. Colo. 360 meters. 10 watts. Chrontele News & Gas & Elec. Supply Co. Mon, 8-10 pm. Mountain.

Mountain. When the second of the s

Flygars.
KFCV, Houston, Tex. 360 meters. 10 watts. Fred
Mahaffey, Jr. Dally ex Sun. 7:30-8 pm, markets, entertainment. Sun. 2-3 pm, entertainment.

KFFB, Bolse, Ida. 240 meters. 10 watts. Jenkins Furn.
Co. (Owyhee Hotel). Tues, Thurs, Sat, 8-10 pm,
concert. Hacific.
Ore, 380 meters. 10 watts. Eastern.
Ore, Badio Co. Daily 8:30-9:35 pm, music. Pacific.
KFFO, Hillsboro, Ore. 220 meters. 5 watts. Dr.
EH. Switth. Daily, 6-7 pm, music, sports, news.
Fill. Switth. Daily, 6-7 pm, music, sports, news.
First. Switth. Daily, 7-8 pm, 6-8 pm, special program. Mountain.
KFFR, Sparks, New, 226 meters. 100 watts. Jim Kirk, Thurs, 7-8 pm, "Sagebraik Changies," Pacific.
KFFM, Lamoni, 10wk, 309 meters, 100 watts. Green, 100 pm, religious services. Central.
KFFY, Mountain, 5-5 pm, Central.
KFFY, Alexandria, La. 275 meters, 100 watts. Al. Gr.
KFGC, Baton Rouge, La. 254 meters, 100 watts.
Louisians, State University, Fri. 8-9 pm, Central.
Louisians, State University, Fri. 8-9 pm, Central.
Louisians, State University, Fri. 8-9 pm, Central.
Co. Tues, Thurs, Sat, 8 pm, music, lectures. Word, 10 sm, chaple service; 11 pm, special jazz program. Central.
Leiand Stanford Univ., Calif. 330 meters, 500 watts.
Leiand Stanford Univ. Fathers, 5 watts. Avining-from Carraer, Fri. 8-500 pm. Teathers.

Central.

(FGH. Sanford Univ. Calif. 380 meters. 500 watts.
Land Stanford Junior University. No regular sched.

KFGL. Arlington. Ore. 234 meters. 5 watts. Arlington Grange. Ftl. 7:30-8:30 pm. Pacific.

KFGL. Arlington. Ore. 234 meters. 10 watts. Crary Hardware Cla.

239 meters. 10 watts. Crary Hardware Cla.

129 meters. 10 watts. Crary Hardware Cla.

120 meters. 10 watts. First Presbyterian Church. Sun, 11 am, 7:30 pm, church sorvices. Contral.

120 meters. 10 meters. 10 watts. First Presbyterian Church. Sun, 11 am, 7:30 pm, church sorvices. Contral.

121 meters. 120 meters. 120 watts. First Prasbyterian Church. Sun, 11 am, 7:30 pm, church sorvices. Contral.

122 meters. 120 meters. 120 watts. First Prasbyterian Church. Sun, 11 am, 7:30 pm, church sorvices. Contral.

123 Mich. 293 meters. 120 watts. 120 meters. 120 watts. 120 meters. 120 watts. 120 meters. 120 meters. 120 methers. 120 methers. 120 methers. 120 methers. 120 watts. 120 methers. 120 watts. 120 methers. 120 watts. 120 meters. 120 wat

Fallon & Co. Wed, Thurs, Fri, Sat, 6-6:45 pm; Wed,





