

Reflex, Ultra Reinartz, Flewelling—This Issue

Radio Digest

EVERY
WEEK

Illustrated

TEN
CENTS

REG. U. S. PAT. OFF.

Vol. IV

Copyright, 1923
R. D. P. Co. Inc.

CHICAGO, ILL., SATURDAY, MARCH 31, 1923

No. 12

UNCLE SAM OWNS AIR

WILL SETTLE WAVELENGTH SAYS HOOVER

Harold T. Powers Suggests
Elimination of All
Spark Sets

Receivers to Be Cheaper

Squier Says Give Broadcasters War
Department's Wave
Lengths

BULLETIN

By E. E. Plummer

WASHINGTON.—On Wednesday, March 21, the public hearing of the Radio Wave Length Conference was closed and the Hoover Committee went into an executive session to promulgate recommendations of changes to be made until adequate legislation can be passed.

At the hearings Wednesday, J. C. Rosenthal, of New York, representing the music publishers and authors threw a bombshell into the meeting by announcing that all broadcasting stations would be asked to make payment on copyrighted material used and if refused the matter would be taken into the courts.

WASHINGTON.—When the senate failed the American public in an emergency it automatically forced 1923 development under 1912 conditions. The only source of cheer to the Radio public then lay in the conference of representatives of the Radio industry which opened in Washington March 20.

In the opening address of the conference, Secretary of Commerce Hoover, chairman, said, as Congress had failed to bring about any step of progress that it was almost necessary and the government probably would give the broadcasters a wave band of six hundred to sixteen hundred meters.

Ether Is Government Property

Following Hoover's talk a survey of Radio inspectors and complete report of the Radio field was read. Following this all members of the conference were heard in turn. Each signified his willingness and hearty co-operation to make the old law do. Major General Squier said broadcasters could have the war department wave bands if needed, as wars do not happen daily. Hiram B. Maxim asserted it was necessary

(Continued on page 2)



Photo by White

Photo by Bachrac

R. C. A. OFFERS AID TO INVESTIGATE TRUSTS

Preliminary Arrangements for
Commission's Probe Nearing
Completion

WASHINGTON, D. C.—Officials of the Federal Trade Commission in charge of the Radio investigation under the Congressional resolution state that preliminary arrangements are being worked out. It is not believed at the present time that any hearings will be held and it is probable that only two or three experts will work on the investigation. It is understood that the Radio Corporation of America has offered to co-operate with the commission in any way in which it can.

France Handles Letters as Deferred Message Traffic

WASHINGTON, D. C.—A Radio letter service has been put into effect in France, by which letters mailed in that country and received at the Radio station are transmitted as deferred traffic after the clearance of all other messages. On arrival in the destined country they will be mailed to the addressee. The messages must be written in plain language of either the country of origin or the country of destination and must contain at least 20 words. The French Government accepts no responsibility for delays in transmission occurring in the mails of the countries concerned in the Radio letter service.

CALIFORNIA CHURCH WILL TEACH RADIO

EL CAJON, CAL.—This city has a community church that has come to the conclusion that Radio is the great thing of the day. The church, therefore, has installed a complete Radio equipment in a tower room and has invited those who are interested in the use and development of Radio to join a class for instruction. A licensed Radio operator is in charge.

ASSISTANT INSPECTOR VISITS DISTRICT EIGHT

SPRINGFIELD, O.—Following the report of several complaints in this section, A. G. Parkhurst, assistant Radio inspector for the eighth district, traveling out of Detroit, visited this city. He inspected several Radio stations about which there had been some complaint and will make his report within a short time.

The first trans-Atlantic test of Radio telephony by WJZ was enhanced by "The Original Radio Girl," Miss Vaughn De Leath. (She appears in the circle to the right.) In "The Laughing Lady," recently broadcast by WJZ, Ethel Barrymore (above) plays the star role

U. S. STATION HEARD ALL OVER ENGLAND

ONE MAIL BRINGS FORTY-TWO LETTERS

British Fans Acknowledge Reception of Special Program Broadcast by WOR

NEWARK, N. J.—The remarkable ease with which British Radiophans receive the broadcasting stations in this country during periods when their own local stations are shut down was emphasized by the recent test made by station WOR, at Newark, N. J., in giving a special mid-night program. In a single mail last week the operators of the station received forty-two letters from fans scattered all over England.

Incidentally, the test shows how thoroughly the British public have gone in for Radio, because in order to hear the program they all had to stay up until 5 o'clock in the morning. Even the most "died-in-the-wool" distance bug in this country would scarcely stay up that late for a record.

Gets Humorous Letters

By a strange coincidence, the fan who reported receiving WOR on a loud speaker was N. G. Baguley, of 23 The Park, Newark, England. He wrote a lengthy letter describing his set, which consisted of three stages of Radio-frequency amplification, a detector and two stages of audio.

All of the letters emphasized the clarity of the announcers voice—J. E. K., who in private life is Miss J. E. Koewig. In this respect some of the letters were really funny. One from a fan in Woking, just outside of London, wrote: "Dear Sirs (and Madame your Mistress of Ceremonies whose clarity of speech is wonderful)." Another from Margate was addressed to "The Lady Announcer of WOR."

The letters give an insight to the transmission of the new broadcast stations in England, as all of them were unanimous in declaring that the modulation of all the American stations heard by them was far superior to the local stations.

WEIRD SIGNALS SAID TO COME FROM MARS

French War Ministry Conducts Investigation of Mysterious Noises

PARIS.—The war ministry is investigating mysterious Radio signals heard March 19, which some Radio experts suggest came from Mars.

The Eiffel tower, which is the most powerful station in the vicinity, did not utter the peculiar noises and no other French station emitted them, it is said.

Astronomers say they do not believe another planet was signaling the earth, but they professed ignorance of the origin of the weird Radio noises. Experts agree that it was not static.

U. S. OWNS ETHER

(Continued from page 1) that the broadcasters learn co-operation as have the amateurs, and this was something lacking by a majority of the plants today. W. A. Wheeler, of the Department of Agriculture, said he thought the agriculture department of second importance only to mobile forces, after Hoover had advanced a new theory that the ether was government property.

Sets Will Be Cheaper

Major Armstrong expressed himself as a believer that Radio sets would be at a minimum in price to everyone within a year, so increasing the listeners in of the broadcasting stations. He urged that the wave lengths be regulated as speedily as possible. L. E. Whittemore, of the Bureau of Navigation, coincided with Mr. Armstrong in his views and said he believed the summer months would not experience the slump in Radio interest as was shown last year. C. Francis Jenkins, inventor of Radio pictures, asked consideration of the conference for his new device when fixing the wave lengths.

A suggestion for the elimination of all spark transmitters was presented by Harold J. Powers of the Amrad. However, this issue was greeted as impracticable by quite a number of the conferees.

Wave Length Big Issue

The prime questions of the conference are understood to be the re-distribution of wave lengths and elimination of interference, especially in the interest of broadcasters and Radio receiving set owners. A new survey of the wave bands assigned tentatively last year to different services by the committee will be made with regard to any vital changes which may have taken place during the last twelve month.

Secretary Hoover is anxious to aid every service without handicapping any, particularly the mobile services such as ships and planes. There are a number of wave bands which it is hoped can be reassigned or transferred so as to improve general conditions.

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

Table with columns: Station and City, Met., Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday. Lists various stations like CFCN, CKAC, KDKA, etc. with their respective broadcast times.

(Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific time, subtract two hours. Thus the use is very simple.)

CONTENTS

Radio Digest, Illustrated, Volume 4, Number 12, published Chicago, Illinois, March 31, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rate, yearly, Five Dollars; Foreign, Six Dollars; single copies, Ten Cents. Entered as second-class matter April 27, 1922, at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

Table listing contents: "All the Live News of Radio", "An Evening at Home with the Listener In", "The Chic Radio-Hat Girl", "The Cave Man Radiophan", "The 'How' of the Simplified Super Circuit", etc.

Looking Ahead

The First Prize Flewelling Set, designed and made by Mr. Lawrence M. Blakely, student at Georgia Institute of Technology, Atlanta, Ga., will appear in the next issue of the Digest. Blakely's design showed such dexterous workmanship and complete understanding of the "Flivver" that the judges were sold on it at first sight. This appears in the April 7th issue. Don't miss it.

The Q and A Page will be devoted to questions and answers on the Reflex circuit. Every day the Digest's mail is flooded with requests for information on the recently popular hook-up. As a result we have decided to turn over the entire Q and A department to the Reflex April 7. Get a copy.

The Announcers Series will be continued in the next issue. This time we will not tell you who they are until the April 7th number appears. Who do you think they are? Maybe it's the announcer from your favorite plant. Better see.

Part II of Broadcasting Station Schedule appears in the Digest next week. Three issues of the Digest gives you the only popular directory published.

E. T. Flewelling will continue his exclusive series of articles on the "Flivver" circuit set. If you are a flivver owner or contemplate building one, don't miss a single article of Flewelling's. Reserve your copy of April 7th at your newsstand.

The Radio Conference was covered in person by E. E. Plummer, of the Digest staff. Mr. Plummer was in Washington and together with the regular correspondent at the Capital, L. M. Lamm, will give you all the latest news in the April 7th issue on the new Hoover regulations. You'll want to know.

A-B-C Lessons for Radio Beginners, Chapter Fourteen to appear next week will in no way fail to keep up the high standard Arthur G. Mohaup has attained. Turn to page 11, this issue, and read chapter thirteen.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Form for sending in a blank today, including fields for Name, Address, City, State, and a note about enclosed check M. O. for Five Dollars.

RADIO BARGAINS NATIONAL AIRPHONE

The most practical Radio Set ever made, complete in every detail and most efficient. Endorsed by leading engineers as the best ever seen or heard. Complete with two interchangeable Inductance Coils ranging from 150 to 2700 meters. Regular price \$12.50. Special \$7.35

- 43-Plate Vernier Condenser, \$3.65
43-Plate Variable Condenser, \$1.75
23-Plate Vernier Condenser, \$3.00
23-Plate Variable Condenser, \$1.55
11-Plate Vernier Condenser, \$2.75
11-Plate Variable Condenser, \$1.25

We carry a complete line of De Forest sets and parts
ATLAS CUT RATE RADIO SHOP
345 S. Clark St., Chicago, Ill.
Mail Orders Promptly Filled

Seyferlich's

Panel Labeling Outfit and Soldering Iron enables anyone to mark his own Radio Panels. Duplicates the work of an expensive engraving machine and permits the Radio constructor to brand his trademark or name on the panel. Complete set of nine separate words with holder and Cutler-Hammer Radio Soldering Iron. \$25.00



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RADIO At Cut Prices

Standard parts only in original packing. Sold on a "money-back" basis. Reference: RADIO DIGEST

- PHONES: Modell's Special, 2200 ohm, \$3.45; \$ 8.00 Brande Superior, 5.95; 12.00 Nathaniel Baldwin Type C, Double, 8.95; 6.00 Nathaniel Baldwin Type C, Single, 4.50
TUBES: 1 1/2 Volt Mercury Tubes, \$4.95; U. V. 201, 5.50; Imported Peanut Tube, 2.00
CABINETS: Made in our factory; 7" x 10", \$1.45; 7" x 18", 2.15; 7" x 24", 2.95
MISCELLANEOUS: \$5.50 Coto Coil Transformer, \$3.95; 8.00 Dayton Variometer, 5.45; 8.00 Dayton Varicoupler, 5.45; DURATEK Permanent Crystal Detector, 2.00; W.D.-11 Adapter, .65; 1.50 Lightning Arrestor, Indoor and Outdoor Type, .85; Ammeter for Testing "V" Batteries, .49; \$5.00 43-Plate Condenser, 1.95; 2-inch Bakelite Dials, .25; 4-inch Electro Dials, .75; 3-inch Bakelite Dials, .35; W.D.-12 Transformer for W.D.-11 Tube, 4.65; \$1.00 Freshman Variable Grid Leak and Condenser Combined, .75; \$ 8.00 Genuine All-Wave Coupler, 6.95; 10.00-3000 Meter Coupler, 4.95; 18.50 Homcharger DeLuxe, 13.95; 1.00 Bakelite Socket, .50; 20.00 Dictograph Loud Speaker, 13.95; Bristol Loud Speaker, 22.50
SETS: \$12.00 Radiola R. C. Set, \$7.50; Little Gem Crystal Set, 8.50; 25.00 Aerex Crystal Set, 9.95; 35.00 DeForest Tube Set, 18.50

WHEN ORDERING BY MAIL Add Postage by the Following Scale

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Money Order or Personal Check Accepted
Modell's ESTABLISHED 1888
RADIO STORES
Dept. F. 5, 191 Fulton Street, N.Y.C.

NORWEGIAN PLANTS TO BE ALL NORSE

BROADCASTERS WILL RECEIVE LIST OF OWNERS

Telegraph Administration Will Provide Operating Personnel and Cost of Maintenance

WASHINGTON, D. C.—The Norwegian Telegraph Administration has recently made public a memorandum intended to form the basis for negotiations with foreign companies applying for broadcasting licenses in Norway, according to a report received by the Department of Commerce from the American Vice Consul at Christiania. The principal provisions of this memorandum are as follows:

The company to which a license for broadcasting is to be issued must be a stock company in which only Norwegian capital is represented and in which Norwegian Radio manufacturers, Norwegian press, and local amusement syndicates must have an interest. Material to be broadcast will be limited to entertainment, general information, and news. All Norwegian firms interested in any way in the manufacture of Radio receiving apparatus, and all press associations, whether agencies, bureaus, or newspapers, shall be invited to subscribe for stock in the company.

Administration Bears Expense

The Telegraph Administration will place the use of the Christiania Radio station at the disposal of the broadcasting company for experimental purposes and for the erection of any apparatus needed for broadcasting. This additional apparatus must be supplied by the company at its own expense. The Telegraph Administration will provide the operating personnel and bear the cost of maintenance, including the power required. To cover the cost of overhead and operating expenditures, the company will pay the Telegraph Administration a fixed monthly sum to be agreed upon.

Broadcasting from the Christiania Radio station is to be limited to a few hours in the evening. At all other times the Telegraph Administration is to have exclusive use of the station. All material to be broadcast must be censored and edited by the Telegraph Administration or by any other government agency which it may designate. The term of the concession or franchise will be limited to two years pending future legislation.

Can Not Monopolize

Licenses for receiving apparatus are to be sold or rented only to persons who have secured licenses from the Telegraph Administration. The broadcasting company is to furnish each owner or renter of such apparatus with a catalogue containing the names and addresses of all owners or renters. Furthermore, licenses for receiving apparatus will be issued only to those possessing apparatus of Norwegian manufacture, approved by the Telegraph Administration and bearing its seal and registered.

The company is not to have a monopoly in the manufacture of receiving apparatus, but may require a remuneration for broadcasting, the amount of which is to be approved by the Telegraph Administration. Foreign manufacturers shall have the right to make an agreement on reasonable conditions with the broadcasting company. The company shall pay a definite fee to the Telegraph Administration for every receiving set sold or rented.

Convict Has Receiver in Ohio State Penitentiary

COLUMBUS, O.—The most rabid Radiophan in this section has been found. He is Erwin F. Kumler, an inmate of the Ohio penitentiary serving from three to five years for automobile stealing. He was returned recently to Cleveland to testify at the trial of his alleged partner and was given permission to return to his cell with his Radio outfit by Warden P. E. Thomas.

Kumler brought the set back from his trip and has installed it in the pen. The concert hours have been set from 6 to 7 p. m., and a loud speaker will be used. After these hours, Kumler will be allowed to continue his listening in with an individual headset.

Niagara Falls Fans Band to Combat Interferences

NIAGARA FALLS, N. Y.—To combat the evils of nightly disturbances by amateur Radio senders who disregard all rules of the air, about 100 of the Niagara Falls fans have organized a Radio Association. Efforts are being made to bring membership up to 300. The association has entered complaint regarding unwarranted disturbances to the Radio inspector for the district. There are approximately 1500 fans in Niagara Falls.

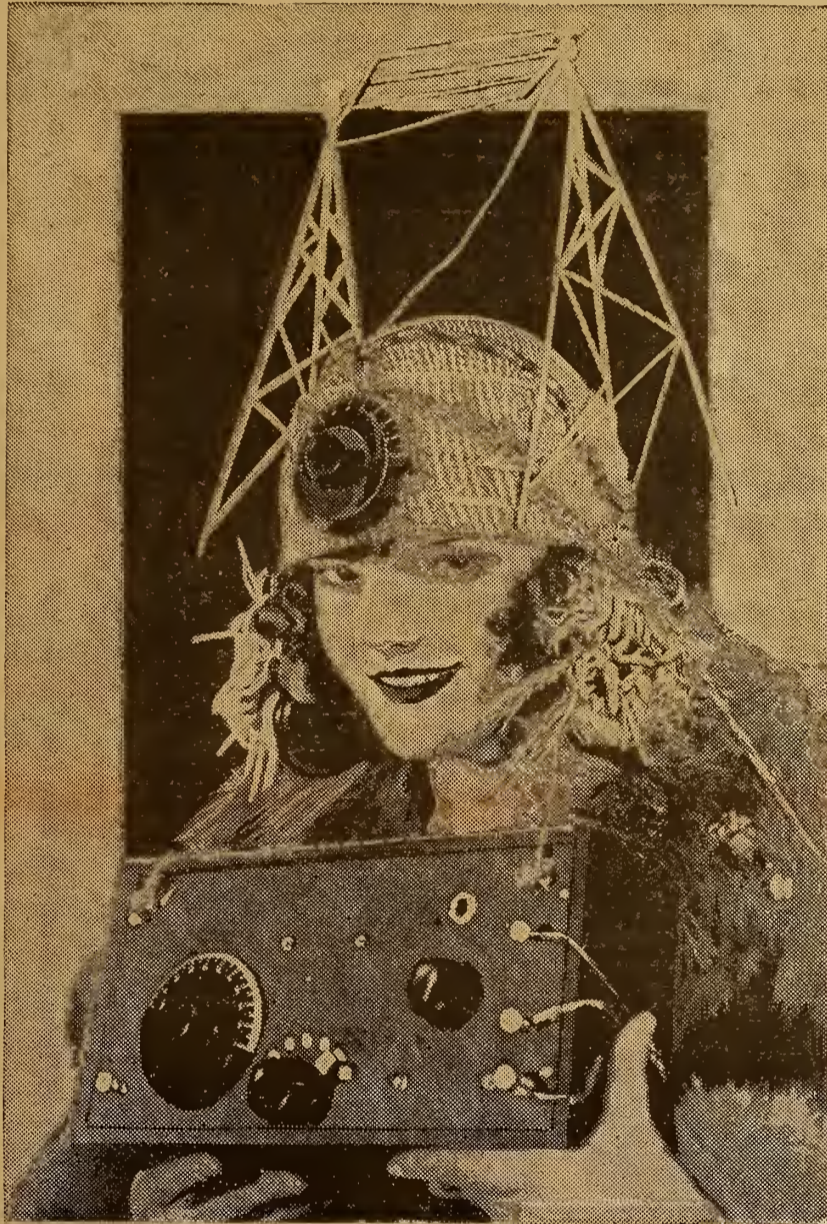
USE RADIO TO SELL NEW YORK BUILDING

NEW YORK.—A \$1,200,000 real estate deal was completed by Radio today, after E. Clifford Potter, cruising in the Mediterranean aboard the Adriatic, had "sat in" with his colleagues in discussions of the deal in this city. By the long distance Radio transaction, the seven-story building at Broadway and 39th street was sold to the Amri Realty Company.

BOSTON DX AMATEUR HEARS KDYX-HAWAII

EMORY J. PRISTAS, 62 Bromfield Road, West Somerville (Boston), Mass., picked up Honolulu on the evening of January 7, at 12:15 E. S. T. He heard snatches of a violin solo. He wrote Station KDYX, Honolulu, Hawaii, for confirmation, and after several weeks of waiting, received verification. Honolulu is over 5,100 miles from Boston. This is believed to be a DX record.

THE CHIC RADIO-HAT GIRL



"Something always new," is the spirit of the eternal feminine. Perhaps it is just to keep a step ahead of the opposite sex. But you must admit the Radio Hat is NEW. The petite Miss above exhibited the novel head gear at a recent millinery show and came away with first prize. The best part about it is that it actually works and one can receive messages over it for some distance. This fact was proved by bringing in stations 1,000 miles away

PLAN TO AIRPHONE NEWS TO VETERANS

Commander Personally to Address 50,000 Legionnaires Over Ether

BOSTON, MASS.—Plans are being perfected by State Commander William H. Doyle of the American Legion to have broadcasted all legislation and Legion business of interest to Massachusetts World War veterans, as a means of personally reaching thousands of Legionnaires in their homes and Legion posts throughout the state. The innovation has been approved by National headquarters, and steps have been taken by the latter to have broadcasted weekly Legion news of importance throughout the country.

According to plans now being completed, a special entertainment under the direction of State Legion officials from some central broadcasting station, and arrangements are being made for the placing of a receiving set in every post in the state. Commander Doyle will address the 50,000 or more Legionnaires in this manner, and a synopsis of legislation affecting Legion members will also be given. Weekly concerts for the benefit of disabled veterans in Bay State hospitals is part of the plan also.

FIRE STOPS PLANT IN MIDST OF BROADCAST

WEAN Will Be Off Air Pending Repairs

PROVIDENCE, R. I.—A fire that recently caused a damage of \$1,500,000 in the Shepard Stores here, run by the same management as the Shepard Stores of Boston, burned out the Shepard broadcasting station, WEAN, in the store.

About twenty persons were gathered in the Radio room, listening to a concert that was in progress from the broadcasting department, when the fire started. Immediately the announcer gave out word that there was a fire in the store and that the program would have to be stopped. Before firemen got the blaze under control, it having started a second time when they were about ready to leave, three floors were burned out, with the enormously valuable stock of merchandise, with the damage estimated at over a million.

A hundred lines of hose from surrounding cities and towns poured tons of water into the fourth, fifth and sixth floors for hours before any impression was made. At times it seemed as though half the business section around was doomed. Until repairs are made to the building, the broadcasting station will be out of commission.

"DAUGHTERS OF THE SEA" PHONE CHEER

SEATTLE ORGANIZATION TO LOOK AFTER SAILORS

A Powerful Transmitting Plant Will Give Messages of Courage to Those in Danger

SEATTLE, WASH.—For the purpose of making more comfortable and pleasant the hours spent in their home ports by the masters, mates and pilots of the Pacific and developing Radio broadcasting to their ships while at sea, wives, daughters and sweethearts of mariners living in Seattle have formed an organization called the "Daughters of the Sea."

The Daughters of the Sea plan to bring home closer to the ship, and the Radio will be their chief means toward that end. The club has undertaken the fitting up of quarters on the top floor of one of the city's tall buildings, and is furnishing them with a library, comfortable chairs, smoking accessories and marine glasses, so that seafarers may watch from the windows the ships making and leaving port.

A powerful Radio sending and receiving apparatus is to be installed on the roof of the building and entertainments, concerts, etc., in the clubrooms will be broadcast to the ships at sea. The personnel of vessels in any storm area will be cheered by the voices of loved ones at home. A practical service also will be maintained; the location of all ships from the home port will be recorded from day to day. The plans also include the entertainment of visiting captains from other ports of the world. There will be a committee supplying all arriving ships with flowers, and seamen strangers will be provided with comfort and entertainment.

AMATEUR CONVENTION WILL BE HELD APRIL 6

Ohio A. R. R. L. to Hold Its Second Get-together

COLUMBUS, O.—Arrangements are almost complete for the second Ohio A. R. R. L. Amateur Radio convention to be held at Hotel Columbus in this city on April 6, 7 and 8. The committee in charge of the various phases of the meeting have promised that this will be by far the most elaborate and most interesting gathering of Radiophans ever staged in Ohio.

Numerous attractions have been provided, including the following: Trip to the signal corps station WVZ at Fort Hayes, convention association meeting, A. R. R. L. traffic meeting, code and other contests with many valuable apparatus prizes, meeting a Hartford representative of the A. R. R. L., five-minute talks by district superintendents of Ohio, practical information of C. W. transmitters, information on all types of receiving equipment, discussion of fundamental electrical facts that every amateur should know, initiation services into the Royal Order of Wouff Hong, with every good A. R. R. L. man eligible; visits to Columbus stations, displays of apparatus by dealers and manufacturers, discussion of filters, rectifiers and what not and a great banquet on the closing evening of the convention.

Bob Bohannon, technical adviser of the club and operator of station WBAV, will install a 10-watt broadcasting set in the hotel for demonstration purposes. It will operate with a loop antenna. The first two days of the convention will be for delegates only, and only those having badges will be admitted to the sessions. The third day, Sunday, will be open to the public. Exhibits of dealers and manufacturers will be open at all times to public inspection.

SOS CALL OF SHIP SAVES MAN'S LIFE

Stricken Man Carried from Ships to Hospital in Raging Sea

CAPE MAY, N. J.—John H. Steel today owes his life to the miracle of the Radio and the courage of two hardy skippers who risked their lives, with those of their crews, to save him.

Steel, a member of the crew of the Fenwick island lightship, anchored thirty miles southeast of this city, was attacked with appendicitis Saturday night. The skipper broadcast a Radio appeal, which was picked up here. He rushed it to Capt. R. C. Weightman of the coast guard cutter Kickapoo.

Despite a raging sea and vicious wind, Capt. Weightman put to sea, and by 8 o'clock was alongside the Fenwick. The latter's crew put a boat over with Steel in it, and after a hard fight transferred the sick man to the Kickapoo, whence he was hurried to the government hospital at Lewes.

STATE AND CHURCH UNITE IN SERVICES TO BROADCAST ADDRESS FROM THEATER

Columbus, Ohio, Holy Week Services
Will be Heard by Thousands
of Fans

COLUMBUS, OHIO.—Epoch-making in the movement of the alliance of the church and stage will be the fact that the address of President William O. Thompson, of Ohio State university, will be broadcast from the Keith stage in this city on Good Friday. This event will mark the closing of the Holy Week services which will be held at the noon hour at Keith's theater.

Offers Theater

President Thompson will be the daily speaker. The services will be held under the auspices of the Columbus Federation of Churches through the courtesy of manager W. W. Prosser, of the local Keith theater, who each year places the theater at the disposal of the organization for the Holy Week services. Last year, the theater was packed daily by representative men and women of Columbus, including bankers, brokers, state, city and county officials, attorneys, physicians and ministers—in fact all busy people who were glad of the noon-time opportunity to attend Holy Week services at a place so convenient to the center of the city.

President Thompson's final address will be broadcast throughout the country, the station to have this privilege to be announced later.

Sunday School Lesson By Air

ATHENS, O.—Rev. Deforest Murch, of Cincinnati, formerly of this city, taught the Sunday school lesson recently at the Christian church in Athens by Radio from Cincinnati.

ETHER WAVES PEP UP MAIL SORTERS

"Mr. Gallagher and Mr. Shean"
Help Get Mail Out
on Time

WASHINGTON, D. C.—Sorting mail by Radio is the very latest thing in the postal service, exemplified at the Washington city post office from 9 to 11 o'clock one evening last week.

A thousand clerks and carriers did their duties in the great workroom of the office while a Radio receiving set filled the air with music drawn from the air.

First Assistant Postmaster General Bartlett inaugurated the novelty by broadcasting a message to the workers from the Post Office Department sending station. This brief message was broadcast by Mr. Bartlett exactly at 9 o'clock. Following that there were no more speeches, nothing but lively music to help put speed into the workers and "pep up" their general enjoyment of life.

Last year the Minneapolis post office introduced a phonograph on its night shifts, but the local office is said to be the first in the country to entertain its workers by Radio.

The receiving apparatus is one owned by the office of the air mail service, Post Office Department.

If the operator tuned in on a "bed-time story" or a lecture on housekeeping, he switched off to some other wave length as it was not believed that such entertainment and the proper sorting of mail would mix. But any distributor can sort letters better, it is held, to the lively strains of the tune that made Gallagher and Shean famous. So the aim was to "listen in" on concerts, selecting the best from the air waves. Postmaster Chance introduced the novelty by way of experiment.

A new Radio station has been opened at Vari, Greece. The call is SXB.

Electric & Radio Supply Co.

165 North Wells Street

Chicago, Ill.

Jobbers and Distributors of the Following Lines:

Kellogg	Mesco	Central Radio Lab.	Carter
Murdack	Vesta	A. C. Elec. Mfg.	General Radio
Frost	Signal	Erla	Baldwin
Fada	Acme	U. S. Elec. & Mfg. Co.	Franco (Battery)
Cardwell	Walnat	Thordarson	Cunningham Tubes
Howard		All American	

Get in touch with us—NOW—our prices will interest you. Everything in Radio. Prompt shipment assured. Write us.

Memo Pad

What I will need to make a good tube set

- A Kellogg No. 501 variocoupler
 - A Kellogg No. 605 variable condenser
 - A Kellogg No. 2 tube socket
 - A Kellogg No. 505 miniature condenser
 - A Kellogg No. 503 mounting
 - A Kellogg No. 609 radio resistance
 - A Kellogg No. 502 dial
 - A Kellogg No. 69A head set
 - A Kellogg No. 501 rheostat
 - A Kellogg switch and switch points
 - A and B batteries and cabinet
 - A Detector tube
- Kellogg radio equipment is recommended for several reasons

First — It is easy to install and simple to operate.

Second — It is built of the highest grade material to give the best possible results.

Third — It is electrically and mechanically correct and will last a life time.

Fourth — It is built by the Kellogg Switchboard and Supply Co., who have manufactured high grade telephone equipment for the past 25 years.

Fifth.— Every Kellogg radio part is GUARANTEED by the manufacturer.

"Use, is the test."



"He who lightly promises
is sure to keep but
little faith."

—Lao Tzu.



Heed not the persuasions
of those who would sell
you something "just as
good"—get results with a
Grebe Receiver.

Doctor Wu



Licensed under
Armstrong U. S.
Pat. No. 1113149

A. H. GREBE & CO., Inc.

Richmond Hill, N. Y.

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



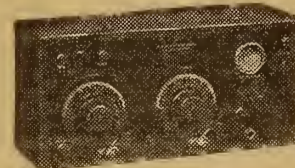
MRC "SENIOR" Regenerative Receiver

A Long-Distance Wonder-Worker

HIGHEST type of Regenerative Receiver. Licensed under Armstrong U. S. Pat. 1,113,149 and pending Letters Patent 807,388.

Enthusiastic letters from customers all over the country tell of nightly triumphs in tuning in distant or elusive stations, thru both headphone and loudspeaker.

Set comprises tuner, detector and two stages of amplification in one handsome mahogany cabinet. Dials are operated by the famous MRC Split-Hair Vernier. Price, without tubes or batteries... **\$125.00**



"JUNIOR" SET

MRC "Junior" Regenerative Receiver similar to the "Senior" but without the amplification. Price, less tubes **\$57.50** and batteries.....

Also ask us about the Michigan Two-Stage Amplifier and our line of Condensers, Variocouplers, Variometers, Rheostats, Etc.

When you send for circular, give us name and address of your favorite Radio Dealer.

Factory Branch: 9 South Clinton Street, Chicago, Illinois
H. O. Rugh, Radio Engineer, in charge

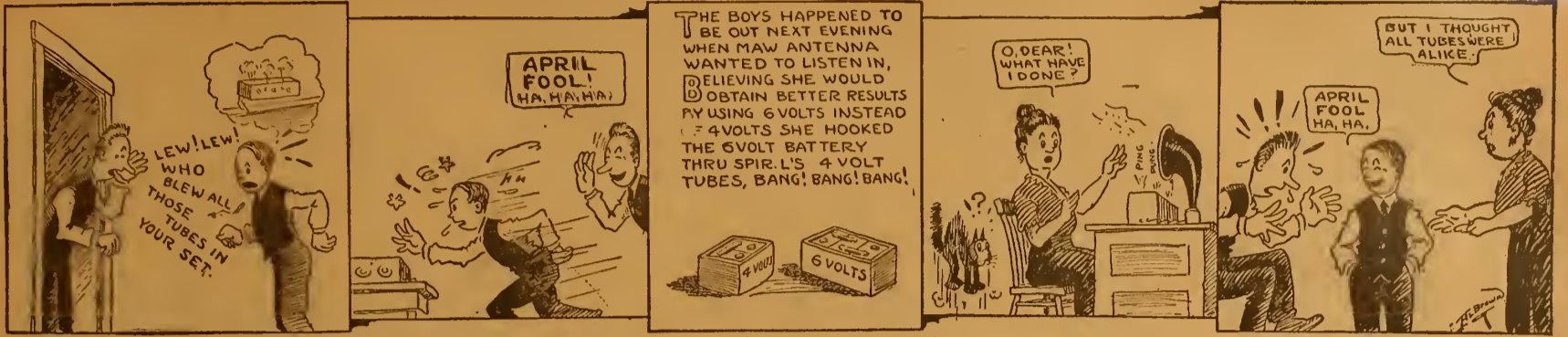
MICHIGAN RADIO CORPORATION

GRAND RAPIDS, MICHIGAN

THE ANTENNA BROTHERS

Spir L. and Lew P.

March 32 and 33



KYW Jazz Revues Keep Fans Awake

Many Small Town Clubs Hold Dances to Isham Jones, Cook and Melody Boys

By ROBERT J. STANTON.

Insomnia has become prevalent with the Chicago Radio audience since the inauguration of the midnight revues which are broadcast every Friday night from Westinghouse Station KYW, a theater without footlights. The old fashioned nightcaps have become a style of the past and have been replaced by the more up-to-date headphones.

Can you imagine reclining at ease in your downy cot while being entertained with a program of the latest popular music with nothing more to do when the show has ended that to shut off your set, remove your headphones and open the gates to the "Land of Nod". However, there is a fly in the ointment, as it is impossible to lie in bed when Isham Jones, Cook's Dreamland, and the Alabama Melody Boys play such "hot" dance selections that even the microphone in the studio starts to "shake and shiver."

Clubs Dance to KYW Jazz

Many clubs in small towns throughout the country have held Radio dances, for which the music has been supplied by selections played during these midnight revues from KYW. Many of the programs have been furnished by musical comedies playing in Chicago theaters, such as Shuffle Along, The Greenwich Village Follies, Spice of 1922, Lillies of the Field, and the French Doll. The next musical comedy to furnish a midnight program will be Raymond Hitchcock's new show which is scheduled to arrive in Chicago this month. Mr. Hitchcock claims the Radio is now his second nature and that he is preparing a special monologue to broadcast from KYW.

SEAMAN FAN SAVES SHIP BY SOS CALL

Amateur Substitutes for Operator and Succeeds in Bringing Aid

SEATTLE, WASH.—With only a slight knowledge of the international Morse code, Seaman Addison Galligan recently saved the entire crew of the wooden steamship Nika, thirty-three men in all, when he sent an "SOS" which brought the Coast Guard cutter Snohomish to the side of his vessel near Umatilla Reef. The ship was rudderless and blazing with a fire that had started in the coal bunkers.

For a long while Galligan had been experimenting with a Radio receiving set at his home in Everett, and like hundreds of Radiophans, he realized the value of the code. Some day, he thought, it might come in handy at sea.

Galligan was a seaman, and pressed into service in the absence of a regular operator, he slowly tapped out the call for help and the letters "F-i-r-e."

Fifteen minutes after the Snohomish caught the first call she was on her way to Umatilla Reef.

The United States now has six transmitting stations and one central receiving station on the Atlantic Coast which serve to connect this country with Europe.

THIEVES USE ETHER FOR COMMUNICATION

BOSTON, MASS.—A high government official expresses the belief that the principals arrested recently and indicted for alleged conspiracy in the theft of \$100,000 worth of motor cars, and violation of the Dyer act, used the Radio in communicating with one another or with so-called agents. It is said that \$100,000 is an estimate of the value of the cars stolen.

J. P. Kibler, Luray Cavern Guide, Is Original and Only "Cave Man" Fan

Guide Learns Code on Improvised Set Built of Nondescript Parts and Crystal Dug from Virginia Mine—Uses Rural Telephone Line for Aerial

By Armstrong Perry

WASHINGTON.—If I had found a mole soaring over the house with the crows and turkey buzzards I would not have been much more surprised than I was to find that J. P. Kibler, Luray Cavern guide, was a Radio enthusiast.

With other officials of the Cave Men's Club of America, I accepted the cordial invitation of T. C. Northcott, owner of the property, to explore Luray and Ruffner's caves. Both are located in the same hill and in spite of the failure of other explorers we hoped to find some connection between the two. Mr. Kibler stayed with us through two days of hard climbing and squeezing. If I wormed my way into any

He took me in. One of the first things I saw was a bookcase full of technical books. Here and there about the room were other watches, repaired or in process, tools and Radio apparatus. A completed



J. P. Kibler, Luray Cavern guide, and Radio amateur—with his cheap but efficient home-made receiver

Radio receiver consisted of an oatmeal box wound with No. 20 single cotton covered wire. The first six turns were tapped singly. There were sixty more turns, tapped every ten turns. A 23-plate vari-



J. P. Kibler emerging from Ruffner's Cave, Luray, Va., where underground Radio experiments are to be made. This cave is not open to the public

passage that he did not enter it was purely a matter of avoiddupois.

Finds Home-Made Genius

After we had penetrated every nook and corner of the two great caverns I walked home with him. He lives on his own farm about a mile from the Luray entrance pavilion. Two men in a carriage were waiting for Mr. Kibler. Going to a shop near the house he brought out some repaired parts of farm implements for one, then he went into the house and brought out a watch he had repaired for the other. I began to wonder what kind of a genius I had met up with.

PHANTOM-CIRCUIT

Build Your Own. This marvel of mystery, using no loop, no aerial and no ground, brings in music instead of interference. We have heard stations 950 miles distant on one tube. By using WD-11 tube set can be entirely self contained. Very easy to build from our instructions, use your own spare parts, nothing complicated like radio frequency or super regenerative. Only one tuning control. Complete instructions, with hookup and photo of circuit mailed to you for 80 cents. Stamps accepted. VESCO RADIO SHOP, Box D-704, Vacaville, Calif.

able condenser, an electron tube from a mail order house, and a home-made grid leak and condenser were other elements in the receiver. The latter was made from two pieces of hard rubber with mica and copper sheets between them, and a lead pencil mark. Using 2,000-ohm phones he had heard stations as far away as Seattle and Des Moines on the one tube. He lighted his filament with an auto battery and for the "B" battery used seventy-five cents' worth of dry cells from a mail order house.

Uses Telephone Aerial

He is patiently learning code by means of a home-made crystal detector. The base is hard rubber. The galena he dug himself from a Virginia mine. The cat whisker is held by a brass spring. In his code work he uses as an aerial the rural telephone line, on which he has worked enough to learn all its various uses.

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The "How" of the Simplified Super Circuit

Part VIII—A Radical Departure in the Flivver Circuit

By E. T. Flewelling

IT HAS been proven rather conclusively that the best all around Radio receiver is also the most simple one. However, most Radiophans like a large number of controls to procure the finest adjustment. It is a good idea to strive for simple means of attaining our ends and in Radio as in other things we are rewarded by better all around results if simplicity is closely followed.

It is understood that during the recent Trans-Atlantic tests that most of the results were obtained by simple receivers, and that even the super-heterodyne, admittedly the most elaborate of all Radio

Such a circuit arrangement is shown in Figure 2 and constitutes an extraordinary receiver in many ways.

Condenser Bank Eliminated

The familiar bank of three condensers and the second adjustable grid leak peculiar to the Flewelling circuit is omitted in this circuit. The answer is as follows:

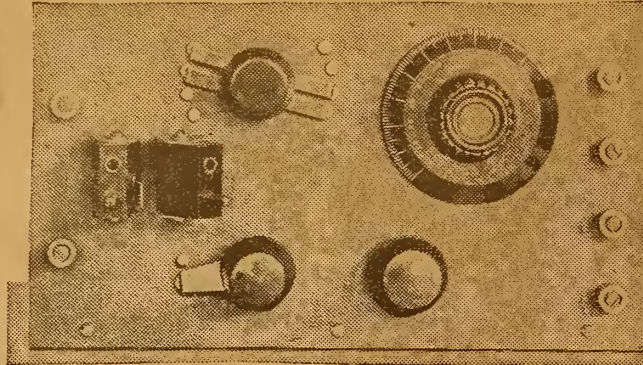


Photo Showing Arrangements of Parts of Simplified Flivver Set

When the theory of the Flewelling Super is understood it will be seen that the effect is caused principally by the blocking and freeing of the tube working in conjunction with condensers. It has been found that only one condenser is needed to attain this end if a good control is maintained over the grid of the tube by means of a suitable variable grid leak and the other points that we have taken up in our previous articles are taken care of. The condenser is the familiar .006 Mfd. capacity and the grid leak is one that is not affected by changing atmospheric conditions, the cartridge type of enclosed resistance of the Pudlin Engineering Company, being very satisfactory.

More Simple to Operate

We have made exhaustive tests and comparisons with this one-condenser circuit and the three-condenser bank type and have no hesitancy in reporting that results were identical in both cases, but of course, slightly easier to secure in the case of the one-condenser circuit due to its being the more simple. The circuit is confidently offered to meet with full approval.

The photographs show a convenient manner to mount the parts of this circuit. Front and rear views of an unwired set are shown, and the assembly is the result of study as to the arrangement so that the set will have the most convenient operating characteristics.

It will be noticed that the grid condenser and the grid leak are mounted directly upon the grid post of the socket. This is a convenient mount for them and also has the further advantage of giving minimum length to the grid lead, an important item to consider.

Binding Posts and Switches

The series-parallel switch is mounted at the top of the panel (because it is not often used, where the location means minimum length of leads between the tuning inductance and the tuning condenser.

The two-pole switch at the bottom is used to change from the simple regenerative set to the super set. The reason for the arrangement of the other parts was covered in our previous article.

Posts are shown for both antenna and ground connection in the usual manner and in changing over from the plain circuit to the super this connection need not be changed if the proper inductance coils are in use.

Use of Both Aerial and Ground

In our various articles on the use of super sets mention has been made that it was not possible to use both ground and antenna at one time, or to the contrary, that radical results might be obtained if they were used. Let me say here that if

the inductance coils are changed to compensate for the additional capacity in the circuit when both aerial and ground are used at one time, any type of super set will work in practically the same manner that it will if the antenna or ground alone is used.

The point is, that so long as equal re-

satisfaction. It has been used to receive in the usual super manner, both broadcasting on the usual wavelengths and code on wavelengths ranging from 150 to 25,000 meters. This was done while working with either antenna, ground, loop, combinations of these, or even with nothing at all. We have also enjoyed

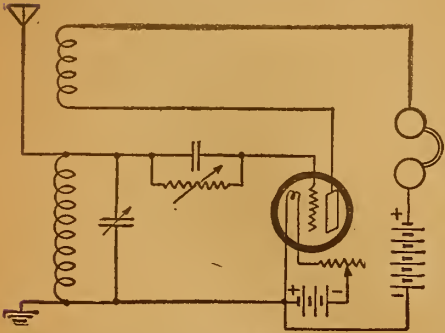


Figure 1

receivers, failed to score a hit in these tests.

Interchangeable Coils—Wide Range

Let us consider the circuit shown in Figure 1. This is a straight single-circuit tickler coil type of regenerative receiver, is as simple as can be wished for and is a type that is very popular. If an interchangeable type of coil such as the honeycomb or Giblin-Remier coil is used in such a circuit—one may reach any wave length commonly in use, by the simple method of changing coils. Various sizes of coils are available in these types. These coils are perhaps the most efficient available to most of us. They eliminate dead end losses, due to unused turns of wire, and they contain a minimum amount of distributed capacity. Because of these points they give us a receiver of good

results are obtained with one, why, use both? If both are used, say in the case of the 360-meter stations, it simply means that we use smaller coils because the additional capacity required is supplied by the added ground or antenna.

We have been considering the use of the super using only ground or aerial, and so recommend 50 and 75-turn coils as best suited to cover the average needs. If both antenna and ground are used, as in the case of the set under consideration, you will probably find that a combination use of a 35 and a 50-turn coil will be sufficient for 360-meter work.

Receiver Proves Excellent

If it will be of any assistance to the fans in considering the relative value of the set shown, let me say that such a set has been in use by the writer for some time and has given a great amount of

many concerts while using the set in the auto.

The super is at its best, of course, on short waves. When it is desired to reach the longer ones it is only necessary to plug in the right coil and turn the switch to cut out the super action. Various combinations of coil—super action and series or parallel connections of the tuning condensers are at the finger tips.

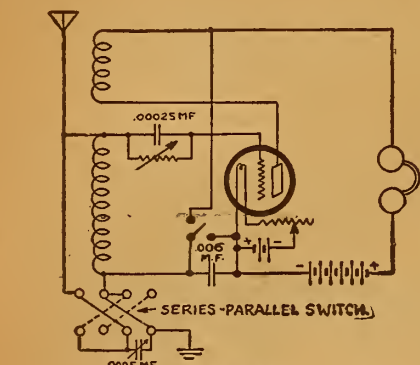
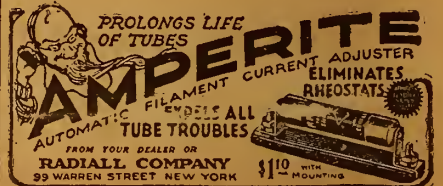


Figure 2

tonal qualities and highest efficiency, which is surely worth while.

Change in Circuit

If such a circuit is slightly changed to allow the super effect to be used at will, we have a still better receiver. If you use Giblin coils to cover the wave lengths in use, it will be found that even greater flexibility may be secured if the tuning condenser is arranged so that it may be connected in series or in parallel with the tuning inductances as may be desired. The maximum range with a minimum number of coils may be covered. For these reasons it is of advantage to add to the circuit two switches that will enable us to make these changes at will.

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J. N. Cartier, manager and announcer (before megaphone), a direct lineal descendant of the French explorer and discoverer of Canada, whose name he bears. Cartier's voice at CKAC has been heard in Juneau, Alaska, in Copenhagen, and by amateurs on the French coast, including ships in the Bay of Biscay. His voice is strikingly discernible among others, owing to the fact that he speaks French and English without the slightest trace of foreign accent

Stanley W. Barnett (at the left) is in the air every evening and heard all over the country as announcer for WOC, Davenport, Iowa. In addition to having achieved fame as an announcer, Mr. Barnett is licensed as a first class Radio operator. His popularity among fans is best expressed in the words of one Radiophan who wrote, "I think the voice of the announcer at WOC is best adapted to his work. He has many rivals but none better"

Emory L. O'Connell, announcer for WGAT (at the right), the American Legion, department of Nebraska broadcasting station at Lincoln. Emory is a disabled World War veteran studying law at the University of Nebraska. He says that the announcer's job is excellent training for his chosen profession, as a lawyer's words must go "a long way" to convince the average jury. He also says that it trains a man to speak "le on his feet"

ANNOUNCER MAKES GRAMMATIC BREAK

REQUEST FOR TELEGRAMS HEARD BY FANS

CFCN Draws 373 Fan Letters from United States, Canada and Alaska

By Jeffrey I. Dingman

CALGARY, ALTA.—Once again CFCN the broadcasting station of the W. W. Grant Radio, Ltd., at Calgary has startled Radiophans; in fact, rather shocked them, and another Radiophan has given CFCN the credit for accomplishing something entirely new in broadcasting.

Imagine the startled look that would appear on the countenance of a listener who heard the words, "Where the h—l are those telegrams?" floating in from a station hundreds of miles distant. That is what happened to Edward M. Sehorn, proprietor of The Daily Journal, Willows, California, recently.

Sehorn Chides Grant

In a letter to CFCN, in which he gently chided Mr. Grant, Mr. Sehorn said:

"Last night while listening to your concert—which, by the way, came in as well as the best on the Coast—I distinctly heard your announcer say: 'Where the h—l are those telegrams?' or words to that effect. He probably said it to himself, not realizing that his softly-spoken 'h—l' would be heard all over the country. I don't object to such mild swear-words, however, and this is probably the first time on record such a word has been broadcast."

Mr. Grant laughingly pleaded guilty to the charge, saying he was about to broadcast telegrams from distant points, but the communications had been mislaid.

Draws 372 Letters

"I know I had the microphone extended at arm's length," said Mr. Grant. "I would have spared my audience had I thought my words would have been heard by the outside world. Still, it is certainly an indication of the enormous output power CFCN possesses."

In the same morning's mail with this letter there were 372 other communications from Radiophans who had heard the request for the missing telegrams from the Calgary station. They were from thirty states in the Union, six from provinces of Canada, and one from Alaska.

WPAL Broadcasts Chorus

COLUMBUS, O.—The Westgate Masonic chorus of forty male voices rendered a complete program broadcast from WPAL, the Superior Radio and Equipment Company here. The concert by the chorus was its first experience in the Radio studio.

Station WPAL has inaugurated readings on operas. The first of this series was the opera "Tannhauser" with Burleigh Cupp, member of the faculty of the Morey School of Music, explaining the three sets in the opera.

Station KPO Is Monument in Memory of F. J. McCarthy, Cash-Boy-Inventor

Charles V. Logwood Tells of Many Hardships Undergone by Himself and Deceased Companion Who Gave Valuable Aid to Airphone in Its Beginning

By Albert H. Munday

It is not generally known to Radiophans throughout the world, and in San Francisco especially, that the high power station KPO, one of the most powerful in the world, on the top of Hale Brothers' Store at Fifth and Market streets, is a monument to the memory of a boy who, had he lived, would have been one of the wizards of Radio today. That boy was Francis Joseph McCarthy, who in 1906, when only 17 years of age, gave demonstrations on a Radiophone on which he had been working for more than three years. McCarthy was probably the first boy Radiophan in the world and one who was destined to lead the world in matters of Radio. Unfortunately he was killed in an accident in Oakland in 1906, shortly after his first success, but his Radiophone patents have brought his family the sum of \$100,000.

Starved to Get Set

Although only a mere lad he had his assistant and that boy is still one of the leaders in the Radio world today. It is Charles V. Logwood, who claims that had McCarthy lived he would have revolutionized the world with his inventions and his service to the Radiophans. Mr. Logwood worked day and night with McCarthy and together they actually starved for days at a time in order that the money they saved could be spent in making a new set. It must be remembered that in those days it was impossible to buy the parts to make a set and everything piece by piece had to be designed and made by the experimenters.

Will Help the Amateur

The story of McCarthy and his assistant Logwood as boys who toiled for months and years to perfect their youthful inventions, reads like a romance, and is a story that will eventually go down as a part of history of the Radio world. Giving all credit to McCarthy, who he considered a genius, Mr. Logwood told his story especially to the representative of the Digest in order to show that the future of the science really rested with the Radiophans who are struggling day in and day out with their new sets and their experiments. It is chiefly due to his many trials and difficulties that Mr. Logwood understands the trouble of the youthful Radiophans of today whom he is very eager to help them to help themselves. As soon as the Armstrong vs. Logwood case, now pending in the United States Patent Office, is settled, Mr. Logwood intends to work on several new circuits that will be especially suitable for youthful Radiophans. He pointed out that it was only in helping them that the future of the science can progress and

emphasized that in their ranks must be found the future experts who are to carry on with the development of the new science.

Start First Radiophone Company

"McCarthy first started working at the age of twelve for the Pacific Telephone and Telegraph Company in 1903," related Mr. Logwood. "He was then a freckled-faced youngster helping to install house telephones. I was also with the company and we often worked together. We were both interested in Radio and spent considerable time and money in making small sets. Later McCarthy went to work as a cash boy in Hale Brothers store. One day Prentiss Cobb Hale asked young McCarthy what his hobby was and he promptly told Mr. Hale that the only thing he was ever interested in was Radio telephony. Mr. Hale promised to help him and immediately bought several expensive books and encouraged McCarthy as much as possible. A short time later the first Radiophone company to be started in the world was floated by young McCarthy and I was appointed his assistant. We built a station on the beach at San Francisco and carried out many experiments which were successful. In 1905 we gave our first demonstration and spoke a distance of one mile from the Cliff House to Mile Rest. I was sent to New York to purchase special equipment and had just returned to San Francisco when the earthquake came and our apparatus was wrecked. McCarthy was killed in an accident a few weeks later."

Big Station Nearly Ready to Link Argentina to U. S.

BUENOS AIRES.—The big, high-power Radio station at Monte Grande, near Buenos Aires, the first South American station in the international commercial Radio system, is almost completed, and it is announced that service will begin in June or July next.

It will place Argentine in direct Radio communication with the United States for the first time, as well as with Europe. Engineers say there are two strange, static "dead areas," one near the equator off Brazil and one in the South Atlantic which only a station equipped like that at Monte Grande can overcome.

Fifty-one Radiophone stations are broadcasting daily the national crop and market reports of the Department of Agriculture. More than 15,000 individuals, firms and railroads co-operate in gathering the data broadcast throughout the country.

All-Zanesville Program Broadcast by Rotarians

COLUMBUS, O.—An all-Zanesville Radio program was broadcast from Station WBAV, Erner & Hopkins Company, here recently. The program was the second of a series of concerts being presented by talent from various Ohio cities from the Columbus station. The Zanesville Rotarians had charge of the arrangement.

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45-R Vesey St., New York City

AMATEUR RADIO CALL BOOK

Radiophone Broadcasting Stations

Corrected Every Week—Part I

AGI, Presidio of San Francisco, Calif. 50 mi. Signal Corps, U. S. A. Sun, Thurs, 8-9 pm, instruction, music, Pacific.

AQ6, Canton, O. 425 only. 500 mi. Hdqtrs. 135th Field Artillery O. N. G. Wed, Fri, music. Sun, church services. Eastern.

AS6, San Antonio, Tex. 200 mi. U. S. Army, Ft. Sam Houston. Mon, Thurs, irregular.

AV7, St. Paul, Minn. 400 only. 500 mi. Signal Corps, U. S. A. (St. Paul Armory). Daily ex Sun, 2-2:30 pm, music, announcements. Thurs, 8:30-9:15 pm, Central.

BE1, Tacoma, Wash. 400 only. 100 mi. Camp Lewis, U. S. Army, Third Signal Co. Daily ex Sat, Sun, 6-7 pm, music, announcements, lectures. Pacific.

CFAC, Calgary, Alta., Can. 430 only. 1,000 mi. Western Radio Co., Ltd. (Calgary Daily Herald). Daily ex Sun, 12:30-1 pm, 3-4. Daily, 7:45-8:45 pm, Mountain.

CFCA, Toronto, Ont., Can. 400 only. 500 mi. Toronto Star. Daily ex Sun, 12 m. weather; 2:30-3:30 pm, news, music; 5:30-6, news; 8-9, concert. Sun, 8:45-9:45 pm, concert. Eastern.

CFCB, Vancouver, B. C., Can. 400 only. 1,500 mi. Vancouver Daily Province. Daily, 8:30-9:30 pm, reports, news, music. Pacific.

CFCE, Halifax, N. S., Can. 440 only. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.

CFCF, Montreal, P. Q., Can. 440 only. 1,000 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

CFCH, Iroquois Falls, Ont., Can. 400 only. 200 mi. Iroquois Paper & Printing Co., Ltd. Daily, 8 pm, weather and stock reports. Experimental station. Eastern.

CFCN, Calgary, Alta., Can. 275, 440 only. 1,500 mi. W. W. Grant Radio Ltd. Wed, Sat, 10:30-11:30 pm, dance music. Wed, Sat, Sun, after 11:30 pm using test call WAG. Mountain.

CFCX, London, Ont., Can. The London Advertiser.

CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.

CFTC, Toronto, Ont., Can. The Bell Telephone Co.

CFV, Vancouver, B. C., Can. Victor Wentworth Odium.

CHBC, Calgary, Alta., Can. 410 only. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quotations, music. Mountain.

CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.

CHCB, Toronto, Can. Marconi Co.

CHCF, Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.

CHCG, Calgary, Alta., Can. 400 only. 150 mi. Western Radio Co., Ltd. Daily ex Sun, 3:30-4:30 pm. Daily, 7:45-8:45 pm. Mountain.

CHCS, London, Ont., Can. London Radio Shoppe.

CHCX, Montreal, Que., Can. B. L. Silver.

CHVC, Toronto, Canada. 410 only. 200 mi. Metropolitan Motors Co. Daily ex Sat and Sun, 6-5:30 pm, news, concert. Eastern.

CHY, Montreal, Que., Can. Northern Elec. Co.

CHXC, Ottawa, Ont., Can. 450 only. 50 mi. J. R. Booth, Jr. Mon, Wed, 8:30-11 pm, music, entertainment. Eastern.

CHZ, Montreal, Que., Can. 420 only. 75 mi. Dupuis-Freres, Wed, Fri, 9-10 pm, music. Eastern.

CJCA, Edmonton, Alta., Can. 450 only. 1,000 mi. Edmonton Journal, Ltd. Daily ex Sun, 12:30 pm, weather, markets, 7:30-8 pm, Children's half hour, 8:30-9:30 pm, concert, reports. Pacific.

CJCB, Nelson, B. C., Can. 400 only. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.

CJCD, Toronto, Canada. 410 only. 200 mi. T. Eaton Co. Daily ex Sat and Sun, 4-4:30 pm, concert. Sat, 12:30 pm, concert. Mountain.

CJCE, Vancouver, B. C., Can. 420 only. 150 mi. Vancouver Sun. Daily ex Sun, 8-10, music, news. Pacific.

CJCF, Kitchener, Ont., Can. 420 only. 50 mi. The News Record, Ltd. Thurs, 9-11 pm, Eastern.

CJCH, Toronto, Ont., Can. United Farmers of Ontario.

CJCI, St. John, N. B., Can. 400 only. 75 mi. McLean, Holt & Co., Ltd. Daily, 8-9 pm, music, news, weather. Eastern.

CJCN, Toronto, Ont., Can. Simons, Agnew & Co.

CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.

CJCY, Calgary, Alta., Can. Edmund Taylor.

CJGC, London, Ont., Can. 430 only. 800 mi. London Free Press. Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.

CJNC, Winnipeg, Man., Can. 400 only. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 1-2 pm, Tues, 8-10 pm, Thurs, 7-8 pm, Fri, 8-10 pm, Alternate Sun, 8:30-10 pm. Central.

CJSC, Toronto, Ont., Can. Evening Telegram.

CKAC, Montreal, Que., Can. 430 only. 1,000 mi. La Presse. Daily ex Sun, 2 pm, weather; 4:30-4:45, reports; 4:15-5:15, dance music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-8:30, concert; 8:30-9:30, music; 10:30-11:30, dance music. Sun, 4-4:45 pm, 6-6, music. Eastern.

CKBC, Winnipeg, Man., Can. T. Eaton Co., Ltd.

CKCC, Toronto, Ont., Can. Ind. Telephone Co.

CKCK, Regina, Sask., Can. 420 only. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music; 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music. Tues, 7:30-9, concert. Sun, 9 pm, sacred concert. Mountain.

CKCF, St. John, N. B., Can. 400 only. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Eastern.

CKCG, Toronto, Ont., Can. Westinghouse Co., Ltd.

CKCC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd.

CKOC, Hamilton, Ont., Can. 410 only. 100 mi. Vertwell Radio Supply Co., Ltd. Mon, Wed, Fri, 8:30-9:30 pm, concert. Sun, church services. Eastern.

CKQC, London, Ont., Can. 410 only. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.

CKZ, Winnipeg, Man., Can. Salton Radio Eng. Co.

DD5, Denver, Colo. 412 only. 1,500 mi. Fitzsimmons Gen. Hospital. Mon, Wed, Fri, 8-9 pm, music. Mountain.

DM4, San Antonio, Tex. 1,500 mi. U. S. Army, Kelly Field. No regular schedule.

DM7, San Antonio, Tex. 200 mi. U. S. Army, Brooks Field. No regular schedule.

DN4, Denver, Colo. 340 only. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.

KBZ, Bakersfield, Calif. 100 mi. Frank Siefert. Daily ex Sun, 7:30-8:15 pm, reports, music. Sun, sacred program, irregular. Pacific.

KDKA, E. Pittsburgh, Pa. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12-30 pm, news, reports, sports; 6:50, bedtime stories; 8-9, music; 9:55-10, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 vesper service. Eastern.

KDN, San Francisco, Calif. 485, 510 also. 500 mi. Leo J. Meyberg Co. Daily, 1-2 pm, 8:30-9, 4:30-5:30, 7:15, music, reports, concert. Pacific.

KDOW, New York, N. Y. S. S. America. Home port is New York.

KDPM, Cleveland, O. Westinghouse Elec. & Mfg. Co.

KDPT, San Diego, Calif. 500 mi. Southern Elec. Co. Daily ex Sun, 7-7:30 pm, news, weather, concerts. Tues, Sat, 8-10 pm, Pacific.

KDVL, Salt Lake City, Utah. 485 also. 1,800 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.

KDVM, San Diego, Calif. Savoy Theater.

KBQ, Portland, Ore. 425 also. 25 mi. Oregon Institute of Technology. Tues, 9-10 pm, Radio lectures. Pacific.

KDYS, Great Falls, Mont. 485 also. 1,000 mi. Great Falls Tribune. Daily 12 m. weather, time. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.

KDYY, Salt Lake City, Utah. Cope & Cornwell Co.

KDYM, Phoenix, Ariz. 100 mi. Smith Hughes & Co. Daily ex Sat, 7-7:30 pm. Mountain.

KDYX, Honolulu, T. H., Hawaii. 500 mi. Honolulu Star-Bulletin Co., Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Tues, Fri, 3:45-4:30 pm. Sun, 11 am-12:15 pm, 5-6, Church services, 12th Meridian.

KDZA, Tucson, Ariz. Arizona Daily Star.

KDZB, Bakersfield, Calif. Frank E. Siefert.

KDZE, Seattle, Wash. 500 mi. The Rhodes Co. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed, 8-9 pm, concert. Pacific.

KDZF, Los Angeles, Calif. Automobile Club of Southern California.

KDZG, San Francisco, Calif. Cyrus Pierce & Co.

KDZH, Fresno, Calif. 485 also. 50 mi. The Herald-Buford Co. Daily ex Sun, 8:15 am, 4-5 pm, news, reports. Daily ex Tues, Fri, 8-9 pm, reports, music. Tues, Fri, 6:30-7:30 pm. Sun, 8-9 am, church service. Pacific.

KDZI, Wenatchee, Wash. 700 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, music. Sun, 11 am-12:30 pm, church services. Pacific.

KDZK, Reno, Nev. 50 mi. Nevada Mch. & Elec. Co. (Nevada State Journal.) Daily ex Sun, 4-4:30 pm, news. Wed, 6:30-7:30 pm, music. Fri, 8-9 pm, special. Pacific.

KDZL, Ogden, Utah. 100 mi. Rocky Mountain Radio Corp. Mon, 12-1 pm, 7-9 pm. Mountain.

KDZM, Centralia, Wash. 50 mi. Hollingworth Hdwe. & Radio Supply Store. Daily ex Sat & Sun, 8-9 pm, music. Pacific.

KDZQ, Denver, Colo. 500 mi. Wm. D. Pyle. Daily ex Sun, 6:45-7:15 pm, news, 9-10 pm, concert. Mountain.

KDZR, Bellingham, Wash. 200 mi. The Bellingham Pub. Co. Mon, Wed, Fri, 7-8:30 pm, music, news, reports; 7:30-7:45, code practice. Tues, Sat, Sun, 7-9 pm, Pacific.

KDZT, Seattle, Wash. Seattle Radio Assn.

KDZZ, Everett, Wash. 50 mi. Kinney Bros. & Sappell. Daily ex Sun, 2:30-3:30 pm, 4:30-5:30, 8:15-9:15. Pacific.

KFAD, Phoenix, Ariz. 200 mi. McArthur Brothers. Daily ex Sun, 7:30-8:30 pm, news, weather, stock, reports. Mountain.

KFAE, Pullman, Wash. 1,500 mi. State College of Washington, Mon, Wed, Fri, 7-9 pm, lectures, music, readings. Pacific.

KFAF, Denver, Colo. 3,750 mi. Western Radio Corp. Daily ex Thurs and Sun, 8-9 pm, music, reports, news. Mountain.

KFAJ, Boulder, Colo. 800 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.

KFAN, Moscow, Ida. 200 mi. The Electric Shop, Tues,

tion, Inc. Tues, Thurs, Sat, 7:30-9 pm, music. Mountain.

KFKC, Colorado Springs, Colo. Colorado Springs Radio Co.

KFCL, Los Angeles, Calif. 485 only. 1,500 mi. Los Angeles Union Stock Yards. Daily ex Sun, 10-10:30 am, 12-12:30 pm, 4-4:30, 8-8:20, live stock reports. Pacific.

KFCM, Richmond, Calif. 500 mi. Richmond Radio Shop. Mon, 8-9 pm, music. Sun, 1-2 pm, music. Pacific.

KFCF, Ogden, Utah. Ralph W. Flygare.

KFCG, Casper, Wyo. Motor Service Stn.

KFCV, Houston, Tex. 300 and 600 also. 300 mi. Fred Mahaffey Jr. Daily ex Sun, Mon, 7:30-8 pm, markets, entertainment. Sun, 2-3 pm, church services. Central.

KFCY, Le Mars, Ia. Western Union College.

KFCZ, Omaha, Neb. Omaha Central H. S.

KFDA, Baker, Ore. 25 mi. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.

KFDB, San Francisco, Calif. 400, 485 only. 1,500 mi. Mercantile Trust Co. Daily ex Sun, 10-11 am, weather, markets; 11-11:30, news, quotations; 2-3 pm, lectures, concerts. Mon, Wed, Fri, 8-10 pm, concert. Sun, 7-7:30 pm, children's stories.

KFDC, Spokane, Wash. 25 mi. E. B. Craney. Mon, Wed, Fri, Sat, 7:30-9 pm. Wed, Sat, 3-3:30 pm. Pacific.

KFDD, Boise, Idaho. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.

KFDF, Casper, Wyo. 485 also. 600 mi. Wyoming Radio Corp. Daily ex Sun, 12:30 pm, weather, stocks. Wed, Fri, 8-9 pm, music. Sun, 8-9 pm, sacred music; 11-11:30, music. Mountain.

KFDH, Tucson, Ariz. 200 mi. Univ. of Ariz. Tues, Thurs, 7:30-8:30 pm, music, lecture, reports. Mountain.

KFDJ, Corvallis, Ore. Oregon Agri. College.

KFDL, Denver, Colo. Knight-Campbell Music Co.

KFDO, Bozeman, Mont. H. Everett Cutting.

KFDP, Des Moines, Iowa. 300 mi. Hawkeye Radio & Supply Co. Wed, 8-9:30 pm, music, entertainment. Sat, 9-10:30 pm, music, entertainment. Central.

KFDR, York, Neb. Bullock's.

KFDS, San Francisco, Calif. John D. McKee.

KFDU, Lincoln, Neb. Neb. Radio Elec. Co.

KFDV, Fayetteville, Ark. Gibbex & Stinson.

KFDX, Shreveport, La. First Baptist Church.

KFEB, Taft, Calif. City of Taft.

KFEC, Portland, Ore. 25 mi. Meier & Frank Co., Inc. Daily ex Sun, 12 m, reports; 4-5 pm, music;

Tues, Fri, Sun, 8:30-9:30 pm, news, concert, bedtime story. Pacific.

KHD, Colorado Springs, Colo. 485 also. 50 mi. C. F. m. weather. Mon, Wed, Fri, 7-7:30 pm, music, lectures. Mountain.

KHJ, Los Angeles, Calif. 400 only. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 6:45-7:30, 8-9:30. Sun, 10-11 am. Pacific.

KHJ, Seattle, Wash. Louis Wasmer.

KHJ, Sunnyvale, Calif. 500 mi. Radio Shop. Tues, 8:15-9 pm, Fri, 7:30-8:15 pm. Pacific.

KIQ, Stockton, Calif. 100 mi. Condit, The Light Man. Daily ex Sun, 5-6 pm, concert. Mon, Wed, 9-10 pm, concert. Sun, 10-11 am, church services. Pacific.

KIR, Seattle, Wash. 200 mi. Northwest Radio Service Co. Daily ex Sun, 8-9 pm, miscellaneous. Pacific.

KIS, Los Angeles, Calif. 100 mi. Bible Inst. of Los Angeles. Tues, 7-7:30 pm, Thurs, 8-9, sacred music, lectures, etc. Sun, 11:30-12:30, 6-6:45 pm, 8-9, church services. Pacific.

KLB, Pasadena, Cal. 300 mi. J. J. Dunn Co. Mon and Fri, 7:30-8:15 pm, concert. Sun, 3-4 pm and 8-9, concert. Pacific.

KLN, Del Monte, Calif. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert. Pacific.

KLS, San Francisco, Calif. 1,500 mi. Warner Bros. Radio Supply Co. Daily, 11:30-1 pm. Fri, 8-9 pm, Sun, 12-1 pm. Pacific.

KLX, Oakland, Calif. 500 mi. Oakland Tribune. Daily ex Sun, 3:30-4:30 pm, 7-7:30, news, entertainment. Tues, 8-9 pm, Fri, 9-10 pm. Sun, 10-11 am, church services. Pacific.

KLZ, Denver, Colo. 300 mi. Reynolds Radio Co. Daily ex Sun, 7:30 pm, news, markets, bedtime story, pm, code, 8:20-9 pm, music. Pacific.

KMJ, Fresno, Calif. 300 mi. San Joaquin Lt. & Pr. Corp. Tues, Fri, 8-9 pm, music. Sun, 5-6 pm, music. Pacific.

KMO, Tacoma, Wash. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 6-7, 9:15-10, concert, news, lectures. Pacific.

KNI, Eureka, Calif. T. W. Smith.

KNJ, Roswell, New Mex. Temporarily discontinued.

KNN, Los Angeles, Calif. 100 mi. Bullock's. Temporarily discontinued.

KNT, Aberdeen, Wash. 600 mi. Gray Harbor Radio Co. Daily ex Sun, 5-6 pm, 7-8, news, concert. Pacific.

KNV, Los Angeles, Calif. Radio Supply Co.

KOB, State College, N. M. 485 also. 500 mi. N. M. Agri. & Mech. Arts. Daily 11:55-12 m, 9:55-10 pm, time, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.

Daily ex Sun, 4-5 pm, 8:15-9, concert, news. Sun, 10-11 pm, 4-5 pm, 8:15-9, church service. Pacific.

KOG, Los Angeles, Calif. 300 mi. Western Radio Elec. Co. Daily ex Sun, Wed, 5-5:30 pm, code, news. Mon, Fri, 7:40-8:20 pm, music. Wed, 4:30-5 KON, San Diego, Calif. 200 mi. Holzwarner Inc. concert. Thurs, 8-9 pm, concert. Sun, 8-9 pm, KOP, Detroit, Mich. 1,500 mi. Detroit Police Dept. Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.

KPO, San Francisco, Calif. 300, 400 and 600 only. 1,500 mi. Hale Bros., Inc. Tues, Thurs, Sat, 8-10 pm, concert, lectures. Sat, 3-4:30 pm. Sun, 11-12:30 pm, church services. Pacific.

KQI, Berkeley, Calif. Univ. of Calif.

KQP, Hood River, Ore. 350 only. 50 mi. Hood River News. Daily ex Sat, Sun, 7 pm, news. Tues, Fri, 7:15-8 pm, Sun, 9-10 pm, entertainment. Pacific.

KQV, Pittsburg, Pa. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm; 4:30-5, music. Mon, Wed, Fri, 10-10:55 pm, concert. Fri, 4:30-5:15 pm, children's program. Eastern.

KQW, San Jose, Calif. 345 and 485 only. 500 mi. Chas. D. Heald. Daily ex Sun, 1-1:30 pm, Wed, 8-9 pm, concert. Pacific.

KQY, Portland, Ore. 200 mi. Stubbs Elec. Co. Wed, Thurs, Fri, 6-7 pm. Mon, Tues, Sat, 9-10 pm. Pacific.

KRE, Berkeley, Calif. 200 mi. Maxwell Elec. Co. Wed, 9-10 pm. Sun, 5:30-7:30 pm, concert. Pacific.

KSD, St. Louis, Mo. 400 and 485 only. 1,500 mi. St. Louis Post Dispatch. Daily ex Sun, 9 to 10, 10:40, 11:40, 12:40, 1:40, 2:40, 4, 8, Thurs and Sun, silent nights. Mon, Thurs, 11:30 pm, concert. Central.

KSL, San Francisco, Calif. 50 mi. The Emporium. Temporarily discontinued.

KSS, Long Beach, Calif. Prest & Dean Radio Co. No regular schedule.

KTW, Seattle, Wash. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.

KUO, San Francisco, Calif. 485, 525 also. 1,500 mi. San Francisco Examiner. Daily ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 2:30-3:30 pm, lecture, news; 5:15-6:45 pm, concert; 9 am, 12 m, 6:45 pm, weather reports. Wed, 3:30 pm, health bulletins. Sun, 9-10 am, 2-4 pm, 5-6, concert news. Pacific.

KUS, Los Angeles, Calif. 300 mi. City Dye Works & Laundry Co. Daily ex Sun, 7-7:30 am, setting up exercises; 12-12:30 pm, concert, time. Mon, Thurs, Fri, 2-2:30 pm, features. Tues, Fri, 4-4:30 pm, code practice. Wed, Fri, 6-6:45 pm, concert. Pacific.

KUY, El Monte, Calif. 500 mi. Coast Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.

KWG, Stockton, Cal. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues, Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

KWH, Los Angeles, Calif. 485 also. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.

KXD, Modesto, Calif. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific.

KXS, Los Angeles, Calif. Braun Corp.

KYL, Bakersfield, Calif. Bakersfield Californian.

KYH, Honolulu, Hawaii. Electric Shop. No definite schedule.

KYW, Chicago, Ill. 400 and 485 only. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:25 am, 10:12 pm, 2:15, 2:30, markets; 3 (3:30 ex Mon, Wed, Fri), 4, 4:15, 4:30, 5, news, sports (6:30 Mon only, news, reports, sports), 6:50, bedtime stories; 8-9, music; 9, news, reports; 9:05, special. Sun, 11 am, 3:30 pm, 7, church services. Central.

KZM, Oakland, Calif. 200 mi. Western Radio Institute (Holt Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZI, Salt Lake City, Utah. 485 also. 1,000 mi. Deseret News. Daily ex Sun, 3-4 pm, reports, music, 8-9:30 pm, music, news, bedtime stories etc. Mountain.

KZV, Wenatchee, Wash. 485 also. 200 mi. Wenatchee Battery & Motor Co. Daily ex Sun, 3:30-4:15 pm, 9-9:30 pm, Wed, Fri, 1st to 15th each month, 8:45-9:30 pm, 15th to last each month, 8-8:45 pm, weather. Sun, 1st to 15th each month, 7:30-9 pm; 15th to last each month, 11 am-12:30 pm, church services. Eastern.

NAA, Radio, Va. 710 only. 2,000 mi. U. S. Navy Dept. Daily ex Sun, 9:45-10:40 am, 12:25-12:40 pm, 1:45-2:20, markets, weather; 2:45-3, (Tues. only) Dept. Interior; 3:25-4:40, 5:05-5:20, markets, weather; 10:05-10:20, weather. Mon, 6:45-8:20 pm, Dept. programs. Tues, 7:05-8:40 pm, Dept. programs. Wed, 7:25-7:40 pm, Dept. programs; 8:05-8:40, Marine Band. Thurs, 6:45-8:40 pm, Dept. programs, Fri, 8:05-8:40 pm, band concert. Eastern.

OA, Ottawa, Ont., Can. Dept. of Marine & Fisheries.

PWX, Havana, Cuba. 400 only. 1,500 mi. International Tel. & Telg. Corp. Wed, Sat, 9-11:30 pm, music. Eastern.

WAI, Dayton, O. McCook Field, U. S. Army.

WAB, New Orleans, La. Valdemar Jensen.

WAAC, New Orleans, La. Tulane Univ.

WAD, Cincinnati, O. 200 mi. Ohio Mechanics Inst. Fri, 2:30-4:00 pm, and Sat, 8:15-10:15 pm, Cincinnati Symph. Orchestra concert. Central.

(NOTE—The second part of the station schedule list will appear next week.)

Continued—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which Radio Digest has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one third appearing this week, the second third to appear next week, and the last part, together with the state, city, station index, to appear the week following.

The station schedules, given here, are listed alphabetically by call letters. Following the call is given the city and state, the wave length (PROVIDING a wave length other than 360 meters is used), the miles and the station, the owner of the station, the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last third of the station schedules and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

Thurs, Sat, 7:30-8:30 pm, music, reports. Sun, church services. Pacific.

KFAP, Butte, Mont. Standard Pub. Co.

KFAA, San Jose, Calif. City of San Jose.

KFAR, Hollywood, Calif. Studio Lighting Service Co.

KFAS, Reno, Nev. 300 mi. Reno Motor Supply Co. Mon, Tues, Thurs, 8-9 pm, music. Pacific.

KFAT, Eugene, Ore. 100 mi. Pac. Radio Co. Mon, Wed, Sat, 9-10 pm, lectures, music. Sun, 8:30-9:15 church service. Pacific.

KFAU, Boise, Ida. 485 also. 200 mi. Boike H. S. Daily ex Sun, 9:30-10 am, 3-3:20 pm, markets, news; 8:30 pm, weather. Mon, Fri, 8:30-9 pm, concert. Wed, 8-9 pm. Mountain.

KFAV, Venice, Calif. 340 only. 50 mi. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.

KFAW, Santa Ana, Calif. 485 also. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 6:30-7:30 pm, concert. Pacific.

KFAY, Medford, Ore. 485 also. 500 mi. Virgin Radio Service. Mon, Fri, 9-10 pm. Special programs other days.

KFAZ, Reddy, Calif. 200 mi. C. H. T. Weatherill. Daily ex Sun, 9-9:15 pm, reports, news. Pacific.

KFBB, Havre, Mont. 485 also. 150 mi. F. A. Buntrey Co. Daily ex Sun, 9:30 am, agriograms, weather. Tues, Fri, 8-9:30 pm, music. Mountain.

KFBC, San Diego, Calif. 500 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.

KFBD, Hanford, Calif. 485 also. 200 mi. Clarence V. Welch. Mon, Wed, 3-4 pm, 7:30-8:30, news, music, agriograms. Tues, Thurs, Sat, 6-7 pm, music. Fri, 3-4 pm, 9-10, news, music. Sun, 7-8 pm, church services. Pacific.

KFBE, San Luis Obispo, Calif. 50 mi. R. H. Horn. Mon, Wed, Fri, 4-5 pm. Wed, Fri, 7-7:30 pm. Pacific.

KFBG, Tacoma, Wash. First Presbyterian Church.

KFBH, Marshfield, Ore. Thomas Musical Co.

KFBJ, Boise, Ida. 70 mi. Jenkins Furn. Co. (Owyhee Hotel.) Daily, 8-9 pm. Mountain.

KFBK, Sacramento, Calif. 485 also. 300 mi. Kimball-Upton Co. Daily ex Sun, 3-4 pm, 6-6:30, concert, news. Sun, 8-9 pm, church service. Pacific.

KFBT, Everett, Wash. Lesse Bros.

KFBZ, Trinidad, Colo. Chronicle News & Gas & Elec. Supply Co.

KFBU, Laramie, Wyo. Bishop N. S. Thomas.

KFBU, Colorado Springs, Colo. Clarence O. Ford.

KFCB, Phoenix, Ariz. 500 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.

KFCO, Wallace, Ida. 380 only. 100 mi. Auto Supply Co. Tues, Thurs, Sat, Sun, 7:30-8:30 pm. Sat, Sun, 9:30-10:30 pm, music. Pacific.

KFCD, Salem, Ore. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.

KFCF, Walla Walla, Wash. Frank A. Moore.

KFCH, Billings, Mont. 500 mi. Electric Service Sta-

6:30 pm, reports. Thurs, 9-10 pm, concert. Sat, 11 am-12 m, children's hour. Pacific.

KFEJ, Tacoma, Wash. Guy Gresson.

KFEP, Denver, Colo. Radio Equipment Co.

KFEO, Oak, Neb. J. L. Scroggin.

KFER, Fort Dodge, Ia. Auto Electric Service Co.

KFEV, Douglas, Wyo. 485 also. 250 mi. Felix Thompson Radio Elec. Shop. Weather reports and special warnings. Mountain.

KFFA, San Diego, Calif. 200 mi. Dr. R. O. Shelton. Daily, 6-7 pm, entertainment. Pacific.

KFFE, Pendleton, Ore. 100 mi. Eastern Oregon Radio Co. Daily, 7:30-8 pm, music. Pacific.

KFFO, Hillsboro, Ore. Dr. E. H. Smith.

KFFQ, Colorado Springs, Colo. 250 mi. The Mark-shall Motor Co. Daily, 4-5 pm, concert. Mon, Wed, Fri, 8-9:30 pm, special program. Mountain.

KFFB, Pueblo, Colo. Lowenthal Bros.

KFFG, Mt. Vernon, Wash. 50 mi. Buchanan Stevens & Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Fri, 7-9 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Sun, 2-3 pm. Pacific.

KFFH, Astoria, Ore. Astoria Budget.

KFFA, Gunnison, Colo. Colorado State Normal Schol. KFFH, Stanford Univ., Calif. 500 mi. 300 and 410 also. Leland Stanford Junior University. No regular schedule.

KFFI, Santa Barbara, Calif. Fallon Company.

KFI, Los Angeles, Calif. 400 only. 1,500 mi. Earl C. Anthony, Inc. Daily ex Sun, 1-1:30 pm, 5-6 pm, 7-7:30 pm, 8-11 pm. Tues, Fri, 1:30-2:30 pm. Sun, 10:30-11:30 am, 4-5 pm, 8-10. Pacific.

KFV, Yakima, Wash. 250 mi. Foster-Bradbury Radio Store. Daily ex Sun, 3-4 pm. Mon, Fri, 8-9 pm. Pacific.

KFZ, Spokane, Wash. 300 mi. Doerr-Mitchell Elec. Co. Tues, Wed, Fri, 7-8:30 pm, music. Sat, 7-8 pm. Pacific.

KGB, Tacoma, Wash. 200 mi. Tacoma Daily Ledger—William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Tues, 5-7:30 pm, entertainment. Pacific.

KGG, Portland, Ore. 500 mi. Hallock & Watson Radio Service. Daily ex Sun, 5-6 pm, music, entertainment, 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm, music. Pacific.

KGN, Portland, Ore. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.

KGO, Altadena, Calif. 350 only. 300 mi. Altadena Radio Lab. No regular schedule.

KGU, Honolulu, Hawaii. 485 also. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat, special program, 150th meridian. (Three hours later than Pacific.)

KGW, Portland, Ore. 400 and 485 also. 1,500 mi. Oregonian Pub. Co. Daily ex Sun, 3:30-4 pm, women's program. Mon, Wed, Fri, 8-9 pm, concert. Mon, Fri, 11-12 pm, Hoot Owls. Fri, 7-7:30 pm, lecture. Sun, 7-8 pm, concert. Pacific.

KGY, Lacey, Wash. 250 mi. St. Martins College.

Radio Digest Illustrated

REG. U. S. PAT. OFF.

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

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Endicott 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472

H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011



58
PUBLISHED WEEKLY

SUBSCRIPTION RATES

Yearly\$5.00 | Foreign\$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, March 31, 1923 No. 12

Need for Radio on Aircraft

Ruling in Denmark Forces Radio Equipment on Airplanes
THE air traffic commissioner of Denmark recently rules that all airplanes must be equipped with Radiophones. This is held as an important advance in both aviation and communication in Denmark. It is a progressive step not yet taken in the United States. Although ships of the sea must be so equipped, aircraft do as they please. After many accidents in aerial traffic over sea routes with some loss of life, two aerial navigation lines have voluntarily begun to equip their aircraft with Radio as a safety precaution.

Rear Admiral Moffett, chief of the naval bureau of aeronautics pointed out the necessity of Radio equipment, or at least pigeons on all aircraft, several months ago. All army and naval planes are Radio equipped at least when on long distance trips, and in addition carrier pigeons. The need of legislation for aircraft and aerial navigation is pointed out by many American experts, but a bill now before Congress was caught in the legislative jam and did not pass this session.

Vital Element in Life

The Audience Listening In on Radio Reaches Millions
IN THE last year scientists and engineers outdid themselves: Ten years of ordinary progress was crowded into the short space of twelve months. Turn whichever way you will and Radio greets you. Open your paper tonight, and somewhere within its columns you will find a discussion of Radio and the Radiophone.

The Radiophone is a fact, not a theory. It has already become a vital element in our domestic, industrial, social and political life. Radio provides the biggest show on earth at the present time. The Radio audience numbers millions and consists of people representing every country in the world.

The cast of the Radio show is unlimited; all the world is the stage. World's Series baseball games, play by play, direct from the diamond; prizefights direct from the ringside, blow by blow, mingled with the sound of the gong and outcries of the crowd; football games, direct from the gridiron, yard by yard, backed by college songs and cheers; track meets, lap by lap; and now the latest feature added to the program is opera, aside from the regular stock market quotations, weather reports, timely topics, etc.

About Amateur Operators

Canada Checking Up on Licensed Amateur Stations

CANADA has 1,800 licensed amateur Radio transmitting stations and fifty licensed broadcasting and commercial stations. Every owner of a Radio set in Canada is required to have a license. The rate for a receiving station is \$1 a year and licenses are obtained through the postoffices.

In order to check the wavelengths of transmitting stations Radio inspectors are being appointed in every city with a population in excess of 15,000. Twenty-five of these Radio policemen, most of them ex-service men, already have been appointed, to see that amateur transmitters comply with the new regulations which forbid amateur dots and dashes of voices in the air from 7:30 to 10 p. m., the hours reserved for broadcasting stations.

Amateur transmitters in the United States number 17,000 and there are no hours stipulated when these stations cannot send messages. In many instances the amateur gets above the allotted wavelength and causes interference from those trying to hear the concerts.

Many persons believe that the amateur should be heavily restricted by legislation, but it must be remembered that because of the liberal rights granted by the government to the amateur there was a host of self-trained amateurs in this country, second to none in the world, ready to enter the army and navy as Radio operators when the war broke. Great Britain had placed restrictions on her Radio amateurs and the result was a great shortage of operators in war time. A few Marconi operators had to handle the service until others could be trained. Regulations in the United States have been such that encouragement has been given to the amateur to experiment. The result has been that many improvements have come from amateurs experimenting in the attics of their homes.

Condensed

By DIELECTRIC

The American museum expedition was the first one in the history of big scientific explorations to utilize a Radio receiving outfit. With Radio the vast areas are within the touch of civilization, and the hitherto sensation of separation with its tendency to morbidity, is counterbalanced by the reception of broadcast programs.

Not long ago I ventured the assertion that practically the entire world would be able to listen in to a concert from a single station in the near future. Some places were missing from the list of those successful in tuning in WOR, the Station of L. Bamberger and Company, Newark, N. J., when they broadcast a special program recently, but from all accounts a large part of the Radio world heard most of the numbers sung by Miss Bennett. The reception of her voice was singularly true throughout its entire range, which is something to be envied by many of the Radio singers. Not the least comforting feature as regards Edith Bennett is the fact that she is an American girl and received her entire musical training in the United States. Requests for encore numbers will be coming in from European fans if they can be assured of such rendition.

Many instances of isolated communities and of individuals who, because of the peculiarity of their occupation, cannot enjoy the usual social privileges common to the rest of us, have found in Radio receiving sets the secret to pleasures formerly denied them are on record. However, I believe the first time that Radio has altered the dread lot of a leper (banishment from society) is in the case of Mr. Willett, a former state senator of Montana. For a man who has served in a public office to be absolutely cut off from his fellowmen must be a very depressing experience. It is not difficult to imagine the feelings of this man—and his wife, who remains with him—when he can turn to his set and hear from several states various announcements and classes of music. Some financially able Radiophan could greatly enhance the possibility of reducing melancholia among these unfortunate outcasts by donating sets to leper colonies.

The Radio Trust is ever with us, in one form or another, according to those who should be in a position to learn something of the facts. Whether such a thing actually exists or is in process of forming it is advisable for every fan to acquaint himself with as much information on the subject as he can acquire. Radio should never become the exclusive property of a single group, and that includes the manufacture and sale of sets and accessories as well as broadcasting. We are already familiar enough with the results of a monopoly of a very necessary adjunct to an efficient receiving set and such familiarity does not encourage us to see any further monopolistic encroachments. I say we should secure all the information available in order that our correspondence with national representatives may be intelligent. Every fan should make it his business to impress his desires on Congress.

The city of Chicago has not been slow to make innovations either in the material broadcast or in the manner of its transmission. Now we are to have a station in this city which may compare favorably for ornate construction with any anywhere. This "crystal studio" is fortunate in its setting, for one thing, being installed in the Edgewater Beach Hotel and for another, the peculiar construction of the studio itself. It will be possible for those interested in the procedure to witness what takes place in a Radio studio, due to the walls being made of plate glass. This station is not on the air as yet, but when you hear an announcer give the call WJAZ you may know the crystal studio is broadcasting.

We fans (some of us at least) have had access to first-hand information concerning several foreign countries, their mode of living, commercial advantages, presence or lack of progressive institutions, attitude of mind regarding this great country of ours and it has been presented through the popular disseminator—the microphone. On different occasions there have been broadcast "Italian, Russian, Japanese, Mexican Night" programs, consuming most of the evening's allotment of time, presenting some of the foremost artists and public men, with music and addresses calculated to enlarge our knowledge of the world about us. It is quite possible, of course, that some statements to which we listened were polished up for the occasion, nevertheless, such informative features convey facts worthy of attention and tend to acquaint races with each other's motives. It is rather important that we see the other fellow's point of view, not least of all when we turn our sets into transmitters.

Passengers by rail need be without entertainment only so long as the railroad companies fail to provide adequate means of listening to Radio broadcasting. On long journeys one tires of the usual means of diversion ordinarily supplied and wishes for a Radio set placed in one of the cars for the passengers' use. Some trains on a few of the railroads have equipped the dining car with receiving sets and where this has been done it has been greatly appreciated. If you happen to be traveling on the New York limited from West Point, Ga., not only will you be provided with the means of hearing Radio concerts, but the railroads operating in that section will give you a full program during the evening. They have their own broadcasting station maintained for the express purpose of entertaining you. It does more than entertain the passengers, however, for listeners in many States have reported hearing them. I have many times listened to the announcer calling the train number and imagined the group gathered in the diner before the receiver, as the train sped north. Give us more trains equipped for Radio reception.



RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

Our Steno Sometimes Says Things at Her's

Dear Indi.—I see where a French engineer claims to have invented a new machine for setting type, which has a special attachment permitting Radio copy to be received direct on the machine. Would like to know if any one has built a typewriter that will write out a letter when you talk at it.—Polly, "Sheba Steno."

Yeh, Marconi and He Were Cousins

You've run 'cross the chap who is sixty years or more; Who lives of the past—in the good old days of yore;



He's the type of bug who just sits around to buzz 'Bout the great old Radio "ham" he used to was. —SQUEEGEE.

Marcelled Tonsils Are Also Cute

When "phonographed voices" are sent by radio, the ladies will get the habit of manieuring their voices before having the photos taken.—Brownie.

But Thinka Tha Shieks, Rita

Dear Indigest—The static is said to be heavy in the Desert of Sahara. Radiophans should consider this before planning their summer vacations.—Rita M.

Now You've Gone and Spoiled Our Whole Day

Oh, Indi!—Some time ago a Radio amateur claimed to have reduced milk to an ethereal state and sent it by Radio to a distant point and there restored it to its liquid form. What great possibilities suggest themselves for the transportation of—no, the thought is too terrible.—"Oley."

And Insects Have Antennae



Radio news is everywhere, It's on the press, it's in the air; It's in the homes and in the zoos, The latter have their Radio gnus.

—BALD ONE.

A. B. C. Lessons for Radio Beginners

Chapter XIII—Radio Frequency Amplification

By Arthur G. Mohaupt

RADIO frequency amplification is an effective means of increasing the range of a vacuum tube receiving set; that is, it enables a detector circuit to receive signals from distant stations which in themselves would be too weak to operate the detector alone. Radio frequency amplification also makes possible the reception of Radio messages and musical entertainments by means of a loop or other form of indoor antenna.

Adding Stages of Frequency
Although one or two steps of audio-frequency can easily be added to a detector receiving set, the addition of these parts merely strengthens or amplifies the current oscillations after they come from the detector. They do in no manner, however, increase the range of the original receiving. Remarkable changes can be brought about in a receiving set employing two stages of audio frequency amplification, if one step of Radio frequency amplification is substituted for the second stage of audio frequency amplification. In such practice no more tubes are necessary than were initially employed, yet stations can be heard which formerly were entirely out of reach—and all this is accomplished with perfect reproduction and sufficient tone volume to effectively operate a loud speaker.

Operation Must Be First Learned
But simple as it may seem and appear at first thought, the application of Radio frequency amplification should not be attempted until thorough knowledge and skill of operation has been obtained in the use of the plain or regenerative receiver. The three-circuit regenerative receiver is capable of producing remarkable results if the operator knows how to make the proper plate voltage and filament current adjustments in addition to skillfully manipulating the coupler secondary so as to secure the necessary degree of coupling required for tuning in the desired stations and tuning out undesired and interfering stations. Only after the operator is thoroughly satisfied that he understands his set completely and that he is obtaining the best possible results that his outfit is capable of producing, should he direct his thoughts and attention to Radio frequency amplification. The latter at once introduces additional complications and requires special tuning adjustments which were not needed with the plain detector circuit. However, after its application and operation have once been mastered, Radio frequency amplification is capable of producing surprising results that will

amplification can be introduced to such an extent as is necessary to render them capable of operating the detector to best advantage, and after this audio-frequency amplification can be brought into play to further strengthen the rectified current

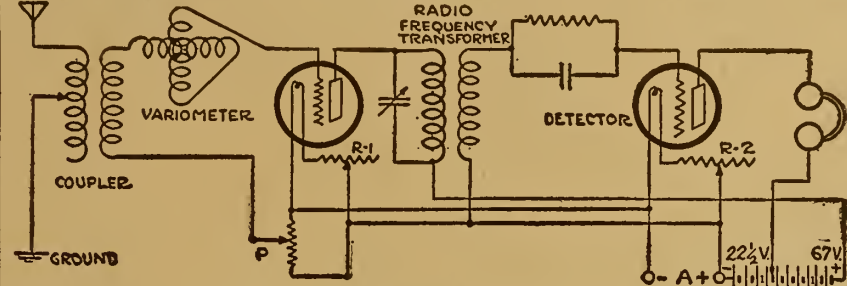


Figure 46

oscillations and render them capable of operating a loud speaker. Radio frequency amplification is thus not limited to one or two stages as was the case with audio frequency amplification, but any number of steps of Radio frequency amplification can effectively be employed until the received signals are of the necessary intensity to operate the detector.

With an indoor loop aerial with which the induced signals are inherently very weak, Radio frequency amplification if properly designed and applied can be used to strengthen these faint oscillations to such an extent that they can affect the detector with the same efficiency as the signals received from a good outdoor antenna. With an outdoor antenna it is seldom necessary to employ more than one or two stages of Radio frequency in order to give the receiving station the desired range, but with a loop aerial as many as three stages are necessary in order to produce sufficient effects upon the detector.

Advantages of Radio Frequency Amplification

With the use of Radio frequency amplification numerous advantages are gained which are not possible with audio frequency amplification. With the latter all noises, irrespective of their source or nature, are amplified; and if such disturbances are present to any extent, they will soon so seriously interfere that the sounds in the phones will be anything but pleasant. Radio frequency, on the other

hand, does not involve the presence of these disturbing tube and battery noises to such an annoying extent; for most of

these noises are the results of oscillations of comparatively low frequency, and these cannot be effectively transmitted through an amplifying circuit designed especially for Radio frequency oscillations. Also, with Radio frequency a number of stages can be effectively used without

distorting or seriously impairing the quality of the signals amplified. However, a Radio frequency amplifier cannot be used effectively to amplify "loud" signals, as the amplification would be only comparatively slight and hence would not warrant the application of this auxiliary apparatus.

Another advantageous feature resulting from the use of one or more steps of Radio frequency amplification, is that the selectivity of the receiver is greatly increased, for experience has shown that a difference of only twenty-five meters in the wavelengths transmitted by two different sending stations is sufficient to make it possible to tune in one station and exclude the others. It is true, of course, that such effects can be secured only through skillful and efficient tuning. It is for this reason that it was suggested above that Radio frequency amplification should be dealt with only after the simple receiving circuit has been thoroughly mastered.

Types of Radio Frequency Amplifiers

Radio frequency amplifiers are classified according to the methods of coupling that is used between the successive stages of the amplifier circuit and between the last stage and the detector circuit. The simplest of all is the resistance-coupled type,

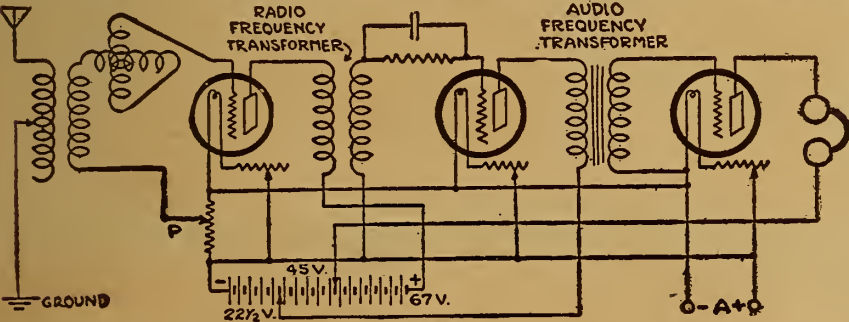


Figure 47

hand, does not involve the presence of these disturbing tube and battery noises to such an annoying extent; for most of

at once induce an incentive to dig deeper into its realm to see if there really is any limit as to what can be accomplished with its assistance.

Principles Underlying Radio Amplification

In order that a three-electrode detector tube can function properly, it is necessary that the potential variations impressed on the grid be of sufficient intensity to affect or influence the migration of the negatively charged electrons from the filament to the plate.

If the incoming oscillations are too weak to produce any appreciable effect upon the flow of current in the plate circuit, no sounds can be produced within the telephone receivers. This would be the case with the signals coming from a far distant station, or if the antenna were indoors or otherwise "shielded" by some intervening object. However, if these faint oscillations could in some way be intensified without distorting them or altering their inherent nature, they would be capable of more effectively acting upon the detector tube and thus rendering it capable of functioning more efficiently.

Operation of Radio Frequency

It is this very effect that is accomplished when Radio frequency amplification is employed. Instead of impressing the received signals directly upon the input circuit of the detector tube, they are first sent through one or more suitably coupled amplifying tubes before they are sent to the detector. As a result the signals are greatly amplified and can hence produce the same effect upon the detector circuit as the signals from a nearby station.

No matter how weak the incoming signals may be to start with, Radio frequency

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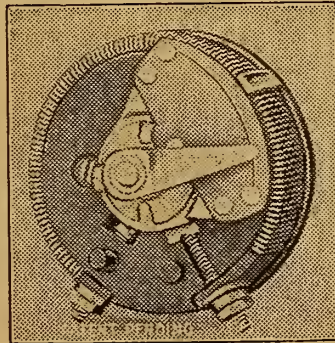
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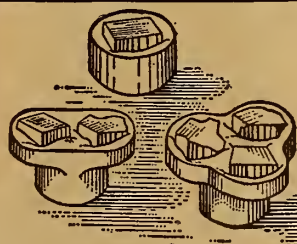
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in which a high resistance of suitable value is connected between the output circuit of one tube and the input circuit of the next tube. This method, however, is satisfactory and efficient only for long wave Radio communication, such as for transoceanic service, and hence is not of interest at this point.

In the inductively coupled type some form of inductance is used between the successive tubes. In some circuits a variometer can be effectively used for this purpose. Then there is also the capacitance method of coupling, but this has thus far not proven satisfactory.

Transformer Coupled Type

Probably the most convenient and most satisfactory type of Radio frequency amplifier is the transformer coupled type. In these the output and input circuits of successive tubes are coupled by means of specially designed Radio frequency trans-

(Continued on page 12)

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The illustration shows a hook-up for two stages of audio frequency amplification which has proven very satisfactory in that it cuts down greatly on the dis-

WORKSHOP KINKS? EARN A DOLLAR—

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

ortion often obtained in using this type of amplification. It will be noted that two different audio transformers are used. The first has a 10 to 1 and the second a 3 to 1 ratio. Another peculiarity is in the transformer connections. The diagram shows these clearly. — Fritz Franke, Chicago, Ill.

A. B. C. LESSONS

(Continued from page 11)

formers. The one disadvantage of this type of coupling is that the transformer must be especially designed for the wave lengths of the signals which it is desired to receive. Practically all modern Radio frequency transformers as used for the reception of broadcast programs are designed for a range of from 300 to 550 meters. For the efficient receiving of wave lengths above and below this band, transformers of slightly different design are necessary. In general, however, well designed Radio frequency transformers can be depended upon to give quite satisfactory and efficient results.

Circuit With One Stage R. F. Amplification

In Figure 46 is shown an interesting circuit in which one stage of Radio frequency and a detector are employed. The tuning circuit at the left consists of a standard variocoupler in the antenna circuit, and a variometer in the grid circuit for tuning this circuit into resonance with the incoming oscillations. The current oscillations in this tuned circuit are impressed upon the grid and filament of a hard amplifier tube. In this tube the oscillations are amplified and then sent into the primary of a Radio frequency transformer. From the secondary of this transformer the oscillations then pass through the grid condenser into the grid and filament of the detector tube, where they undergo rectification and additional amplification. Into the output circuit of the detector tube are connected the head phones in series with the B battery which supplies the necessary plate pressure.

As was stated, the tube used in the Radio frequency amplifying circuit is a "hard" amplifying tube which has its filament heated by the same A battery that supplies current to the filament of the detector tube. For the plate potential of this amplifying tube it is advisable to use a pressure of at least 67 volts in order to obtain most satisfactory results.

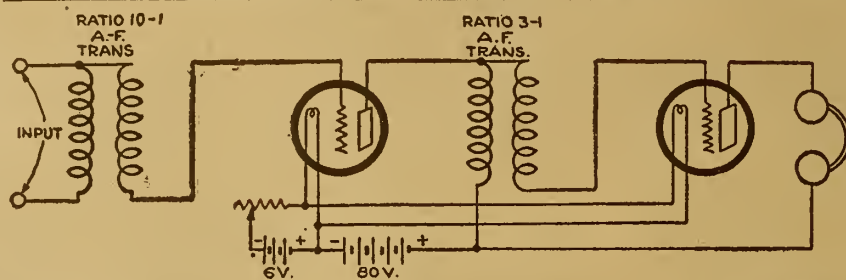
The Potentiometer

Another device used in connection with this amplifying circuit is the potentiometer P in the figure. This potentiometer is a variable resistance usually of about 200 ohms and is connected across the A battery circuit. It also has a third sliding contact which is connected to the tuning circuit of the left. By adjusting this sliding contact the potential of the grid with respect to the filament can be easily varied. Experience has shown that best results are obtained if the grid of the amplifier tube is slightly negative with respect to the filament. Thus with the aid of this potentiometer any degree of negative potential necessary can be supplied to the grid. This is a very important adjustment in all Radio frequency amplifiers.

Radio And Audio Frequency Amplification

In Figure 47 is illustrated another interesting receiver circuit employing one step Radio frequency and one step audio frequency amplification. This circuit if properly tuned is capable of producing very remarkable results. It has a very great range, and at the same time if used with a good antenna can produce signals loud enough to be reproduced in a loud speaker.

CONNECTIONS IN THE CIRCUIT



It will be noticed that the Radio frequency amplifier and detector circuit are the same as shown in Figure 46, but the output circuit of the detector tube feeds directly into one step of audio frequency amplification. Of course, if desired a second step of audio frequency amplification can be added to strengthen the signals still more, but this will seldom be found necessary.

Construction Details

In the construction of receiving sets employing Radio frequency amplification as was illustrated in the above two figures, certain regulations must be observed in order to prevent unpleasant interference between the various component parts. For instance, the variocoupler and variometer, which should be of good quality, should not be mounted closer than four inches apart. In fact, if possible they should be placed at opposite ends of the panel. In arranging the tubes and transformers it is best to allow a space of approximately three inches between the last Radio frequency amplifying tube and the detector tube. Also, if possible, a space of at least four inches should be allowed between the last Radio frequency transformer and the first audio frequency transformer. This is necessary in order to prevent any inductive interference, especially if the transformers are not shielded. If two audio frequency transformers are used, trouble can often be avoided if they are mounted with their cores at right angles to each other.

Close Connected

With the exceptions suggested above, the various parts such as tubes and transformers should be arranged so as to be as close together as possible. In this way the necessary connecting wires will be shorter; and, as is commonly known, the shorter the wires the less danger there is of losses or interference.

To assist in the tuning process it is a good idea to connect a 3-plate or 5-plate variable condenser across the primary of the first Radio frequency transformer. In this way this primary circuit can be tuned into resonance, with the effect that much louder signals will result. In fact, often the adjustment of this little condenser will tune one station out and another in.

Another important element which plays a vital part in the tuning process is the rheostat controlling the current to the

detector tube. For this reason it is best to use a rheostat with a vernier adjustment so that very close settings can be made. The grid leak in the detector tube circuit also needs careful consideration, for if the resistance is too low, it will load up the grid with an excess charge and thus paralyze the tube just when maximum amplification is wanted. Although there are numerous variable grid leaks on the market, the most satisfactory form yet devised is the pencil mark type, for with this the resistance can be easily varied as required. By changing the thickness of the pencil mark between the terminals of the grid leak, the point can readily be determined at which the detector tube will give maximum amplification without paralyzing itself.

Chapter Fourteen

The next chapter will deal with additional circuits employing two or three stages of Radio frequency amplification. In addition, special information will be given in connection with loop aeriels and the types of circuits best adapted for this type of aerial. The chapter will thus form an important addition to the present one, and should not be overlooked by any one desiring a complete knowledge of this all important subject.

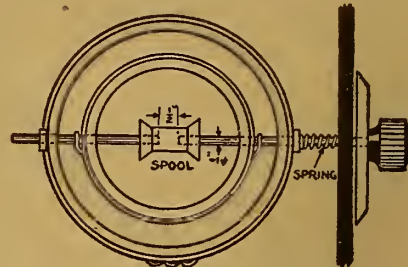
Be sure your lightning switch is not covered with ice, otherwise the signals will be extremely weak.

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Rotor Shaft That Runs True in Variocoupler

Many amateurs would make their own variocouplers if it were not so difficult to get the rotor shafts true. I had this trouble until I hit on the method as shown in the illustration. Procure an empty thread spool and give it a coat of shellac, inside and out. A coat of thick



black enamel may be added to the outside if desired. Wrap the ends of the shafts with one layer of empire cloth, soak it in shellac and push it into the spool while the shellac is still wet. Keep the ends 1/2 inch apart. The shaft will be true and the dial will not scrape the panel.—Jack Ward, Berkeley, Cal.

Back Panel Mounting for Coils

This way to mount spider web coils is exceedingly efficient and they are controlled by knobs on the panel front. I am using this style mounting on my three-circuit tuner and I get excellent results.—Chas. P. Cothran, Covington, Tenn.

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- \$8.00 2200 Ohm Head Phones, per pair \$3.25

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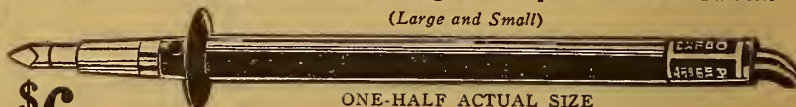
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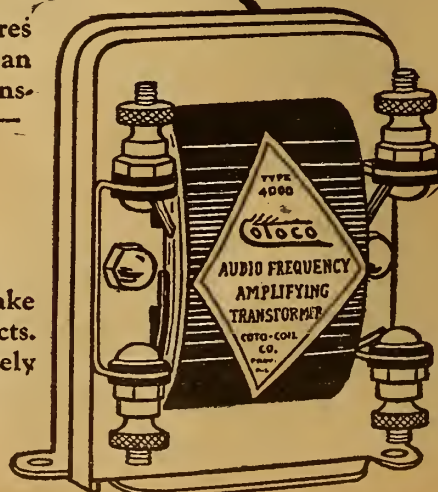
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Increased Signals with Two Tube Set

Loud Tones Produced With Inexpensive Set

The accompanying diagram is that of my receiving outfit. The antenna is one wire 135 feet long and 44 feet high. The leadin is No. 14 gauge wire 40 feet long. This was done to overcome any variable-ness which might be caused by the swaying of the wire, fading away as it is called.

The variocoupler is the secret of the loudness of the signals. The diagram is self-explanatory. The rotor hooked up in this way is practically a variable condenser with increased signal strength. The 1 1/2-volt filament battery gives it another boost on its way. The stator using the whole coil also gives increased signal strength, and does away with taps and switch which are valueless as far as I have experimented.

Tuning the Set

The variometer is another secret to increase your signals, which will take a little patience to learn how to manipulate it. If once accomplished it takes away that critical adjustment of the rheostat.

Set your condensers, variocoupler and variometer at zero. That means, with the plates on the condensers all the way in. The rotors of the variocoupler and variometer are set in the same position as the stator. Turn on your rheostats until the point just below where the hissing and howling starts. Rotate your variocoupler to about 50 on your dial, then adjust your 43-plate condenser in the primary circuit until the whistling or howling starts. For long distance reception the plates will need to be almost entirely all the way out. Try to bring the station almost in, either with the rotor of the variocoupler or condenser then finish off with the variometer until the maximum signal is obtained. Never rotate your variometer over a quarter of a turn from its first position.

Just experiment with it in the position you may have it before you start to tune, then by turning it back to its first normal position, you may get a surprise in the increase of your signal and how it will eliminate tube noises and static. Do the final adjusting with the variable condenser across the primary of your transformer. This should be used sparingly and most of the time left with the plates all the way in. If you want to use a fixed condenser it must be .006 mfd. capacity.

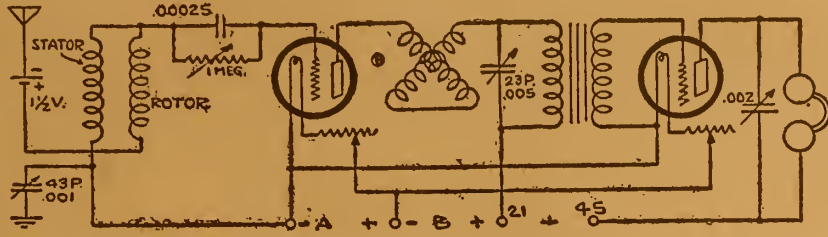
Tune with Condenser

Remember when leaving a station and bringing in a new one to just turn your 43-plate condenser slightly or the variocoupler, either one will give results. As a rule you will need to finish up with the variometer again. I am using a variable grid leak. About 1 megohm is the right capacity, nothing critical about its operation. One thing that must be remembered is that your transformer must be tapped from a 21-volt B battery. This is important.

Body capacity is my worst enemy, but I reduced this to a minimum by taking little strips of nickel plated metal about 1/8 inch thick, 3/8 inch wide and 4 inches long and making a double bend in them at right angles. Small holes were drilled in the ends of each strip for the purpose of screwing on the knobs of the dials. Rubber tubes were slipped over the ends of the strips to keep the fingers from touching the metal parts.—O. P. Klein, Luduc, Alta, Canada.

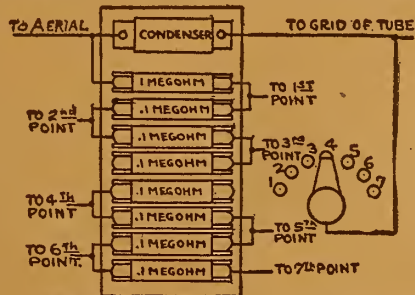
If no solder is handy apply a flux to the joint, then wrap it with several thicknesses of tinfoil and heat the joint with a match. This will make a tight connection that will serve in an emergency.

HOOK-UP USED IN THE SET



Flewelling Variable Grid Leak

In building the Flewelling super circuit I had trouble in adjusting the lead pencil mark variable grid leak, so I set about to make one which resulted in the device illustrated. A very fine adjustment may be had, and by changing the first grid leak tube any resistance that is needed for a certain set is easily found.



A base 2 inches wide and 6 inches long is cut from Formica. On this is mounted the grid leak and grid condenser. This base with its parts can be mounted on the back of the panel as a single unit.

Procure nine pair of grid leaks and condenser mounting clips and one grid leak tube of one megohm, seven of 1/10 megohms and one grid condenser. Mount these on the base and connect up as shown, using a seven-point switch.—A. C. McLellan, Westville, Ind.

Never Dope a Battery

According to the old time horse racers, you can dope any horse, if he is reasonably speedy, so that he can win one race easily. And according to battery men it is possible to dope a storage battery so that it will show a remarkable amount of pep for a while. But, with both the horse

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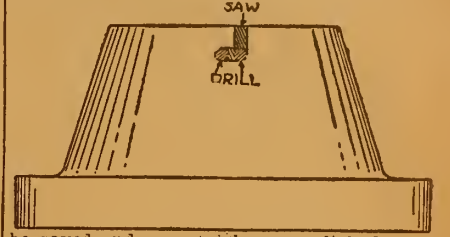
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Very often a molded socket becomes broken at the small lip which locks the bulb. It is a tedious job to repair one of these and a new socket will cost a dollar—often more—to replace it.

If a new lip or lock is made on the opposite side, or any other side and the connections moved accordingly the dollar will



be saved and a neat job accomplished. Be careful to have the prongs of the tube set firmly on the springs, then mark the place where the lock pin will be when the tube is fully inserted. Drill a hole at this point the same size as the original, then drill another alongside of it and with a hacksaw cut the vertical slot to this last hole so that the lock pin will slide in freely. Be sure to change the connections before using the tube.—H. F. Manchester, Atwater, Cal.

and the battery, the dope is really the beginning of the swift, sad finish.

There are various kinds of battery dope being put out with rosy promises of increased battery performance, but they are all alike in one particular; the good they do is temporary, and is far over-balanced by the harm they are sure to work later.

Wooden Panels Made Attractive

Wooden panels of a Radio box can be rubberized by breaking several old phonograph records into small pieces, putting them in a tin can, and adding one-half pint of denatured alcohol. This will dissolve in a day or two; then apply on the boards with a brush. A very glossy finish can be obtained if the rubber surface is shellacked. One-quarter inch wood is of correct thickness for most small receiving panels. It would be well to dry the material in a warm oven before applying the insulating mixture.

A buzzing noise in the phones may often be traced to a loose connection or a run down battery.

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How to Construct a Flewelling Super Set

The Second Prize Winner in the \$100 Flewelling Set Contest

By F. P. Hall

(Editor's Note.—The following article is the second prize manuscript submitted in the \$100.00 Flewelling Set Contest conducted by Radio Digest. The first prize set description will appear next week.)

THE writer, as an enthusiastic reader of Radio Digest since the first issue came out in search of the new and novel "hook-ups" usually to be found in there, ran across the first published layout of the now famous Flewelling circuit, cut it out and immediately began work on it.

A supply of fixed condensers was hurriedly procured, and a rough arrangement hurriedly fixed up on a board, and finally stations began to come in; due to the fact that I was using Myers audion tubes, this type of tube being a pet of the writer, some difficulty was experienced in getting the proper values of condensers and grid-leaks, and considerable experimentation was necessary before the wonderful concert of squeals and shrieks was gotten under control.

Layout For The Cabinet

The front of the receiver consists of a formica panel 6 inches by 7 inches by $\frac{1}{8}$ inches, and a 23 plate variable condenser mounted on the back on the left hand side and about 2 1/2 inches down from the top of the panel—the panel being first shielded by shellacking on the back a sheet of thin copper foil and placing under pressure until dry.

A 4 inch dial was fitted to the shaft of the variable condenser and a small extra knob with a 7/8-inch diameter rubber faucet washer was located at the lower center of the panel, bearing against the 4 inch dial with enough friction to act as a vernier in turning the dial.

Clips For Holding The Tubes

Four clips to hold the Myers tube were obtained and placed at the right upper side of the panel, and directly under the same was fastened a Bradleystat.

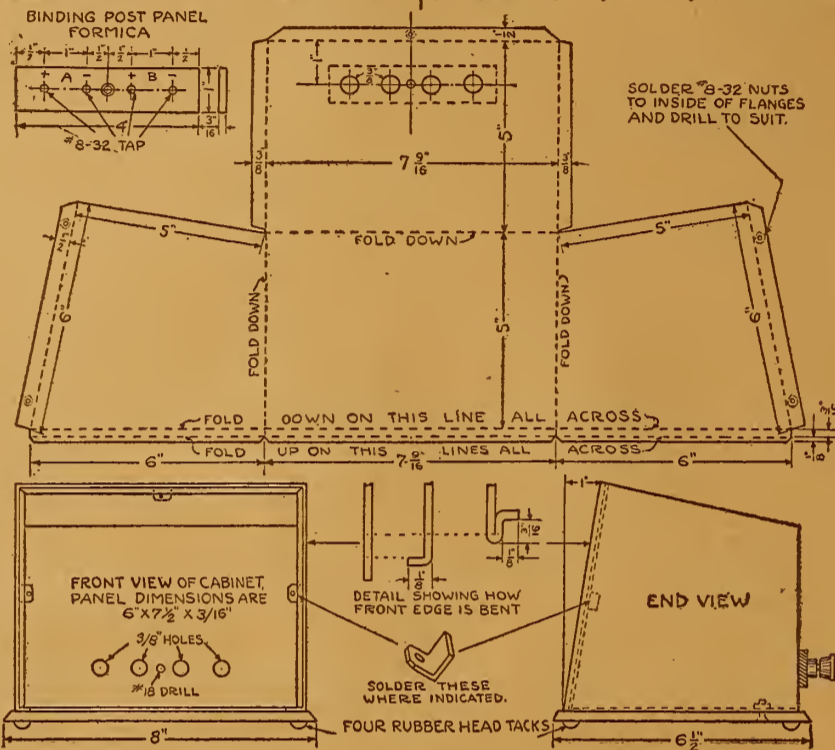
At the left and symmetrical with the Bradleystat knob was then drilled a 1/4-inch hole, and from the "makings" of a variable condenser purchased at a department store for 30c, a 3-plate vernier variable condenser was constructed and mounted directly under the 23-plate variable and connected thereto by suitable leads. The movable blade in this vernier condenser was cut down with the tin shears to a size of about that of half of a silver dollar, in order to provide sharper tuning control.

The shaft of the vernier condenser extends through the 1/4-inch hole in the

their proper positions with small escutcheon pins. Three holes were then drilled in the sides and top for fastening the panel to the case. These were countersunk and nickel plated oval head screws were fitted.

Mounting for Coils

A couple of wood blocks 2 inches in diameter and 1 inch thick were made to



fit the inside of the two Giblin-Remler 50 and a 75 turn coils, and four large fibre disks cut out of 1/8-inch fibre of a size equal to the outside diameter of the two coils were fastened to either side of the wood plugs after the coils had been placed thereon.

A brass strip was screwed to the block holding the 50-turn coil and bent and drilled to fasten to the end plate of the 23-plate variable condenser. A longer brass strip is fastened to the other 75-turn block and a small hinge soldered or

condensers, of a value of .006 mfd. each. A small hard rubber panel was prepared slightly larger all around than two of these fixed condensers laid side by side with about 1/4-inch clearance between them, and three long brass screws were fastened to each side of this hard rubber panel in such a way as to permit two condensers to lay side by side with the

the Myers tube requires a grid condenser of .0005 mfd. value, one of this size must be obtained, or can be made with two brass or copper strips about 1/2-inch wide, with an overlap of 1/4-inch separated and covered by thin pieces of mica, and fastened securely together.

In order to keep the grid leaks as short as possible, the grid condenser was placed directly between the 23-plate variable condenser and the grid terminal of the tube.

A lead was brought from the grid terminal to the grid leak and from the other terminal, connected to the minus side of the filament or A battery circuit, instead of shunting the grid leak around the grid condenser.

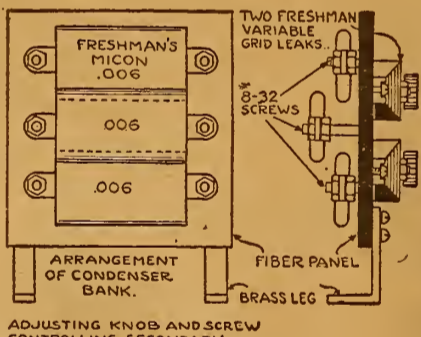
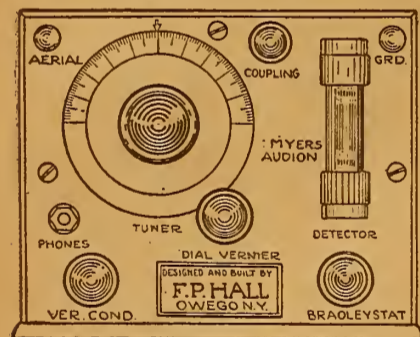
Flexible leads of stranded insulated wire were connected to the outside and inside ends of the 75-turn coil, one lead going to the plate terminal of the tube, and the other to the B battery plus connection.

The second variable leak was bridged across the third .006 mfd. condenser which itself bridges the other two, and by sawing slots in the hard rubber buttons or knobs on these two leaks and making corresponding small holes in the case, these can be adjusted from outside the receiver by use a small screw driver.

Leads to the Parts

The other necessary leads were run to connect up the Bradleystat, the 50-turn coil, the condensers and phones. All wiring was of No. 14 wire, covered fully with spaghetti tubing, and all connections soldered and made tight.

Four flexible leads about 9 inch long were arranged to connect with the four (Continued on page 15)



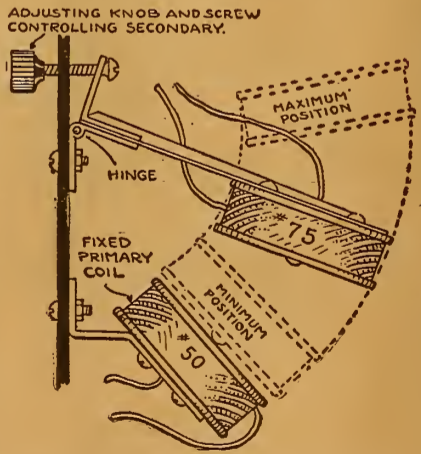
panel previously described as on the left side, and fitted with an extra knob. This knob has a small screw or saw cut filled in with white lead to designate when the vernier condenser blade is in the "half-in, half-out" position, as to afford maximum tuning control this blade should be placed in this position before tuning with the 4-inch dial.

Phone Jack

A phone jack was next fastened to the panel at the extreme left as this location is best adapted to keep the phoniccord out of the way while operating the instrument. Two black binding-posts were then fitted at the upper corners of the panel, the one at the right making contact with the copper foil shielding only, suitable holes being cut in this shield at the other binding post and also wherever variable condenser shafts, legs, etc., required.

Near the top of the panel, to the right of the dial and not too near the plate terminal of the Myers tube, was drilled a small hole and tapped for an 8-32 screw, into which was placed a long brass screw of this size with the head rounded off on the under side, and fitted on the front of the panel with a small hard rubber knob, which was securely fastened to prevent the knob unscrewing. This knob on the outside of the panel being used for giving a micrometer adjustment in the coupling of the two inductances, as is shown in detail in a sketch submitted herewith.

A number of small name plates with the words "Aerial", "Ground", "Phones", etc., were then fastened to the panel in



riveted to the lower end of the same, as well as fitted to the back of the panel in such a position as to allow this coil to swing into contact with the other coil on the end of the condenser.

At the bottom of this same brass strip and on the opposite side from the coil was soldered a small angle shaped piece of brass strip having a slot to engage the head of the screw threaded through the panel, as previously described, this being the variable coupling arrangement shown in a sketch.

Condenser Bank

The next step to consider was the construction of the condenser bank,—consisting of the three large fixed capacity con-

third condenser raised above these two by about 1/4-inch and held firmly in that position by two nuts on each screw in the ends of the condenser. (See sketch showing detail.)

The condenser panel was mounted on the rear of the front panel at right angles with it, a brass strip supporting it rigidly.

The Grid Leaks

On the reverse side of this small condenser panel two Freshman variable grid leaks were mounted (see sketch), the sealing wax in them being carefully melted out and the grid condensers removed. As

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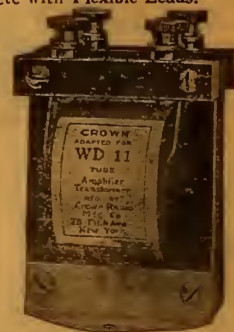
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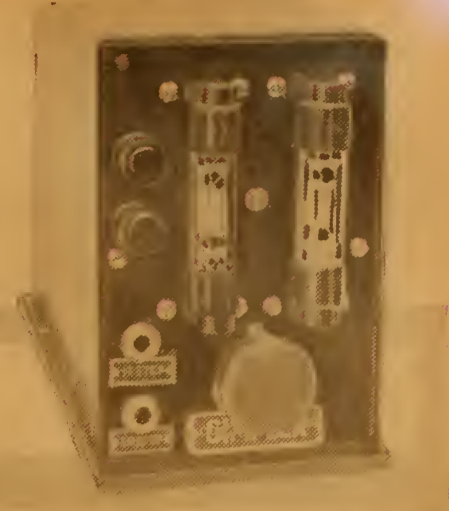
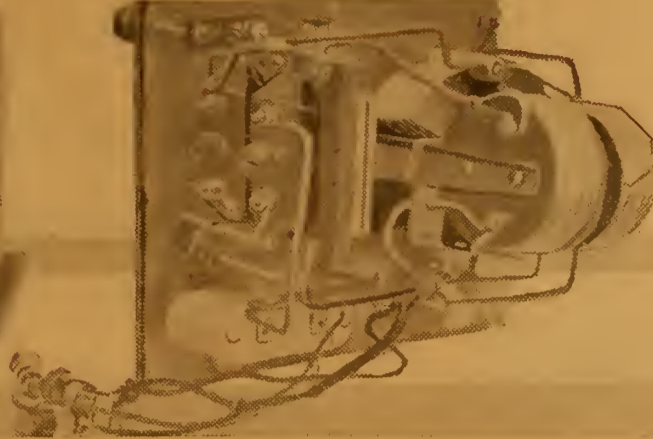
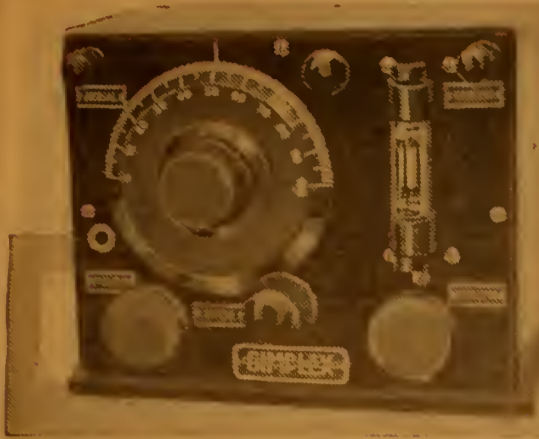
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78 FIFTH AVENUE
NEW YORK CITY



FLEWELLING SET

(Continued from page 14)

binding posts fixed to the back of the case which were supported and insulated from the case by a 1-inch strip of formica fastened thereon. This strip was suitably marked with A+ and —, and B+ and —.

Three oval head nickel plated screws fastened the panel securely in place in the case, with a slight rake or slant of about 1 1/4 inch in 6-inch height, which makes the operation of the knobs, etc., on the front easier and more convenient than when the front panel is vertical.

Sheet Metal Case

The case itself was made from a sheet of medium weight tin, with the dimensions and layout as given in attached sketch. This was cut out and formed up with the aid of a brake, at a sheet metal shop. After forming, the seams were soldered, and the edges as well as the surplus solder filed down smooth and the corners rounded. Three small brass lugs were soldered to the inside at the center of the top edge and the two sides for tapping later to receive the panel holding-on screws.

Five 8-32 brass nuts were also soldered to the inside on the flange that extends around the bottom, and the holes were made to permit screws to be placed in the wood bottom to fasten into these nuts and hold the tin case down firmly upon the base.

When the case was finished, filed and smoothed with emery cloth to a final finish, it was then japanned or painted with black enamel, the first coat rubbed down and a second one given. A piece of hard wood about 1/4-inch or 3/8-inch thick was cut to the required size and finished smooth and enameled. Four rubber head tacks or bumpers were then fastened to the bottom to act as feet.

Aerial or Ground Connections

As explained in Radio Digest both aerial and ground are not required. You will recall that in the first part of this article I stated that the binding post marked

"ground" was attached to the copper shielding and hence to the metal case only, but otherwise has no connection with the wirings. I have found that if a ground connection is made to this binding post, thus grounding the shield, it eliminates the capacity effect and also adds to the loudness and stability of the reception.

In operation the receiver is the acme of simplicity. Just connect the batteries, turn up the filament to a low brilliancy, screw in the coupling knob until you hear the tube grow "mushy", turn the big dial and you meet a number of "squeals".

I find in operating the receiver that the closer the coupling the less B battery is normally required. I get good reception with 45 volts on the plate and sometimes when a distant one refuses to come-in pile on the B battery up to 180 volts, and my, how the tube does sing. With the coupling at about 1 inch between coils and 90 volts on the plate, about everything on the air can be brought in.

Selectivity of Set

The principal advantage of this particular

design is the extreme selectivity obtainable. First there is the vernier filament control, second, the dial vernier, then the small vernier condenser, and for a finishing touch the closely controlled coupling knob.

The small size of the vernier condenser blade is also a great advantage, but yet I have had two stations with waves so close that less than a quarter turn of the vernier gave me either.

In general I think this circuit is the greatest ever, and I have tried out a lot of "trick" hook-ups. I think there are great possibilities yet undisclosed with it. I find, for instance, that in using Myers audion tubes, that on account of the changed values of this tube due to its compact construction and low internal capacity and impedance, that the values of the three fixed condensers of .006 mfd. capacity are not critical, the circuit operating fairly well on as low as .001 mfd. for these condenser values, and as the

grid condenser is 1/5 the usual size for the regular type of tube, it may be that less than a .006 mfd. is best.

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Eliminate Wall Pins by using Signal Dots for permanent records. Books can be closed and Maps removed from wall without disturbing record. Made in two sizes for Maps, Books or Cards. Send fifteen cents in stamps for envelope containing 100 signals in three colors. Mention Map, Book or Card. Dealers write for special discount for gross lots. L. L. Smith & Co., 188 Washington St., Lynn, Mass. Mfrs. of Radio and Auto Specialties.

Thousands of Satisfied Boosters Attest to the Superiority of the Genuine and Guaranteed

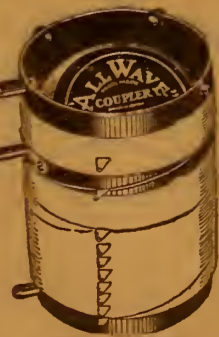
"All Wave" Coupler

TRADE MARK

Wave Length—150 to 3,000 Meters

Why Be Confined

To listening in on nearby stations, when the "All Wave" coupler in your set will enable you to receive broadcast reception from stations thousands of miles distant?



Be Prepared

To receive on the higher wave lengths that have been and will be allotted to broadcasting stations because of their ever increasing number.

Price \$9.00

ASSEMBLY AND OF RESULT

THE "ALL WAVE" COUPLER COMBINES

SIMPLICITY OF EFFICIENCY

Inasmuch as all variometers, variocouplers and loading coils are eliminated. Six efficient hook-ups sent upon receipt of ten cents in stamps to cover cost of mailing.

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Don't Waste Money, Time and Patience on Cheap, Improperly Designed Radio Parts. Insist on Getting New York Coil Company's Products, Which Insures Entire Satisfaction. Honestly Priced, Scientifically Constructed and Engineered to Deliver the Maximum Results.

JOBBER AND DEALERS get our complete literature and worthwhile discounts.

Standard 90 Degree Variocoupler, \$3.50.

OUR 180 DEGREE VARIOCOUPLER is a masterpiece, suitable for use in any circuit. Most efficient and best constructed Coupler in existence. Price, \$4.50.

Our Combination Mounted Variocoupler for table or back panel mounting has all taps connected and soldered, nothing else like it. Price, \$8.00.

MOUNTED 3 CIRCUIT TUNER. Exceptional selectivity and sharp tuning makes the most easily constructed and highest efficiency Set known. Price, without Dial, \$6.00.

Our Variometers are full size precision instruments. They are not of the "competitive" type. Price, \$4.00.

Our Audio Frequency Transformers are the choice of the leading manufacturers and radio engineers. Guaranteed to give high magnification, less distortion and better all around efficiency. No howling. Price, \$4.00.

NEW YORK COIL COMPANY'S Variable Condensers are the standard by which others are judged, containing such features as all metal framework, adjustable bearings and positive electrical contact:

11 Plate.....	\$1.50	43 Plate.....	\$3.00
23 Plate.....	2.00	3 Plate.....	1.25

NEW YORK ENTERTAIN-A-PHONE RECEIVING SET No. 2—Complete with detector and two stages of amplification, all in one cabinet. Contains a non-regenerative two circuit hook-up with two stages audio amplification. Results are simply a revelation. It must be operated and heard to be appreciated.



Workmanship and design of exceptional character throughout. Of unusual interest to the jobber. Price, \$50.00, fully guaranteed.

NEW YORK COIL COMPANY, Inc.

340 Pearl Street

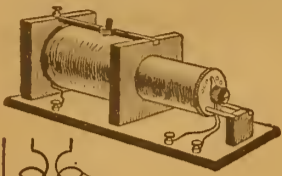
New York City, N. Y.

About Radio Parts

THE LOOSE COUPLER

Another form of tuning unit that closely resembles the tuning coil is the loose coupler. However due to its bulky construction it has gradually lost its former popularity.

The resemblance to the tuning coil in



this instrument lies in the fact that its primary winding is adjusted for the proper wavelengths by means of a slider, but here the resemblance ends, as there are two distinct circuits which are inductively coupled. The current flowing in the one creates a constantly varying magnetic field which induces an alternating current in the other secondary winding.

This secondary winding can also be adjusted for wavelength control by means of the tapped switch at one end.

By sliding this secondary in and out of the primary winding the induction in the secondary is controlled.

For different wavelengths there are certain points of resonance, that is the point of coupling, where the current in the secondary reaches its maximum value. In this manner very selective tuning is possible.

THE VACUUM TUBE

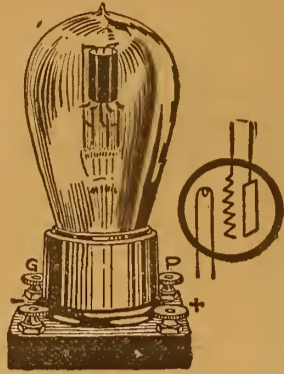
The success of the Radio industry is due to the development of the vacuum tube. Not only because it takes the place of the crystal detector with increased efficiency but also because of its ability to act as an amplifier.

It consists essentially of an evacuated bulb which has four sets of terminals. Two of these terminals are connected to the filament which when heated emits electrons that flow to a second element called the plate. This plate also has an external terminal.

The peculiar property of this flow of electrons or current, which makes it so valuable is the fact that the electrons will flow only from the filament to the plate but not back again. In this manner alternating current when passed through the filament to plate circuit loses all the impulses in one direction and becomes a direct pulsating current.

The third element called the grid also has an external terminal. This grid is

the means of controlling the flow of electrons from the filament to the plate. It can retard or even increase the flow depending on the charged condition of the grid. This third element increased the



efficiency of the tube to an unlimited extent and is the biggest development made in Radio.

Renewing Dial Figures

Every amateur wants a neat looking panel, but in time the marks and numbers become darkened and yellow. This makes a panel look bad. A little white paint may be mixed thickly so that it is like a paste and then spread it over the figures on the dial. When dry the surplus may be wiped off with a damp rag, leaving the depressions full of white paint.—W. King Jenkins, San Francisco, Cal.

The use of Radio for the dissemination of information about the collection of waste paper and its importance to the paper industry is the latest step taken by the country towards relieving the present shortage by informing the public that there is a new and active market for this waste.

PRICES SLASHED!
BUY HERE FOR MUCH LESS

All Merchandise Sold on a "Money Back" Basis

FONES

\$ 6.00 Manhattan 2000 Ohm Fones.....	\$ 3.75
12.00 Genuine Nathaniel Baldwin Type C Double.....	8.65
6.00 Genuine Nathaniel Baldwin Type C Single.....	4.50
7.00 Guaranteed 2400 Ohm Fones.....	3.95

TUBES

U. V. 200 Detectors—List \$5.00.....	4.25
U. V. 201 Amplifiers—List 6.50.....	5.35
U. V. 201A.....	5.95
Improve Detector Tubes.....	2.65
Mercury 1 1/2 Volt; guaranteed as good as V.D. 11. Fits standard socket; consumes 1/4 ampere current per hour.....	5.95

MISCELLANEOUS

\$45.00 Magnavox Loud Speaker, Type R3.....	26.95
25.00 Atlas Loud Speaker.....	17.95
Mounted Hot Spot Crystals, 35c value.....	.20
Crystal Detector Stands, 90c value.....	.40
\$2.00 Grewol Enclosed Detector.....	1.55
Genuine Reinartz Coils, 15 taps, \$3.00 value.....	1.95
\$7.50 Moulded Dayton Variocouplers.....	4.95
7.25 Moulded Dayton Variometers.....	4.75
1.10 Dayton Rheostat.....	.75
1.00 Genuine Dayton Bakelite Dials.....	.45
.50 Dials 2 and 3 inch.....	.25
1.00 Eria Sockets.....	.45
Switch Levers, 50c value (adjustable radius).....	.30
10-1 Transformers (well-known) \$4.75 value.....	3.75
5-1 Transformers (well-known) 4.75 value.....	3.75
3-1 Transformers (well-known) 4.50 value.....	3.45
Radio Frequency Transformers—\$4.50 value.....	3.45
Genuine Million Point Crystals.....	.25
Solderall.....	.20

HONEYCOMB COILS

25 Turns.....\$0.35	200 Turns.....\$0.70
35 Turns......35	250 Turns......70
50 Turns......35	750 Turns......90
75 Turns......35	1000 Turns.....1.15
100 Turns......45	1250 Turns.....1.40
150 Turns......55	1500 Turns.....1.50

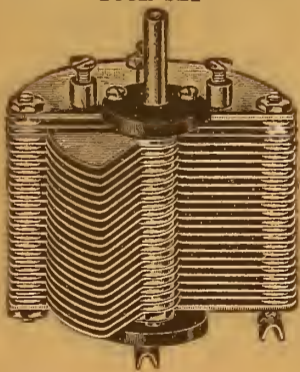
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BY ADDING A PERFECTLY CONSTRUCTED VARIABLE CONDENSER TO YOUR SET



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23 PLATE.....	1.40
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REINARTZ CIRCUIT

EVERY PART COMPLETE

1 Reinartz wound coil, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD variable condenser, 1 13-plate .00025 MFD variable condenser, 3 inductance switches, 16 switch points and nuts, 4 switch stops and nuts, 8 binding posts, 2 3" dials, 1 variable grid leak, 1 .002 MFD phone condenser, 23 feet bus bar wire, 1 high-grade Radion panel and diagram and complete instructions **\$10.00**

FLEWELLING CIRCUIT

EVERY PART COMPLETE

2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .0005 MFD variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 high-grade RADION panel, 1 3" dial and the Radio Digest Booklet on Operation and Construction of Circuit..... **\$11.00**

TWO STAGE AUDIO FREQUENCY AMPLIFIER

EVERY PART COMPLETE

1 7x9 Panel, 2 Audio Frequency Transformers (5 to 1 Ratio), 2 Rheostats, 2 V. T. Sockets, 3 Jacks (Double Circuit), 7 Binding Posts, 1 Variable Resistance Leak, Necessary Bus Bar Wire. Can be used with either of the above circuits or any other receiver..... **\$11.00**

TUNING AND DETECTOR UNIT

and 2 stages of audio-frequency amplification

List Price **\$35.00** for each unit

Built in Mahogany finished cabinets measuring 7x7x14 inches for Tuner and Detector Unit and 7x7x8 inches for Amplifying Unit. Affords an unusually high range of program selectivity and local stations can easily be tuned out to secure distant ones. Guaranteed to give excellent results, only the very best material being used in its construction.

Special Price .. **\$21.75** per unit Combination .. **\$40.00**

CONDENSERS

3 Plate Variable; value, \$1.75....	\$1.05
13 Plate Variable; value, \$2.50....	1.20
23 Plate Variable; value, \$3.50....	1.35
43 Plate Variable; value, \$4.50....	1.85
13 Plate VERNIER; value, \$5.50..	3.75
23 Plate VERNIER; value, \$6.00..	4.00
43 Plate VERNIER; value, \$6.50..	4.25



Reinartz Coils

Including Mounting Value, \$2.50
\$1.75



Ball Bearing Inductance Switch

Value, 75c; Special at 30c



AUDIO FREQUENCY TRANSFORMER

Designed for use with W. D. 11 Tubes, List, \$4.50; Price, \$2.75



V. T. SOCKETS
Nickel plated brass sleeve, composition base; value, \$1.00; special at 50c



ALUMINUM LOUD SPEAKING HORN

Nickel plated, highly polished; \$8.00 list.....**\$3.75**



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Telephone 3000 Ohms Headsets; \$9.00 value; reduced to**\$3.50**



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50 turns mounted..	\$0.95
75 turns mounted..	1.00
Double Coil Mountings.....	2.45
Triple Coil Mountings.....	3.35



EXTRA SPECIAL While They Last

Clapp-Eastham—39 Plate Variable Condenser, .001 capacity, Bakelite ends. Equipped with 3-in. Dial.....	\$1.95
Clapp-Eastham—5 Plate Variable Condenser, Bakelite ends, Dial for Vernier.....	\$1.15
Clapp-Eastham—39 Plate Variable Condenser, .001 capacity, Glass enclosed for table mountings. Precision made. Equipped with 3-in. dial. Reduced to.....	\$3.95

VARIOCOUPLER —Celeron Condensite and Litz Wire Wound Secondary; Value \$4.50, Special.....	\$2.95
Potentiometer with knob; value, \$1.75; special at.....	1.00
Potentiometer with 2 1/2" dial; value, \$2.15; special at.....	1.15
BEST QUALITY JACKS , Single Circuit; value, 65c; special at.....	.30
Double Circuit; value, 90c; special at.....	.45
MULTIPLE POINT INDUCTANCE SWITCH with Knob and Dial (15 switch Points).....	1.75
LIGHTNING ARRESTERS approved by underwriters.....	\$0.90

THREE-INCH DIALS —Unbreakable—heat resisting composition—high finish; special.....	\$0.30
TWO-INCH DIALS —Same design—for rheostats and potentiometer; special.....	.25
RAYMOND VERNIER RHEOSTATS —Value, \$1.50; special.....	.95
FILAMENT RHEOSTAT —Condensite base; value, \$1.10; special at.....	.70
FILAMENT RHEOSTAT with 2 1/2" dial; value, \$1.50; special at.....	.85
TELEPHONE PLUGS60
FRESHMAN VARIABLE RESISTANCE LEAK and MICON CONDENSER Combined.....	.75

Every article advertised above is guaranteed both by the manufacturer and by us—Mail orders filled immediately—transportation PREPAID on all orders of \$5.00 or over east of the Mississippi River. All others include postage.

Construction of the Ultra Reinartz Receiver

Part II—The Panel Layout

By H. J. Marx

IN PART I, details for the construction of the special tuning units of the ultra Reinartz circuit were described. The lay-out of the panel with the comments on the mounting of the various instruments are given in this installment.

The panel required should have overall dimensions of ten by twenty-two inches and should preferably be made of quarter

inch stock. This circuit is not sensitive or critical to body capacity effects and leakages, but at the same time, it is highly

never practical for assembly of Radio apparatus because of the losses due to leakage on account of the low resistance quality of wood, especially when not thoroughly dried or when covered with a coating of paint. Figure 1 gives the dimensional lay-out for the location of all of the apparatus required for assembly. It will be noticed that no baseboard is used, but

may vary according to the type of instrument used.

Grid Circuit Controls

The grid circuit is controlled by the variation of self-inductive coupling between the rotor and windings of the tuning unit. This control is operated by means of the dial, the location of which is indicated by the lower quarter inch hole,

condenser and will be indicated in a later issue.

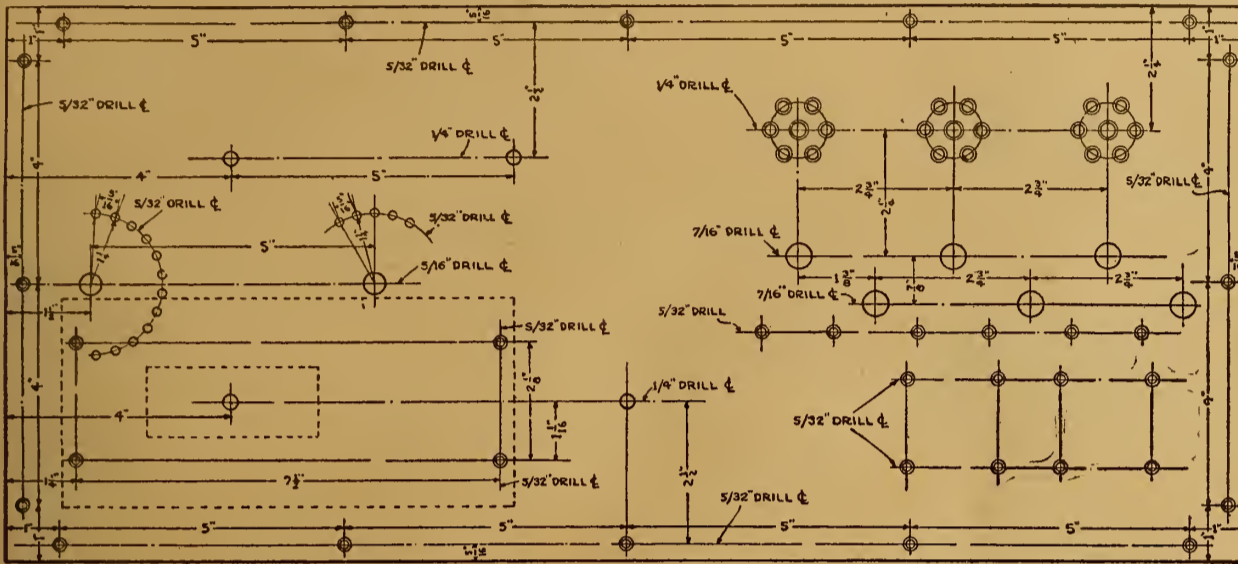
Feed Back Control

The three controls that effect the regeneration of feed back in this circuit are located in the upper left quarter of the panel. The two quarter inch holes are for the plate condensers (No. 2) both of which have a capacity of .0005 and should be equipped with vernier control. The one on the left controls the feed back from the antenna circuit to the plate circuit of the detector tube, while the one on the right controls the feed back from the antenna circuit to the plate circuit of the first Audio frequency amplifier tube. The tapped switch located a little below and between the several lines of these two condensers is used to control the amount of turns used in the tickler coil winding on the tuning unit. It will be noticed that not only do these taps control the actual number of turns in this winding, but also because of the spacing between turns, variation in taps will, to a certain extent, vary the distance and therefore the coupling between this tickler winding and that of the primary and grid circuits.

The same details apply to the location of the contact point holes and the type of switch lever as described for the primary switch and apply to this tickler switch.

In the upper right-hand corner are indicated three sets of peep-holes for ob-

(Continued on page 18)



essential that a good quality of panel material be used. Wooden panels are

in fact, all of the instruments are directly panel mounted even to the Audio frequency transformer. The sixteen counter-sunk holes running along the outer edges of the panel are for wood screws that hold the panel in place in the cabinet. All binding posts are located in the rear in order to avoid the unsightly appearance of the many leads running to the front of the set.

Primary Circuit Control

The primary circuit is controlled entirely by means of the tapped switch in the center of the left end of the panel. This switch consists of twelve taps from the primary winding on the tuning unit. The dimensions for the spacing between contact points may vary somewhat due to the variations in the diameter of the heads of the different contact points that are on the present market. In the same manner, the radius on which the circle is drawn for the location of these points may vary depending upon the length of the lever-on of the switch. Likewise the drilled hole for mounting the switch lever

four inches from the left edge of the panel, equipped with vernier control. The fixed (Details of the mounting of this rotor will be covered later.)

The variable grid condenser shown as No. 3 in the hook up diagram in last week's issue is located by the quarter inch hole in the lower half of the exact center of the panel. This condenser has a capacity of .001 Mfd., and can be condenser (No. 4) of .0015 Mfd. capacity is mounted on the back of this variable

- No. 1—Tuning Unit
- No. 2—.0005 Mfd. Vernier Variable Condenser
- No. 3—One .001 Mfd. Vernier Variable Condenser
- No. 4—One .0015 Mfd. Fixed Condenser
- No. 5—One .0025 Mfd. Fixed Condenser
- No. 6—Two .00015 Mfd. Fixed Condensers
- No. 7—Detector or Soft Tube
- No. 8—Two Amplifier or Hard Tubes
- No. 9—Two Audio Frequency Transformers
- No. 10—One Vernier Rheostat
- No. 11—Two Rheostats (Vernier Optional)
- No. 12—Tapped Tickler and Choke Coil
- No. 13—One .002 Mfd. Fixed Condenser
- 8 Binding Posts
- 3 Tube Sockets (Panel Mount)
- 1 Panel 10 by 22 by 1/4 inches
- 2 Switch Levers
- 17 Contact Points
- 3 Double-Circuit Jacks (Optional)
- 4 Dials

essential that a good quality of panel material be used. Wooden panels are

ESTRU Lattice Variometers
Lattice Variocouplers
Coils

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Deep-seated mounting insures the utmost in sensitiveness to Radio impulses. Made of the purest grade of detector crystal, "Hot Spot" is far more efficient than galena, silicon or radiocite.

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All live jobbers and dealers sell "Hot Spots"

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ALL PARTS NECESSARY
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Everything guaranteed as represented.

Coast to Coast Receiving Apparatus of the Very Best Material

We are including all standard articles of the highest class in the sets herein described. Have a number always on hand, packed for immediate shipment. We use material not found in other sets.

REINARTZ COMPLETE PARTS
Consisting of 7 x 18 panel, 23 plate condenser, 11 plate condenser, Barrchus inductance coil used in Reinartz circuit, 2 dials, one bakelite socket, 3 switch levers, contact points, Freshman variable grid leak, vernier rheostat, 8 binding posts, 25 feet wire, and diagram for construction, for only... **\$10.95**

FLEWELLING COMPLETE PARTS
Consisting of 6 x 14 panel, one 23 plate condenser, one composition dial, 2 honeycomb coils, one double adjustable coil mount, 3 .006 condensers, one Freshman variable grid leak, one condenser, one vernier rheostat, one bakelite socket, 8 binding posts, 25 feet wire and construction diagram, for only... **\$11.95**

THIS WEEK'S SPECIAL—3,000 OHM HEADSETS
These phones are unusual bargains, excellent standard make, with patented universal joint, adjustment on receiver, and comfortable band for head. Regular list, \$7.50... **\$3.95**

MOUNTED HONEYCOMB COILS
25, 50, 35 and 75 turn coils mounted—regular price, \$1.25; our price, 90c ea.

ANNOUNCING THE B-METAL CRYSTAL AND FIXED CRYSTAL DETECTOR

This is the last word in crystals, not a mined mineral but a synthetic crystal sensitive wherever you touch it. The fixed crystal detector needs no adjusting and is set ready for use at all times, encased in glass.

B-Metal crystal packed in individual dust proof container... **.50c ea.**
B-Metal crystal detector... **\$1.00 ea.**

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A series of 7 blue prints giving in full details all the necessary information, specifications, and method of construction, and assembling of the MAWHINNEY RECEIVING APPARATUS. This is the 5-tube receiving set that picked up 5 stations in California, recently written about in Literary Digest and Radio Globe. The Blue Prints tell you in a very simple and clear manner just how to construct a duplicate of MAWHINNEY'S trans-continental receiving set.

If your dealer cannot supply you—Send \$2.00 for complete set of prints.

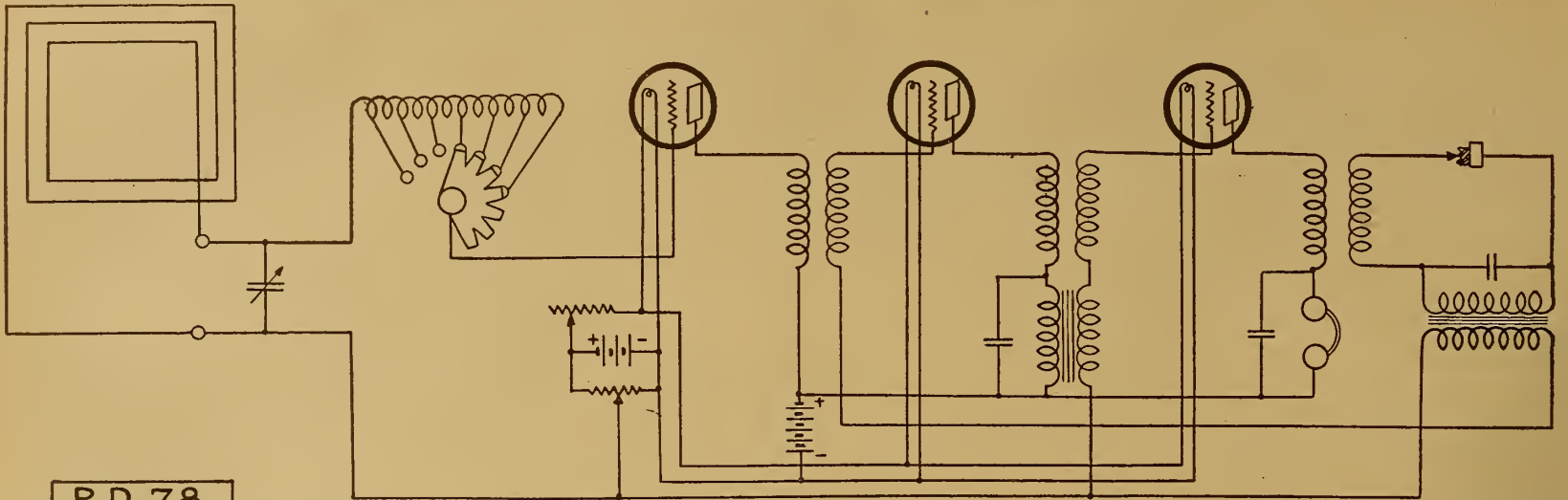
A. S. MAWHINNEY
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DIAGRAMS AND WORKING DRAWINGS

RADIO

MANUFACTURER'S OUTLET CO.
Moco Products 28 SO. WELLS STREET, CHICAGO, ILL.

SIMPLE FORM OF 3-TUBE REFLEX



R.D. 78

THIS circuit is another one of the reflex type, especially adapted to loop aerials, but is also practical for an outdoor antenna with the addition of an extra tuning unit. It corresponds to three stages of Radio Frequency, detector and two stages of audio frequency.

The tap switch and coil unit shown in the grid circuit is easily constructed. The coil consists of 42 turns of No. 20 gauge double cotton covered wire wound on a 3-inch tube and tapped at every

three turns. This then gives the end terminal on the condenser side of the circuit and seven taps to be connected to contact points. Instead of a lever arm switch, the fan type is recommended. This short circuits the unused turns and reduces dead end losses to a minimum. The condenser has 23 plates and a vernier in order to permit maximum selectivity in tuning in distant stations.

The tubes are all amplifier or hard tubes, and a 60-volt plate battery is recom-

mended. As different tubes work on various plate potential values it is best to experiment to see just what plate voltage will give the best results. A power rheostat is used for controlling the filament current of all three tubes at the same time.

It will be noticed that the grid potential of all three tubes is controlled by means of potentiometer across the A battery. The resistance of this instrument should be 400 ohms.

A crystal detector is used for rectification and can be of the fixed adjustment type. Three Radio frequency transformers and two audio frequency transformers are required. The by-pass condensers used across the primaries of the audio frequency transformers and the phones have a fixed capacity of .002 mfd. each.

This hook-up will give satisfactory results for use with a loud speaker.

REINARTZ RECEIVER

(Continued from page 17)

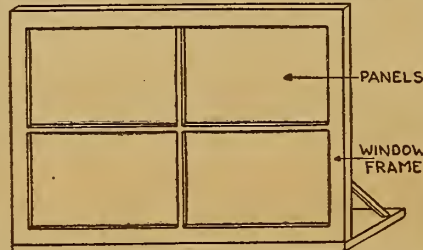
ervation of the lighting of the tube filaments. Directly under each one and on the same center lines are indicated the holes for the mounting of three rheostats. In the original set made up, although only the first was required as vernier, for the sake of uniformity of appearance, the same type was used for all three tubes. Two counter-sunk holes under each rheostat location are for the mounting of a panel type of tube socket.

In order to provide sufficient clearance for the rheostats, a spacing block is inserted between the tube socket and the panel. This increases the distance between the tube and the panel and gives plenty of clearance for the movement of the rheostat. The four counter-sunk holes under each of the two tube locations on the right side are for the mounting of the Audio frequency transformers on the panel. The laminated cores are kept in a vernier line in order to avoid magnetic reactions between transformers, although both are of the shielded type. The three holes to the right and a little below the center of the rheostat locations are for the assembly of three double circuit jacks. These jacks are not included in the hook up diagram given in the last issue and the insertion is left to the option of the constructor. They can be omitted or added as desired.

The two countersunk holes below the primary tapped switch and the other two under the second amplifier plate condenser location are for the mounting of the tuning unit. Details of this mounting will be given in the next part of this series.

Novel Panel Set

A panel set can be made from an ordinary window sash having the small panes of glass. The glass is removed and the panels set in their places. The panels on



a set like this are all the same size and are interchangeable. The instruments should be mounted directly on the panels. —Clyde Hansley, Stockton, Cal.

WD-11 Dry Cell Container

With the vogue of the new WD-11 vacuum tube increasing, amateurs are wandering around for means to accommodate these little tubes and accessories to their sets. A Radiophan has this suggestion for taking care of the dry cell used for filament current. A straight-sided aluminum drinking cup was procured at a ten-cent store. A dry cell fits into it nicely. It was secured to the case by two brass flathead wood screws with a fiber washer interposed for insulation purposes.—A. K. Chenoweth, London, O.

FLEWELLING

ALL PARTS NECESSARY
DEALERS: ATTRACTIVE DISCOUNTS

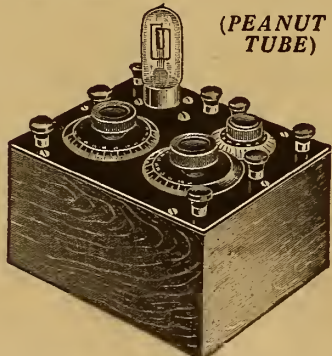
HUDSON-ROSS
123 W. Madison St. Chicago

GREWOL

Enclosed Crystal Detector
Attractive Dealers'
Discounts

WERNES and PATCH
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WD-11 OUTFIT



This wonderful dry battery outfit with a range of 600 miles comes to you ready to assemble, panel drilled and marked, mahogany finished box, condenser ready to screw in place. Variocoupler wound complete, rheostat, dials, binding posts, socket, wire, screws and picture diagram for wiring, all at above price.

\$13.85
Less Tube

- Two-stage Amplifier Box to match the above \$14.15
- Variocouplers, \$4.00 value..... 2.85
- Variometers, \$4.50 value..... 3.10
- Transformers, \$4.50 value..... 3.75
- Reinartz tuning coil, \$3.00 value..... 1.85
- Rheostat, \$1.00 value..... .60
- Sockets, E60 value..... .38
- 1/2" switch lever, 50c value..... .30
- Baldwin type "C" phones, \$12.00 value.... 9.00
- Frost or Murdoch phones, \$5.00 value.... 4.25

Postage extra. No personal checks received. Let us quote on your wants.

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that does the trick
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**YOU must have a
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Switch Plug!—the latest
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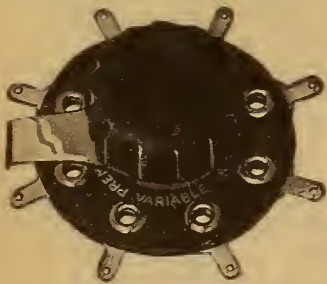


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Questions and Answers

Long and Short Wavelengths

(2064) GMF, Los Angeles, Calif.
Does the Flewelling circuit amplify the short wave lengths more than the longer waves the same as the other super receivers?

Using the proper size coils what is the effective wave length range of this circuit?

Could a peanut tube be used in this circuit? Is a peanut tube so critical that when using it as an amplifying tube vernier rheostats need be employed for long distance reception?

A.—Its action of amplification is the same as that of other super circuits in respect to wave lengths. Its effective wave length range is up to about one thousand meters, using proper inductance coils. A peanut tube may be used and is not critical enough to necessitate vernier rheostats for long distance reception.

Condenser Value and Potentiometer

(2133) AS, Oak Park, Ill.
I would like to try out Hook-Up R.D.65. Please advise the value of the variable condenser shunted across the secondary honeycomb coil and the condenser between potentiometer and one lead of the same coil.

A.—With relation to R.D. 65, a variable condenser of .0005 mfd. capacity is shunted across the secondary honeycomb coil, and either .0005 or .001 mfd. capacity between potentiometer and one lead of coil.

Body Capacity

(2150) HCH, Charleston, W. Va.
Please advise me how to eliminate body capacity. I was told to put tin foil on the back of the bakelite. I did this and connected it to the ground. It helped some but still bothers me very much. I have a three-circuit tuner; variocoupler, variable condenser and two variometers. I get very good results otherwise. I would like to ask also about getting the same stations every night. I get stations from the North, East and West of here but nothing from the South.

A.—There is no practical means of reducing body capacity effect other than the method of shielding as suggested. In

itself shielding somewhat reduces the efficiency of a set and of two evils it seems sometimes a matter of choosing the lesser.

In the matter of your failure to receive stations to the south of you, while receiving from other directions, if the condition is persistent, it is doubtless due to some intervening obstruction, mineral deposit or electric lines.

Reflex Circuit

(2320) EDC, Tecumseh, Neb.
Where should the .002 mfd. fixed condenser be placed in the reflex circuit shown in Radio Digest of January 6?

Would a UV-201 do as well as the Myers tube installed with proper control? How many turns of wire should one use on a loop? Would a larger loop (a larger frame) be better?

Received WWJ, WFAA and KSD very clearly on a homemade loose coupler and a crystal detector about two weeks ago.

A.—The .002 mfd. fixed condenser is to be placed in the lead one side of which is connected to variable condenser and input and the other side of which goes to rheostat and negative battery.

A UV-201 tube will serve effectively as suggested.

Winding Phone Coils

(2433) GJ, Springfield, Mo.
I wish you would please publish what size wire to use and how to wind an old pair of phones into about 2,000 or 3,000 ohms.

A.—You should use No. 40 S.C.C. wire

TWO SUPERSENSITIVE CIRCUITS

(Both Copyrighted)
My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, \$3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.
This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.
My W. D. II Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect winding, \$3.00. Photo of set with every order.
Either set is easy to build, easy to operate. Everything clearly shown.
These high quality silk insulated coils are machine wound on fiber forms. I wind coils to your specifications in lots of 100 or more. Write for prices.

S. A. TWITCHELL
1925 Western Ave. Minneapolis, Minn.

and wind each coil full. Caro must be exercised to have the polarity of the fixed magnet the same as that of the electric magnet. To determine this use a battery and compass. If with the current flowing through the coil, the electro-magnet attracts the same end of the needle on a pocket compass as the corresponding pole of the fixed magnet, the polarity is correct. This should also be true of the other side of the fixed magnet and its electro-magnet with the exception that they should both attract the opposite ends of the compass needle.

About eight turns of wire on loop will serve. A four-foot frame would be better. We are pleased to congratulate you upon your DX reception with a crystal detector set.

Another cause of fading is the rapid change in barometric pressure between the receiving station and the transmitter. A dense fog between the two stations may absorb some of the radiated energy.

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Size	Price	Size	Price
.00025	\$.35	.0025	\$.50
.0005	.35	.005	.75
.002	.40	.01	1.50

At your dealer's—otherwise send purchase price and you can be supplied without further charge. A diagram of the Flewelling Super Circuit sent free if your dealer can't supply you.

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 - Raysol (Kiln dried parts)..... 2.50
 - Atwater-Kent.....Special Pr.
- VARIOCOUPERS:**
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 - Moradio (Enameled)..... 2.00
 - Eastern Long Wave coupler (150-3200 meters)..... 7.25
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- CONDENSERS:**
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 - Regal 11 Pl. .00025 Mfd Cap..... 1.65
 - Duobler condensers all types and capacities including Variometers in stock.....Special Pr.
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 - American Bell 23 Pl. with Vernier..... 4.50
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 - Klowner Vernier..... .75
 - Paragon Standard..... 1.05
 - Framingham..... .70
 - Bradleysta..... 1.85
 - Roberts (6 ohm standard)..... .70
 - General Radio (Any and all resistances).....Special Pr.
 - Radio Corp. (UR 542).....Special Pr.
 - Fada.....Special Pr.
- POTENTIOMETERS:**
 - Radio Corp. PR 536 (200 Ohm).....Special Pr.
 - General Radio (400 Ohm).....Special Pr.
 - Atwater-Kent.....Special Pr.
 - Framingham (200 Ohm)..... 1.10
 - Paragon (200 Ohm)..... 1.80
 - Amoco (150 Ohm)..... 1.10
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 - Regal (all nickeled)..... .75
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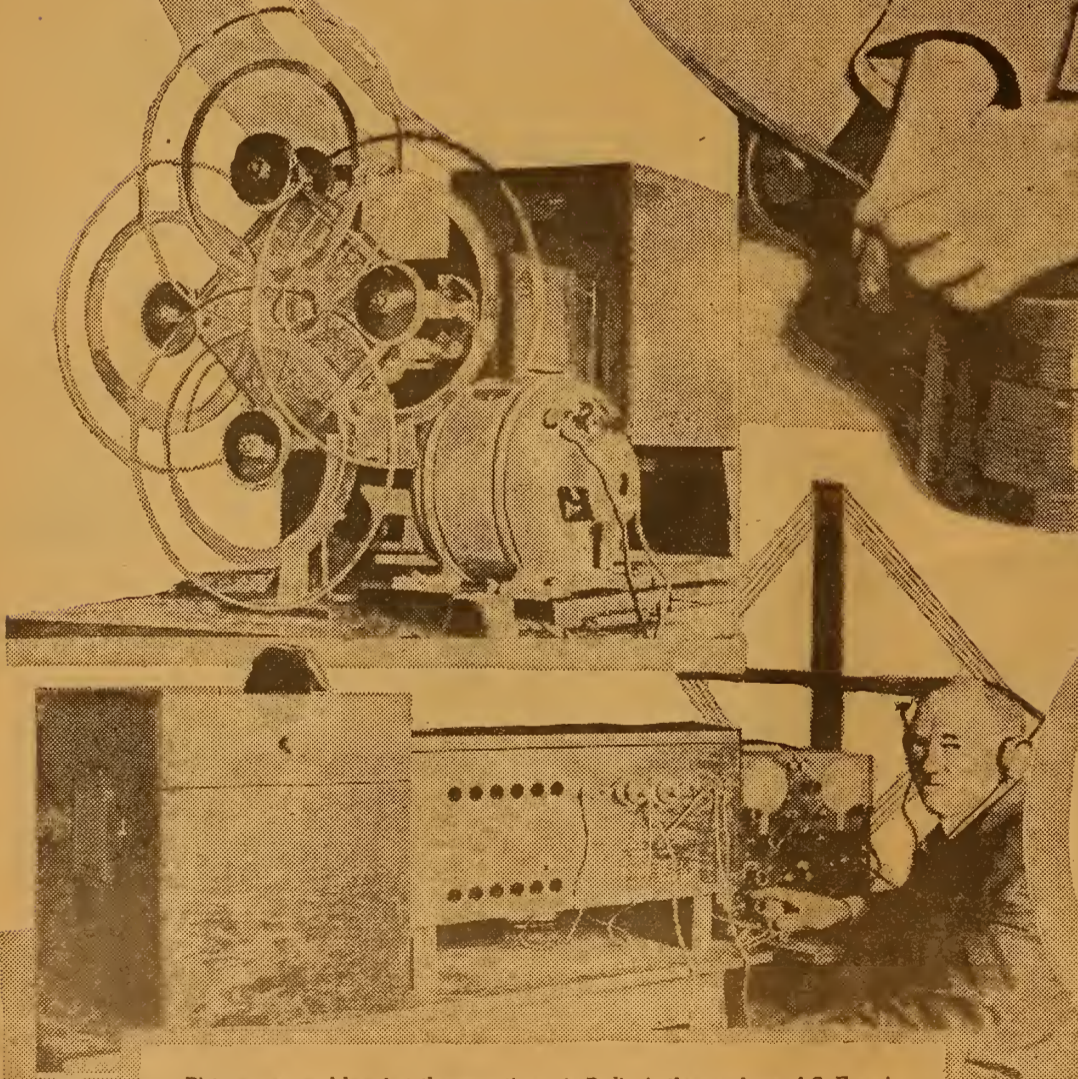
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Radio Illustrated



Jackie Coogan, the youngest movie star, is shown using a crystal set he made all by himself

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Pictures seen and heard at the same time, via Radio, is the new hope of C. Francis Jenkins, the inventor of the photographic Radio picture transmission. He has already sent and received photographs via Radio and is working on an invention that will not only show the event in stills, but will show the action on screens in picture houses throughout the United States. Mr. Jenkins asserts that while his idea seems beyond the realm of possibility, it is very practical in theme. In tests already made, pictures have been sent for short distances of ten or fifteen miles, but plans are being formulated for transmitting photographs via Radio over distances of a hundred miles or more. Insert above is the principal unit of the transmitter, showing the circular disk prism which forms the key to the Radio problem of sending photographs via Radio

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The amateur receiving set contest now in progress at the Radio Fair at the Hotel Imperial, New York City, has drawn entries from all parts of the country among which are many unusuals. Above is a novel entry in a vacuum tube set with spider web inductances, all mounted on the base of a standard audion socket

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