

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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DO SOULS BROADCAST?

"TOMMY" MEIGHAN, RESTING BETWEEN SCENES, OPENS UP POCKET SET TO ENTERTAIN FRIENDS

MAGICIAN THURSTON SETS UP SPEAKER FROM WHICH STRANGE LANGUAGE COMES

Conan Doyle Says, "Spirit Talk"—Magic Master Believes Some People Human Radio Stations—Offers Love-at-First Sight Illustration—Psychic Communication a Possibility

By S. L. Huntley

CHICAGO.—Howard Thurston, famed man of magic, who broadcast recently a talk on "East Indian Magic" from Station WMAQ of the Daily News, advances the theory in an interview with Radio Digest that the mysterious sounds heard in a sea shell resemble some unknown language. In addition he claims that every human being is a sort of a broadcasting station. In elaborating his startling ideas, Thurston said:

Thurston Tells Story

"One stormy night last December five men sat in a room in a Long Island home. The hour was past midnight. One of the group sat near
(Continued on page 2)



Leatrice Joy, Tom Meighan and Director Alfred E. Green out on location. Our film-famed Radiophan, Meighan, likes to carry about his pocket Radio set, much to the enjoyment of the company. Below is Evelyn Freedman, youthful violinist starred many times via KYW, Chicago

CURE FOR OLD LAW IN HOOVER'S HANDS

CONFERENCE SUBMITS REPORT ON QRM REMEDY

Plants May Get Wave Band from 222 to 545 Meters—Room for All, Belief

By E. E. Plummer

WASHINGTON, D. C.—With the completed report of the second Radio Conference laying before him, Secretary of Commerce Hoover states that he will adopt it as soon as he has conferred with other cabinet members to be sure that it will meet with their approval. He also says that he has received legal advice to the effect that the prescribed changes in wave lengths can be made without an executive order from the president.

The conference report marks a new era for the Radio public. The extensions in broadcast wave bands and definite prescribed wave lengths for the fifty large power phone broadcasters, will make for much less interference. Suitable wave lengths are provided for more than 500 low power stations as well.

Boiled down, the important recom-
(Continued on page 2)

MAKE EXPERIMENT IN MUSTER CALL BY AIR

Seventeen Companies of Infantry Respond Quickly to Broadcast

CLEVELAND, O.—An experiment of using the Radio as a means of mobilizing troops, conducted here by Colonel L. S. Connelly, in command of the 145th Infantry, was pronounced a big success. Within two hours after an "emergency order" was broadcast, he had received replies from all of the eighteen companies with the exception of the one at Akron.

BETTY BLYTHE TALKS ON MOVIES FROM WGR

BUFFALO, N. Y.—The women Radiophans in Buffalo and vicinity were much interested recently when Betty Blythe, motion picture actress, gave a special concert and talk from the Federal Telegraph and Telephone Company's studio, WGR. Miss Blythe gave some good advice to those of the fair sex who have it in their minds that they would like to enter the motion picture business.



DO SOULS BROADCAST?

(Continued from page 1) a large reproduction of an ordinary sea shell—it alone filled half of the room.

Weird Sounds Come

"The sounds came. A low but distinct murmur at first, that swelled into a clear flowing babble, weird and mysterious," continued the magician.

What was it? That is the question that the five men tried to learn and it is the question that Thurston the great is going to try to solve when his present tour is completed and he again returns this summer to his Long Island home.

Mr. Thurston is a Radiophan as well as a magician and a believer in spiritualism. It was a few months ago that he began experimenting with a sea shell as a loud speaker and found that he heard other noises and sounds from this shell that were not brought in by the Radio.

Builds Sea Shell Speaker

From this he grasped the idea of building the large shell that he now has in his home. After many experiments of filling the shell with different amounts of sea water he found a point where the strange sounds were heard loudest between the hours of two and three o'clock in the morning.

It is the belief of some, including Conan Doyle, that it is the voices of spirits that are heard and it only necessary to learn the strange language in which they speak in order to commune with those who have passed on.

"It is my belief," said Mr. Thurston as I sat in his dressing room, following his (Continued on page 4)

HOOVER CONFERENCE

(Continued from page 1)

Recommendations of the conference are these: Previously all broadcasting was concentrated on three wave lengths, 380, 400, and 455 meters. A new field extending from 222 meters to 545 meters can now be created for the purpose.

The seemingly small increase in wave bands is in fact quite large. The important phase is that a great many more individual phone station wave lengths exist in the lower wave length ranges than do in the higher.

Amateurs and Ships

The report recommends an extension of the amateur wave band from 150 to 222 meters, instead of 200 as now used. All, including special, amateurs will be in that band however.

A recommendation is made that ships on 450 meters keep silent between 7 and 11 P. M. and as soon as possible alter their apparatus to transmit on 600 meters and above.

"The reading of telegrams or letters by broadcasting stations should be permitted," says the report, "so long as the signer is not addressed in person and so long as the text matter is of general interest."

Another recommendation is that simultaneous rebroadcasting (relaying) be permitted as a service only on a broadcasting wave length, and with the authorization of the original broadcaster and of the Department of Commerce.

Digest Aids in Report

The new regulations recommended are based on a plan submitted by the Radio inspectors, and include elements from other plans submitted by representatives of the Associated Manufacturers of Electrical Supplies, the National Radio Chamber of Commerce, the Institute of Radio Engineers, the American Newspaper Broadcasting Stations, and Radio Digest Illustrated.

It is the unanimous opinion of the conference that the Secretary of Commerce in licensing stations has the authority under the present law to regulate hours and wave lengths of operation of stations, and to revoke or withhold licenses of stations when such action is necessary to prevent interference detrimental to the public good.

The conference also urged that the fullest co-operation be given by those who operate broadcasting stations and by the public with the Department of Commerce in the co-operative adjustment of local broadcasting problems in order to realize the fullest possibilities of the recommendations outlined.

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

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

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

CONTENTS

Radio Digest, Illustrated, Volume 4, Number 13, published Chicago, Illinois, April 7, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois.

Looking Ahead

More About the Ultra Reinartz Receiver—In the next issue H. J. Marx will give complete details for the final assembly, instructions for making connections, and how to tune the popular improved Reinartz Receiver.

E. T. Flewelling Again Next Issue—Mr. Flewelling will in Part X of his series tell more about the simplified "flivver" Receiver. The Digest is the only place you can read articles by E. T. Flewelling.

Arthur G. Mohaupt in His Chapter XV for Radio Beginners will give much information on the construction and operation of loop antennae. Read Chapter XIV on page 11 of this issue.

Receiving Records Contest—This popular DX fan feature will appear in full in the April 14th issue. Records for all stations will be revised to date.

Part III of the Only Sure Fire and Complete Broadcasting Program Directory—Buy the next issue to complete your list of stations and get the State, City-Station Index.

The Fourth Prize Flewelling Set, designed by A. R. Miller, Spring Valley, Minnesota, will be described by Mr. Miller in the April 14 issue. Order it at your newsstand today.

Looking Still Further Ahead—The Digest can promise detail for the construction of a cheap and efficient reflex panel set. This set will be described by H. J. Marx following the conclusion of the Ultra Reinartz Set series.

Newsstands Don't Always

Have One Left

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RADIO At Cut Prices Standard parts only in original packing. Sold on a "money-back" basis. PHONES, TUBES, CABINETS, MISCELLANEOUS. WHEN ORDERING BY MAIL Add Postage by the Following Scale PURCHASES

BROADCASTERS TO HELP BAG BANDITS

CANADA WILL NOT IMPOSE TAX ON SETS

Mounted Police Plan to Prevent Border Raids with Aid of Science

By Jeffrey J. Dingman
CALGARY, ALTA.—Bandits from the United States side of the international boundary line who conduct systematic raids on the prairie provinces of Canada this year for the first time in the history of Canadian criminology will have to reckon with the Radiophone, if suggestions being made to the governments of Manitoba, Saskatchewan and Alberta are acted upon.

Call on Radio for Aid
Attorney-General Craig, of Manitoba, announced in the Legislature last week that information had reached the government that bandits from south of the line will attempt to repeat the exploits which caused a reign of terror in Southern Manitoba, as well as in parts of Saskatchewan and Alberta, last fall. Everything possible is being done, however, to prevent raids on banks and to capture the raiders. It is quite probable that the Radiophone will be employed. This will be the first time that Radio will have been used systematically in the detection of crime in this country.

To Broadcast Descriptions
Canada has taken the lead in commercializing Radio by the establishment of two stations for commercial Radiophone work, between Swan River and The Pas, Manitoba. These stations are now being installed for the Manitoba government, and it has been suggested that descriptions of bands and news of the raids could be broadcast, thus diminishing the danger from marauding bands. That this can be done successfully has been proven, CKCK at Regina having been mainly instrumental in the capture recently of "Doc" Purvis, Canadian National Railway train robber.

Attorney-General Craig stated that the American border is being patrolled closely day and night by large forces of mounted police. Now it has been suggested to the government that each detachment install Radio receiving apparatus, and also that descriptions of suspicious characters arrested and then released for lack of evidence, could be broadcast, so that future misdemeanors might be more easily traced to the proper source, and the work of the police facilitated immensely.

No Tax on Radio
It was also announced in the Legislature that the Manitoba government does not intend to impose a tax on Radio receiving sets. This announcement was made by Hon. F. M. Black, provincial treasurer, in justifying the action of the Manitoba telephone system in taking over the work of broadcasting from the two Winnipeg daily newspapers. Mr. Black said, however, that the telephone systems expected some revenue from rentals.

TEUTON ETHER SERVICE GIVES FINANCIAL DATA

New York Quotations Reach Germans in Ten Minutes

BERLIN.—After four months of experimenting, the Express Service Company (Eildienst Gesellschaft), Berlin, has begun a daily service of financial and commercial news broadcasting to subscribers in various parts of Germany, according to a report to the Department of Commerce from Consul E. V. Richardson, Berlin. This company is financed by German capital and is purely a private undertaking. Having arranged with the National Government for the use of the Radio station at Koenigswusterhausen on a limited basis for a definite period, a regular service of financial news is received from the United States, Switzerland, Sweden, and other countries, via the high power station at Nauen, Germany.

This information is broadcast immediately by Radio telephone to subscribers of the company. These number at present about 800 and are mostly banks and industrial institutions located in some 200 towns and cities. It is expected that New York quotations handled by this service will be available generally to subscribers within ten minutes of their dispatch from New York.

Each subscriber rents from the company the necessary receiving apparatus paying for the service itself an annual fee of 300,000 marks, and for the apparatus an annual rental of approximately 200,000 marks. There are 2½ hour schedules daily, beginning at 9:30 a. m. and 5:00 p. m.

School Has Club

ELMHURST, ILL.—The students of the Elmhurst High School here recently formed a Radio Club and held their first meeting March 14th. Officers were elected and it is the plan of the club to install a powerful receiving set.

LEVIATHAN LIFEBOATS TO CARRY EQUIPMENT

WASHINGTON.—Lifeboats on the Leviathan, America's greatest passenger liner, are being equipped with Radio sets, it was announced today. Should the unfortunate occur and disaster befall the great ship, the survivors will be able to communicate with vessels sent to the rescue. The Radio sets are as powerful as those on the average cargo carriers.

MIDSHIPMEN DRILL IN UNISON TO AIRWAVES

WASHINGTON.—A Radio-controlled drill was a feature of the Annapolis Gymkhana held recently. The midshipmen in the drill team wore Ku Klux costumes and in their conical helmets were installed small Radio receiving sets. From a sending station on the roof of the gymnasium, instructions were issued to the men in the drill.

ANOTHER BEAUTIFUL CONVERT



"Which way do I turn it?" asked Lila Lee, pretty movie favorite, as she adjusted her headphones on her first adventuring in the air. Now she is an addicted bug. Hope it is not long until we hear her on the air as well as see her on the screen

WSB'S Owls Hold Annual Banquet at Ansley Hotel

Special Microphone Gives Music to "Stay at Homes"

ATLANTA, GA.—The first annual banquet of the Radiowis of Station WSB, an organization made up of fans who listen in each night at 10:45 p. m., was held at the Ansley Hotel Rathskellar, here. A musical program was given during the dinner by Ernest Rogers, Journal reporter-songster, Miss Bonnie Barnhart and Fred Houser, the secretary of the Atlanta Convention Bureau.

Following the dinner dancing was in order to the music of the Ansley hotel orchestra. A special microphone gave the music to the fans who were unable to be present.

The whole entertainment was planned and carried out through the ingenuity of Lambdin Kay, Radio director of WSB.

Tube Set Circular Available

WASHINGTON.—A circular describing how to build a tube set, the third pamphlet on Radio construction to be published by the Bureau of Standards, is now available from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 10 cents. Write for Circular 133, "Description and Operation of an Electron-Tube Detector Unit for Simple Radio Receiving Outfits."

Government Scientists Puzzled by "Dead Spot"

Land of Lost Waves Covers Forty Mile Area

WASHINGTON.—Government scientists are trying to determine the cause of "dead spots" between a number of cities in the United States which form an almost impenetrable barrier to the direct exchange of Radio messages.

The most pronounced of these appears to be between here and Baltimore. To get a message to this point, less than forty miles distant, Washington senders are using Chicago and other comparatively remote cities as a relay point. The pleasures of Radio concerts are almost completely lost between the two cities.

Dr. J. H. Dellinger, chief of the Radio division of the bureau of standards, who is trying to fathom the mystery, reports that a similar difficulty exists between Pittsburgh and Cleveland, Hartford and Boston and Providence and Boston. The most plausible theory now advanced, Dr. Dellinger says, is the existence of a Radio activity in these dead spots which so affects certain layers of the atmosphere as to render transmission of waves impossible.

In the case between Washington and Baltimore, theories advanced in other quarters are that the dead spot may be caused by the electric railway line between the cities, by the numerous high-tension cables and conduits between them or by the topography of the country.

MARCONI PROMISES NEW SECRECY SET

FAMOUS WIZARD WORKING ON PRIVACY DEVICE

Claims Solution of Directional Control Sought By All Inventors

LONDON.—Guglielmo Marconi is on the track of Radio directional control. The inventor revealed today that he hoped soon to perfect a device by which Radio messages would be received only by the person for whom they are intended.

This problem, long one of the greatest difficulties in Radio development, has occupied Mr. Marconi's attention for some time, he said, and while declining to divulge his secret, he asserted he was confident he could overcome the obstacle.

Marconi has made numerous experiments to this end already. The chief tests of his device, however, will be made in late April, on his yacht Electra. The yacht is now at Southampton and will leave at an early date for a cruise along the coast of Spain and western Africa.

Is Confident of Success
"The entire matter," he said, "is only in the experimental stage, but I believe it will at least point the way for a successful device of this kind which may be improved later. If successful it will revolutionize Radio telegraphy."

Mr. Marconi explained that the greatest difficulty with regard to Radio is the listening-in by strangers to private communications. Under the new method, it would convert the Radio to a sort of telephone as far as privacy is concerned.

If the new device accomplishes its purpose, it will be possible to send Radio messages from one station to another across the Atlantic without anyone listening in.

Privacy to be Assured.
Both Mr. Marconi and his associates are maintaining a close guard over his new secret, which will be continued until the invention has proved itself. It is understood here, however, that the plan follows somewhat the lines of receiving instruments whereby stations can tell the point of the waves' origin to a small fraction of a second of arc.

The air waves' origin has long been the problem of those seeking a method of directional Radio. If Mr. Marconi succeeds in this, it will mean reducing the sending of Radio messages to the simplicity of telephone calls—and they would be equally private.

First Radio Baby of the Land Is Son of Operator

Proud Father Promises to Have Youngster Broadcast Soon

TACOMA, WASH.—America's first Radio baby! Many children have claimed the title, but here is the real heir.

Born, to Mr. and Mrs. Alvin Stenso, whose marriage ceremony was broadcast last year from KGB, the Tacoma Ledger-Mullins Electric Company broadcasting station at Tacoma, Washington, a son.

As readers of The Radio Digest will remember, Mr. and Mrs. Stenso were united in the bonds of matrimony in the studio of the Ledger station. The entire wedding party was there but the guests were scattered all over the West with Radio receivers clapped to their ears. The entire service, from the wedding march and the nuptial vows to the benediction and the concluding kiss, was broadcast and heard by hundreds of thousands of Radiophans for thousands of miles around.

Mr. Stenso at first favored naming his heir apparent Kenneth Gordon Byron Stenso, in order that his initials might be K. G. B., but he was loath to burden the youngster with so many names, so the new head of House of Stenso will go through life with the "handle" Calvin.

KGB plans to have his fond parents bring young Calvin down to the Ledger studio and have him chuckle and coo a bit via Radio shortly. Mr. Stenso the elder is chief operator at KGB.

Spain Declares Ether Will Be Government Monopoly

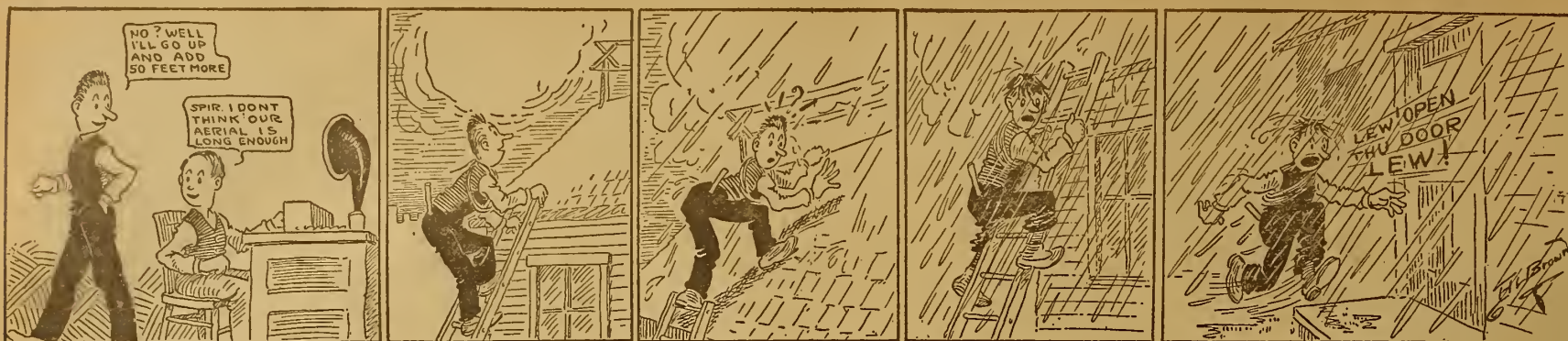
WASHINGTON, D. C.—Cable advices state that the Spanish Government has declared Radio telephony a State monopoly. Bids for an exclusive concession to exploit Radio telephony in Spain will be invited within 60 days and foreign countries interested will be given an opportunity for submitting proposals. It is stated, however, that Spaniards will be given preference.

The American amateur is now only waiting the installing of proper Radio apparatus in China to bridge the Pacific with his code transmitter.

THE ANTENNA BROTHERS

Spir L. and Lew P.

Receiving Damped Waves



CFCN BROADCASTS MARITIME CONCERT

OFFER OF PEANUT TUBE MADE TO LISTENERS

Unique Program Attracts Flood of Letters from Western United States and Canada

CALGARY, ALTA.—CFCN, the broadcasting station of the W. W. Grant Radio, Ltd., at Calgary, recently staged a unique affair when W. W. Grant, a native of Halifax, Nova Scotia, broadcast a special "Maritime Concert" to the Maritime Provinces of Canada, 3,000 miles distant. Mrs. W. W. Grant, visiting Mr. Grant's parents at the time, was listening in on CHAC, Halifax, at the opposite end of the 3,000 mile air line. The test was uniformly successful and will be repeated in the near future.

Offer Free Tube

A new peanut tube was offered free to the first five Radiophans of Nova Scotia, New Brunswick, Prince Edward Island and the Dominion of Newfoundland who reported the reception of the first "Maritime Concert," and a fifteen-year-old Halifax Radiophan was the first to answer. He is Robert Doull, the son of Dr. Arthur E. Doull, 34 Street, Halifax. Many other telegraphic communications were received from the Maritime provinces saying CFCN signals had come in QSA, and all Maritime Radiophans expressed their appreciation of this novel concert.

Young Robert expressed his pleasure in the following telegram: "Congratulations to Grant picked up CFCN at ten fifteen Wednesday night."

Here is a telegram from H. Brennen, Chebucto Head, Nova Scotia: "Picked up CFCN shortly after midnight signals very clear."

Young Robert heard CFCN at Calgary on a Marconi Model C regenerative set.

Brings Flood of Letters

"I was trying to tune in for about an hour," the young Radiophan said in a letter, "and at last at ten fifteen I heard odd bits of distorted music, evidently from a piano and then a voice. I distinctly heard the announcer say 'CFCN, Calgary, Alberta, Canada.' It was not exceptionally clear but I heard it all right. I also heard part of the Maritime Program."

Never before has a Radio feature attracted such a flood of letters and telegrams as this one, communications having been received from all over the middle and western United States and from practically every province in Canada. At the time Mr. Grant had just had the armature on his generator re-wound and was operating on only about three-quarters of the full power. The normal modulating output power of CFCN is 2,000 watts.

Scenes from Pollock's Play Are Broadcast from WNAC

BOSTON, MASS.—Scenes from "The Fool," Channing Pollock's successful play at the Selwyn Theatre, Boston, were broadcast recently by WNAC, the Shepard Stores, by special arrangement. Channing Pollock personally gave a short lecture preceding the play. Of course listeners had to visualize for themselves the personality of the characters and the stage setting, although these were briefly announced, but the plan was highly successful. It is the first time a professional play has been broadcast from a New England station.

Apartment Has Radio

ST. LOUIS, MO.—A new fifty-four apartment building now under construction, here, will be equipped with complete Radio installation. A large central receiving station will be located on the roof with trunk lines to each apartment. In order for a resident of the building to listen in it is only necessary to push a button and they will be immediately connected.

CODE AMATEURS AND LISTENERS POW WOW

LONDON, ONT.—Amateurs and ordinary "listeners in" are getting together here with the idea of forming an association. The objects will be to secure legislation bettering Radio conditions and do away with a certain amount of ill-feeling between the two classes of Radiophans who claim that each is trespassing on the toes of the other.

DO SOULS BROADCAST?

(Continued from page 2)

afternoon performance, "that every person has a Radio plant incorporated in their being. Some are sending stations and some receiving, and there are others that possess the power of both.

"In my performance this afternoon, I said something that was not exactly pleasing to my audience. I at once knew it did not effect them well although they did not make a sound and I did not need to read their faces. This demonstrates my point.

Demonstrates Theory

"Take a case of love at first sight. Two persons of opposite sex meet, neither speaks, they may not resemble the ideals the other has stored in his or her mental art gallery—yet, they are in love. This is a further demonstration.

"I do not mean to say that it is the mental part of the make up of the human body that broadcasts the thought or feeling, it is the spiritual side of one that so functions. I, and I am quite sure you everyone else, has met a person who is distasteful from the time before they even uttered a word, or it may be vice versa, as the case of love at first sight.

"I also think that this power of silent communication is highly developed in animal life, for example, a flock of sea gulls that all fly from a point at once. Of course, I have read and heard of them having a leader and this is some times the case, but if you will study them you will see many instances that they all start in unison.

"Also it is an established fact that a dog listens in, so to speak.

"This is due to what is called instinct but I believe it is silent communication.

To Continue Research

"How does a carrier pigeon find its way back to its home? Of course the question will arise, from whom or what is the pigeon receiving the waves? This is exactly along the line that I am experimenting.

"It is regrettable that I could not carry my experiments to a more definite conclusion before I went out on the road this last time. But I do intend to continue them as soon as I return this summer."

When questioned on what he thought was the cause of the mysterious sounds emitted from the shell, he said, "That is not for me to say. I think it could be any one of the things it is claimed to be by others but just what it is is yet to be proved. I do think the sounds are very similar and are much like a strange tongue. However I have made several world tours and have heard many languages, but it resembles none that I have heard."

HERE IT IS



Pat. Pend.

The Radio Terminal for your A battery. Saves time, trouble and money. No more poor contacts. Easy to adjust and fits all straight post A batteries. Trial set 75c a set of two.

Dealers write for discount

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Cables Give Away to Ether in Navy

New Station For Bar Harbor to be Turned into Coastal Plant

WASHINGTON.—Despatches for American Naval Vessels in the Near East are now being transmitted by Radio from Annapolis and are being copied directly by vessels in the vicinity of Constantinople, with excellent results, according to Admiral Ziegemeier, Director of Naval Communications.

Have Direct Relay

Radio is becoming a very formidable competitor with cable service, and as far as the Navy is concerned, cables as almost obsolete. Messages are never routed by cable except to some South American countries, and if a man-o-war is there, they go by Radio. Direct regular Radio circuits are maintained between Washington and San Francisco and San Diego, and it is seldom that a single word is missed. Washington communicates directly with Puget Sound, and Puget Sound and San Francisco communicate every odd hour of the day.

Bar Harbor Is Coastal Plant

On the Atlantic Coast, the Navy has seven main Radio stations: Bar Harbor, Me.; Sayville, L. I.; Annapolis, Md.; Ar-

lington, Va.; Cayey, P. R.; Guantanamo, Cuba and Panama, besides a large number of coastal Radio stations. The station at Bar Harbor, Me., receives all official Government messages from Europe, the Pacific and the Fleet in the West Indies transmitting them to Washington over a leased wire. Since the fire at the Bar Harbor station, which destroyed some buildings and barracks there, the Navy has decided to turn this station into a coastal station and receive all trans-Atlantic and trans-continental traffic at Washington.

Federal officers raided a gang of bootleggers in Virginia and heard prices being quoted by means of a Radio set maintained for the purpose.

VERNIER VAR. CONDENSERS COMPLETE WITH KNOB AND 3 IN. RUBBER DIAL

\$5.00 Value 11 plate with 3 plate Vernier.....	\$2.00
5.50 Value 19 plate with 3 plate Vernier.....	2.15
6.50 Value 41 plate with 3 plate Vernier.....	2.50
Plain—	Plain—
3 Plate\$0.75	23 Plate\$1.25
11 Plate98	43 Plate 1.50
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"Seeing men in haste do not seek to overtake them."

Kang Hsi.

The wise man carefully deliberates,—then buys a Grebe Receiver.

Doctor Hsu.



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YOU'VE HEARD 'EM? HERE THEY ARE!



"Shorty" (C. E.) Ervin (center), beams at us good naturedly. Mr. and Mrs. Radiophon, meet Shorty; Shorty, meet the mob. What station? WOAJ, Parsons, Kansas. You'll hear Shorty himself if you tune in some night. He is proprietor and owner of the plant, and enjoys highly his task of announcing

At the left we have the Spanish announcer, also the English announcer at PWX, Cuban Telephone Company, Havana, Cuba. In other words, R. P. Falcon leads a double life. Known only as "RPF of PWX," he is heard twice a week by hundreds of thousands of Radiophans. He is Cuban by birth

At the right—ah, the Sheik announcer of WGM, L. O. Moseley (his mother named him Lasso). Devoid of comment, he is; Single; better looking than Rudolph, according to eye-witnesses; twenty-nine summers young; graduate of Emory University; owner of his own newspaper in Dublin, Georgia, and a law student

SENDS ANNOUNCER STRANGE REQUEST

PROUD FATHER WANTS WIDE WORLD TO KNOW

Mother and Son "Doing Well" Broadcast, Latest Announcement Card

By C. H. Huntley

A proud father recently wrote WGY, the Schenectady broadcasting station of the General Electric Company, requesting the station to announce in the air that an eight-pound boy had been born to him and that mother and son "are doing well." Probably every father who recalls his feelings on the arrival of the first born will sympathize with this man whose desire was just a modern elaboration of the wish of a brand new father to shout the good news from the housetops.

Think of Station as Human

This request is unusual but every broadcasting station is asked to make announcements of matters just as personal as this one. It is interesting because it illustrates the intimate, personal relationship which the Radio listener feels exists between him and the Radio broadcasting station. To the average listener a broadcasting plant is not an elaborate mechanical outfit consisting of motor generator set, transmitting equipment and antenna; it is human, its voice comes out of the night and enters his home, amusing the children, entertaining the grown-ups, relieving monotony and loneliness.

It is not to be wondered therefore that those in charge of broadcasting stations receive warm, personal letters from writers unknown to them, or that requests are made to broadcast matters which are purely personal.

Many Strange Requests

A correspondent recently asked one station to announce that he, his wife and child were all well. He explained that his parents in a western state have a receiving set and frequently hear this plant and he thought it would be fine for them to hear from their son and his family. The writer ingeniously requested that the announcement be made three successive evenings as his parents might be out one or two evenings but would surely get the message one night out of the three.

Another correspondent asked the aid of Radio to find his eight months old Aire-dale pup. He said the children missed the puppy and he gave a description of the animal with its license number.

A Cleveland friend of WGY asked that station to co-operate in his plans for a surprise party. The man and wife to be surprised were Radiophans and the writer requested WGY to say "Hello, Mr. and Mrs. Blank" at the precise time that Mr. and Mrs. Blank's friends would enter the front door.

Asked to Repeat

An unselfish youth requested WGY to repeat the first act of one of its Radio dramas because his brother was late getting home and had missed the opening of the play.

Airphone Wig-Wags Location of Rum Runners' Delivery Boats Off Coast

"Lost Motorboat," Ruse Used in Radio Messages Flashed to Confederate on Shore—Coast Guard Chief Thinks Signals Real SOS—Government Investigating

NEW YORK.—Radio messages flashed between the rum fleet off the Jersey Coast and a well-known hotel in Broadway near Times Square in New York set every Coast Guard station on the alert recently. The first message, sent from the big steam yacht Ister, was addressed to a man at the hotel. It said that a motor boat was adrift and was headed for Jones Inlet on Long Island. The man in New York was advised to salvage it.

The service was prompt. A few minutes later the man on Broadway replied that he would set out for Highlands immediately. A third message sent from Times Square to the Ister notified the yacht that three boats were being sent out to different points.

Fleet Can Be Seen

Coast Guard Station 87, at Jones Inlet, picked up the messages, and immediately instructed station masters for miles around to maintain extra watch for the missing motorboat or for any of the three craft dispatched from shore. At No. 87 the rum fleet was not visible, it was said. The fifteen or more ships had withdrawn far beyond the three-mile limit in order more safely to ride out the heavy weather and the storms of the last few days. The

fleet was said, however, to be visible to other stations in the daytime through marine glasses.

Coast guard chiefs interpreted the message from the yacht to mean that liquor was aboard the castaway boat. Their theory was that the drifter was one of the flotilla of small craft which has plied between the rum fleet and the shore.

Ister Turns Rum Runner

The steam yacht Ister was formerly the Nahma and was owned by Robert E. Goelet. She was sold, however, and is now under British registry. She came from England in February and lay for awhile off rum row and then left again, presumably for Nassau. She returned a short time ago and took her place with the other ships that make up the wholesale liquor market outside the three mile limit.

The man who exchanged Radio messages with the yacht, "left hurriedly" for Montreal last night, it was said at the hotel. The clerk said the man was expected back soon.

Prohibition officials said they never had heard of the man who sent the Radio messages. They said the customs and coast guard men would attend to the case.

MAXIM SENDS PORTO RICO PRESS APPEAL

President of A. R. R. L. Relays Message from IAW

HARTFORD, CONN.—The first news despatch ever sent by amateur Radio from the United States to Porto Rico reached its destination and was printed recently in the San Juan Press, according to a copy of this newspaper received by the American Radio Relay League here. The news story was signed by Hiram Percy Maxim, president of the A. R. R. L., and was relayed from his station IAW in this city. The despatch read:

"From Hartford, Conn.
"The San Juan Press, San Juan, Porto Rico.

"The coldest weather of the winter is freezing the New England states to-night, and is causing a great amount of suffering. The coal strike has caused a shortage of fuel, and the deep snows which block the city streets make the delivery of what little coal there is almost impossible. Rich and poor suffer alike. The temperature to-night as this message is sent is below zero and going down each hour.

"As I sit in my Radio room, with the ice covering all the windows, I marvel at the wonders of Radio, where one man in the frozen north talks to another in the warm tropics. Radio is fast bringing the ends of the world closer and closer to-

588 Broadcasters Are Listed By Government

WASHINGTON.—In a recent report given out by the government it is shown the United States now has a total of 588 broadcasting plants, California and Texas top the list in having the greatest number while Mississippi has not a single station. Following is the latest list of the number of stations in each state: California, 59; Texas, 36; Ohio, 31; New York, 30; Pennsylvania, 28; Iowa, 26; Missouri, 25; Washington, 24; Illinois, 24; Nebraska, 23; Kansas, 19; Oregon, 16; Indiana, 15; Colorado, 15; Michigan, 14; Minnesota, 14; New Jersey, 13; Wisconsin, 11; Florida, 11; Georgia, 10; Massachusetts, 10; District of Columbia, 9; Oklahoma, 8; Louisiana, 8; Connecticut, 7; Kentucky 7; Arkansas, 6; South Carolina, 6; Alabama, 5; Arizona, 5; Idaho, 5; Maryland, 5; Montana, 5; North Dakota, 5; Tennessee, 5; Utah, 5; Rhode Island, 4; South Dakota, 4; Wyoming, 4; North Carolina, 4; Virginia, 4; Delaware, 3; Hawaii, 3; Maine, 3; Vermont, 3; West Virginia, 3; New Mexico, 2; Nevada, 2; Porto Rico, 2; Alaska, 1; New Hampshire, 1.

gether, and the day is not far distant when Porto Rico and New England will be as across the street. I wish it were possible tonight to send some Porto Rico weather across the street to New England.

"HIRAM PERCY MAXIM."

JACKIE HEARS HIS VOICE MILES AWAY

KING OF KIDDOM LISTENS IN ON HIS OWN SPEECH

Pallophotophone Records Broadcast Made in East by Jackie Coogan

LOS ANGELES, CALIF.—Jackie Coogan heard himself talk tonight and was 3,000 miles away from his voice. That sounds strange and might be but for the fact that a new invention has made it possible to perfectly photograph the voice on a motion picture film.

A month ago, when Jackie was in New York, he was invited to give a short talk into the Pallophotophone by the General Electric Company. This film was developed and tonight it was broadcast by Radio from WGY, the General Electric station in that City.

Thousands undoubtedly heard the juvenile movie star's voice but for the benefit of those who did not, here is what he said:

To Hear Himself 3,000 Miles Away

"Dear Friends:
"This is Jackie Coogan talking to you over the Radio by means of the Pallophotophone. I can hardly say a word but this is certainly the most interesting invention that I have ever seen. While I am saying these words, my voice is being photographed on a motion picture film. Then Mr. Hoxie, who invented this machine, will develop and print this film, just as they do with my motion picture films, and he will send it out over the Radio when I get back home in Los Angeles. I am saying these words in New York but I will hear them over my own receiving set when I get back across the continent two or three weeks from today. Isn't that a wonderful thing? I know I shall get quite a thrill from hearing myself talk to myself three thousand miles away from myself.

"I get a lot of fun out of Radio. Here's a little story I heard the other day: A little boy had a Radio set and it wouldn't work. A man told him to open the window. He did and he got (Chile) chilly.

Gets Raise in Salary

"I've just come to New York with my mother and father to have them decide on the stories I'm going to make for my new Metro contract. I've met Marcus Loew and my old friend Big Bill Edwards and a dozen of other folks. I've had a great time and I've made a lot of wonderful new friends. New York is a wonderful city—but oh boy, it's cold. Not the people, but the climate. So I'll be glad when we get back home to dear old California, where all my boy friends are and Butzie, my police dog, and my bicycle and all my other toys and everything. Besides, I start getting a raise when we get home. I used to get \$6 a week for working in pictures but my Daddy dear has promised me \$10 a week from now on. And I'm going to get a brand new scooter out of my first week's salary."

The "How" of the Simplified Super Circuit

Part IX—Amplification

By E. T. Flewelling

THERE is an important point to be considered regarding the Super set before a person tries the addition of an amplifier. It is the matter of setting the leaks with amplification in mind.

When setting the grid leak to control the pitch of the squeal, do not at any time, set the pitch of the squeal too high. The best way is to set it high and then slowly bring it down. Listen for a single click in the phones. At this point the proper movement of the tickler coil will produce the rushing or tearing sound in the phones. This is the point desired and it will be found that when a station is tuned in the squeal will be properly regulated by the balancing of the tickler coupling and the tuning condenser. It is this balance that sometimes raises the pitch of the squeal so high that we can barely hear it.

Rise and Fall of Voltage

Careful analysis of the Super action shows that while the squeal which is caused by the rapid blocking and freeing of the tube action this action is also indicative of a corresponding rise and fall of voltage in the circuit. This voltage amounts to a surprisingly large value at times. This is entirely stopped by the large voltages that accumulate on the grid and it is only because we can control this action that our tube functions. Bearing this in mind it is easy to see what might happen to the amplifier tube if we allowed these large values of positive and negative voltage to be applied to the grid of the amplifier tube. We will most certainly

Youth Steals Set; Is Jailed

CLEVELAND, O.—Cleveland's champion Radio bug landed in the toils of the law a few days ago, charged with the theft of three Radio outfits. Chester Bobowski, fifteen, holds the record as the result of his arrest and confession of having entered the Holy Name parochial school, from which he removed two outfits valued at \$61. The youthful "bug" wanted more ways to get messages from the air, so he took a \$37 Radio set from another party, police say. All of the apparatus was found under a bed at his home.

Warn of Forest Fires

Radio engineers on the Pacific coast have devised a means of testing the air for humidity, static and humidity having close relations. When the humidity becomes low the forests become relatively dry and there is greatest danger of fires. By warning the supervisors and other officials concerned with fire prevention to be prepared for trouble, it is expected that many serious forest fires can be prevented.

8,000 Miles on Hay-Wire Aerial

HARTFORD, CONN.—A report has come in to the headquarters of the American Radio Relay League that E. S. Strout of Waterloo, Ia., an amateur using a small hay-wire aerial, has been heard aboard a ship 100 miles east of Brisbane, Australia, more than 8,000 mile away, thus establishing a new long distance record. Compare this with what was considered a remarkable record ten years ago, of 25 miles from Hartford to Springfield, Mass., via Windsor Locks, Conn.

Sparks Disappear

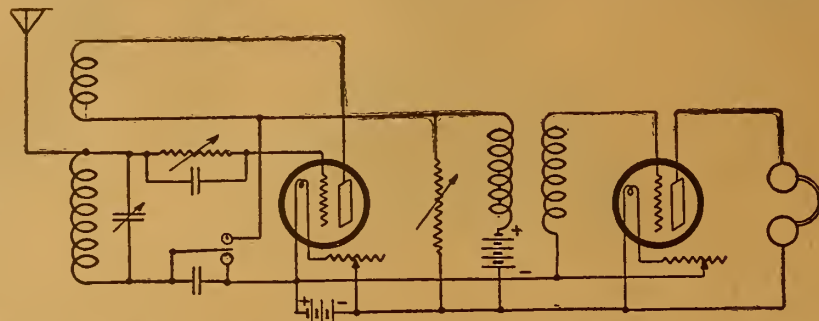
Passing of the spark transmitter in favor of continuous wave transmission for amateur Radio stations was indicated in the American Radio Relay League traffic report for February. Out of a total of 121,592 messages handled by members of the league 108,713 or 89 per cent, went through the air over the continuous wave route.

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amplify parts of the rising and falling voltage, but because the amplifier tube will be paralyzed or blocked, part of the time, we will not amplify the signal to any great extent.

We spoke about bringing the pitch of



the squeal down to the point where the click is heard. This is the point at which the Super works best but the voltage changes are at such a value that the amplifier tube is also blocked because the voltage, rising and falling, has also both positive and negative values. This combination being applied to the amplifier grid can have but one result—impossible distortion of the signal with terrific howls and squeals.

Separate B Batteries

There is another point to consider. In the average amplifier the B battery is generally used in common with the detector. There is always a certain amount of coupling back from one circuit to the other and you will find that amplifiers which are built with an eye to tone, quality, etc., are so arranged that everything is done to prevent this coupling back of one circuit on the other because it always results in distortion, and useless noises. To use separate B batteries, one for the detector, and one for the amplifier is but one step in the right direction for any amplifier and because of the large values running through the Flewelling-Super circuit it is essential that at least we use separate B batteries.

The Amplifier

If this is done we will be able to operate the amplifier more or less successfully, if our ears will stand for it, because, as the squeal is raised when we tune in the station the circuit becomes more or less stabilized and there is less trouble due to blocking and coupling back.

Such a circuit shown in the diagram is suitable for the fans who do not care to enter into a complicated circuit to secure maximum amplification. It will be noted that the usual condenser across the primary of the transformer is omitted and

replaced by a variable resistance. The condenser is, as a rule, unnecessary, and the resistance serves to cut down a great deal of useless noises. It can be varied to suit the taste.

This leaves the Super circuit undisturbed

and one can handle the amplifier as a separate unit.

Tube Connections

A hard tube, of course, is used and the plate voltage is determined by the tube used. That is, use the voltage on the plate of the amplifier tube that gives the best results.

Note particularly the manner in which the connections are made in the tube. The rheostat is placed in the negative lead from the A battery and the return from the grid through the transformer is connected to the battery side of the rheostat. This gives us proper grid biasing due to the drop through the rheostat, for average work and if we wish to push things farther we can use separate biasing or a C battery as we raise the plate voltage. This point applies of course to amplifiers in general but many are not very familiar with amplifiers "in general" and because the point is so important it is best to speak of it.

If we wish to improve on this circuit there are two things that it will be necessary to take care of. First we might improve the circuit to still further cut down the coupling back troubles. Secondly, if

maximum amplification is to be obtained we must use some method to eliminate from the amplifier circuit blocking action that is going on in the Super itself. If such steps are taken real amplification is secured and the writer feels that it is well worth the trouble taken. In our talk next week the writer will attempt to describe such a circuit so that the fans may have the opportunity to see for themselves what may be accomplished with but two tubes, one for the detector and one for the amplifier.

Navy Publishes Bulletin

The Navy Department has begun the publication of the Communication Bulletin, issued in the interests of increasing the efficiency of Naval Communications, especially through greater rapidity and accuracy in handling messages by Radio.

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STATION CONTINUES WATTERSON'S WORK

CREDO HARRIS MAINTAINS STANDARDS OF WHAS

Broadcaster of Louisville Courier-Journal Puts Spirit of "Marse Henry" on the Air

By Vera Brady Shipman

As every home or business concern reflects the countenance of its founders, so does a Radio broadcasting station reflect in its programs its "man behind the gun"—the moving spirit of the local organization.

The Louisville Courier-Journal, WHAS as it is known on the air, has been well known in newspaperdom since the fiery days of its illustrious editor, the late Henry Watterson, "Marse Henry," as he was affectionately known. Southern democracy has been represented faithfully in the halls of fame through the Courier-Journal's eloquent outbursts of patriotism.

WHAS was opened at Louisville in the adjoining building to the newspaper on July 16, last summer. The station operates on 360 meters. At one time a change was contemplated, but at the urgent request of fans, the station remained in the original class.

Meet Credo Harris

When I contemplated visiting Louisville station, and the Digest office notified them of my intention, a prompt card of their Arts Club courtesies was forwarded to me.

I was interested to find just what kind of a man was back of WHAS, whose thoughtfulness for small courtesy was so evident. I asked for Credo Harris. Mr. Harris greeted me.

As a man of poise, a writer, a critic and a man of infinite dreams of what a broadcasting station should accomplish.

Affiliated with the first families of Kentucky (a brother-in-law of the present Lieutenant-Governor Ballard, I afterwards learned), Mr. Harris has gained acquiescence of the leaders of the arts in Louisville and has, through their co-operation, kept his programs of WHAS on a footing of unusual distinction.

Use Chimes

And is it not typical of the plan of such a man that the WHAS opening and closing chimes signal is the opening bars of "My Old Kentucky Home," putting the hearers in instant sympathy with southern ideals?

"I feel," said Mr. Harris, "that every broadcasting station owes to its listeners a sense of responsibility of what comes to them through the air. If we give our listeners jazz, we are helping to keep the American pleasures down to the war level. If we give them too scholarly a program they will tune out and leave us 'high and dry' for programs from other stations who give them what they think they want. But the broadcasting opportunity has a duty to its unseen audience, whose emotions (however latent) will respond as well to a Kreisler arrangement of some favorites as to a new jazz release. The public does not want to be 'educated' but she does want the broadcasting station to realize that her ideals, her desires and her hopes are for fulfillment of a degree better than the mob. And so on every program which goes out from WHAS, there is meant to be some message of depth, some aesthetic flash which touches a heart waiting for the sunrise."

On the right is Credo Harris, director of Station WHAS, whose influence for higher grade programs is felt by Radiophans. At the left is Harold A. Saylor, whose southern accent has pleased many in colder climes. The center photo is of Miss Helen Mitchell, New Albany, Indiana, who gave a recent clavichord recital and was dressed according to the period of the songs. The instrument was loaned by Frank C. Carpenter, Louisville

WHAS in carrying out this ideal, adds to its programs each day, brief paragraph talks on bible characters, given by advance students of the several Theological Seminaries located at Louisville, recitals of especial worth and talks on general interest by visitors or representative citizens. A regular system of setting up exercises is now in preparation to be broadcasted each evening for ten minutes, directed by a local physical director. They call it the largest "physical culture class in the world."

WHAS announcer is Harold A. Salleyer, who like Mr. Harris, has the southern accent which is pleasing on the air. The chief operator is J. E. Graft with Fred Harlow as assistant.

A drive around Louisville gave the first-time visitor a splendid idea of the city and its environment. On the Ohio river, the broad driveway along the wharves shows a river traffic to us who are accus-

tomed to the Great Lakes. The house boats, the regular pleasure and cargo trips to and from Cincinnati and down the Mississippi to New Orleans, are picturesque as could be desired.

Louisville's beautiful park, with its natural curves and rows of white-gowned birches, its residences and its city hall, which houses a mayor whose regime is notable in its integrity, Mayor Houston Quin, whom it was my pleasure to interview, has a career outstanding for clean, moral strength.

Favor Better Program

Louisville Arts Club is a charming retreat where members dine in quiet and where visiting artists may be entertained in the spacious reception halls.

And to the first time visitor to Louisville, the spirit of the newspaper broadcasting, the WHAS spirit that better programs make better listeners, will go far in its intended radiation.

ETHER WAVE CONTROL MAY WIN NEXT WAR

Nations Are Working to Develop Manless War Machines

WASHINGTON.—Radio is being prepared for the next war.

With every advancement in battleship, tank or machine gun construction, governments throughout the world are developing Radio to perfect their military machinery.

Radio tanks have been known for at least three years. Latest reports concern the development of these weapons so as to bring them under Radio control.

According to the plans, no opening would be needed for the operator's vision. He would be entirely encased in armored steel, and would receive his minute directions by Radio from another, but more remote and hidden, tank controlled by an officer. This officer could regulate a platoon of tanks.



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AMERICAN CUTS IN ON EIFFEL TOWER

YANKEE HAS "DISJOINTED SENSE OF HUMOR"

French Police Fail to See Joke in Interference Created by Unknown Private Plant

PARIS.—"An American with a disjointed sense of humor," as he is described by the Ministry of Telegraphs and Telephones, is being sought by the French police, at the request of the French Government, on a charge of being responsible for interference with the Eiffel Tower's Radio telephonic broadcasting.

This interference, it is alleged, is carried out through a private Radio telephone station capable of working on a long wave length and has caused havoc with the Government's official Radio transmission during the last few days.

Picks on Entertainment

The supposed practical joker who is the owner of the strong Radio outfit has been systematically "troubling" the Eiffel Tower transmission, but has studiously refrained from interfering while official communications were being sent, contenting himself with disturbing musical selections and similar entertainment features.

Promptly at the stroke of 5 o'clock, one afternoon, while the Eiffel Tower was in the midst of a program of classical music, the meddler, who is officially known as "Zero Radio Telephone Post," broke in with a characteristic interruption.

"Classical music is no good," said the voice, speaking English; "let me give you some real music."

Then a piano was heard giving a ragtime rendition of "Casey Jones."

The police have learned the approximate location of this Radio outfit, and they are hunting it in the vicinity of Asnières.

But tanks entirely controlled by Radio have been invented. They are devised to be manless. Radio alone, from a safe distance, is planned to drive the tank and man the machine guns.

This is no vague possibility, for it has been put into practice in maneuvering a manless battleship at sea. Firing the guns could have been the next step.

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Radiophone Broadcasting Digest

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the last part, together with the city-station index will appear next week.)

WAAF, Chicago, Ill. 455 also. 300 mi. Chicago Daily Drivers Journal. Daily ex Sat and Sun, 8:30 am, 10:30, 10:45, 12:30 pm, 12:45, 3, 4:30, live stock and weather reports. Sat, same ex no program Dec 3 and 4 pm, Central.

WAAH, St. Paul, Minn. 500 mi. Commonwealth Elec. Co. Tues, 8:30-10 pm, entertainment. Sun, 10:30 am, 3:30 pm, church service. Central.

WAAJ, Boston, Mass. 50 mi. Eastern Radio Inst. Tues, 10-11 pm, Thurs, 8:30-9:30 pm, Sat, 7-8 pm, music. Eastern.

WAAK, Milwaukee, Wis. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm, Central.

WAAW, Newark, N. J. 300 mi. R. Nelson Co. Daily ex Sun, 11-11:55 am, 3-4 pm, music. Wed, 7:30-8 pm, code instruction; 8-9, special program. Eastern.

WAAN, Columbia, Mo. Univ. of Mo. 500 mi. United Electric Co. Daily ex Sun, 12-13:30 pm, educational program; 10:30 am, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAQ, Greenluch, Conn. 600 mi. New England Motor Sales Co. Daily ex Sun, 9:30 am-5:30 pm, every half hr. Eastern.

WAAW, Decatur, Ga. Georgia Radio Co. 485 also. 500 mi. United Electric Co. Daily ex Sun, 12-13:30 pm, educational program; 10:30 am, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAZ, Emporia, Kans. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WJAT, Marshall, Mo. Kelly-Vawter Jewelry Co. WJAU, Yankton, S. D. Yankton College.

WBAU, W. Lafayette, Ind. 100 mi. Purdue University. Mon, Fri, 7:15-7:30 pm, educational lecture. Central.

WBAB, Syracuse, N. Y. 300 mi. Andrew J. Potter. Daily, 7-8 pm, program. Eastern.

WBAD, Minneapolis, Minn. Sterling Elec. Co. WBAF, Moorestown, N. J. Fred M. Middleton.

WBAN, Minneapolis, Minn. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat, 11-11:30 am, Wed, 8-10 pm, Central.

WBAP, Paterson, N. J. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9:15-9:45 am, 10:30-11, 1-1:15 pm, 2:15-2:30, 4:30-5:30, music. Sat. morn. only. Eastern.

WBAD, Decatur, Ill. 100 mi. James Millikin Univ. University activities. definite schedule. Central.

WBAP, Fort Worth, Texas. 400 and 485 only. 1,500 mi. Fort Worth Star Telegram. Daily ex Sun, 9:45-10 am, 11-11:30 am, 3-3:30 pm, 3:45-4. Daily ex Sat and Sun, 7:15-8 pm, 9:30-10:30, news, reports, concert. Sat, 6:10-6:45 pm, bible lesson. Central.

WBAU, Hampton, Va. Republican Pub. Co. WBAV, Columbus, O. 500 mi. The Ernor Hopkins Co. Daily ex Sun, 12:30-1 pm, Mon, 7-9 pm, Central.

WBAW, Marietta, O. Marietta College. WBAZ, Wilkes-Barre, Pa. 200 mi. John H. Stenger. Three nights of week, not regular.

WBAY, New York, N. Y. 400 only. 1,500 mi. A. T. & T. Co. Experimental purposes only.

WBL, Anthony, Kans. 200 mi. T & H Radio Co. Daily, Fri, 10-11 pm, concert, lecture. Sun, 10 am, church service. Central.

WBS, Newark, N. J. 200 mi. D. W. May, Inc. Daily ex Sun, 10:30-11 am, music; 1-1:15 pm, reports; 2:15-2:30 pm, music, reports, Mon, Thurs, Sat, 7:30-8:30 pm, program. Sun, 9-10:30 am, sacred music; 8-9 pm, music. Eastern.

WBT, Charlotte, N. C. 485 also. 1,200 mi. Southern Radio Corp. Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, Fri, 8:30 pm, music. Sun, 7:30 pm, church services. Eastern.

WBU, Chicago, Ill. 600 mi. City of Chicago. Daily ex Sun, 10:15-10:30 am, 11:45-12 m, 4:15-4:30 pm, police reports. Mon, Wed, Fri, 3:30 pm, 7:30, speeches. Central.

WBZ, Springfield, Mass. 422 only. 1,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 8 pm, church service. Eastern.

WCAB, Newburgh, N. Y. Temporarily discontinued.

WCAC, Fort Smith, Ark. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 200, 485 also. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 400 only. Kaufman & Baer Co.

WCAF, Rodgers, Mich. Michigan Limestone & Chem. Co.

WCG, New Orleans, La. 200 mi. Clyde B. Randall. Daily ex Sun, 6:45-7 pm, news, time. Thurs, 8:30-10 pm, concert. Central.

WCAH, Columbus, O. 500 mi. Entekinc Elec. Co. Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central.

WCAI, San Antonio, Tex. Southern Equipment Co. WCAJ, San Francisco, Calif. 150 mi. Nebr. Wesleyan Univ. Daily, 10:30 am, weather. Tues, 7 pm, bedtime stories. Thurs, 9 pm, music, lectures. Central.

WCAK, Houston, Tex. 100 mi. Alfred P. Daniel. Daily ex Sun, 7-7:30 pm, music. Wed, 8-9 pm, concert. Central.

WCAL, Northfield, Minn. 500 mi. Dept. of Physics. Olaf College. Mon, Fri, 7:30 pm, college extension courses. Tues, 7:30 pm, Thurs, 11 pm, Sat, 12 m, music. Tues, Thurs, Sat, 9:40 am, chapel, sports, news. Sun, 8:30 pm, church services. Eastern.

WCAN, Villanova, Pa. Villanova College.

WCAD, Baltimore, Md. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:30 pm, 5-5:20. Mon, Wed, 8-9 pm, Eastern.

WCAP, Decatur, Ill. Central Radio Service. WCAR, San Antonio, Tex. 1,000 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Central.

WCAS, Minneapolis, Minn. 500 mi. Wm. H. Dunwoody Industrial Inst. Mon, 8:30-10 pm, music, lectures. Tues, Wed, Thurs, Fri, 5:30-6 pm, code instruction. Central.

WCAT, Rapid City, S. D. 485 only. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 pm, 3 pm, weather, reports. Wed, 7:15 pm, concert. Mountain.

WCAU, Philadelphia, Pa. 485 also. 500 mi. Durham & Company, Inc. Daily ex Sun, 11:30 am, 2:30 pm, 6:30, reports, music. Tues, Fri, 10-12 pm, concert. Sun, 2-4 pm, music. Eastern.

WCAY, Little Rock, Ark. J. C. Dice Elec. Co. WCAW, Quincy, Ill. 485 also. 300 mi. Quincy Elec. Supply Co. (Quincy Herald). Daily ex Sun, 5 pm, music. Wed, 7-8:30 pm, concert. Sun, 11 am, church services. 2:45 pm, special programs. Central.

WCAX, Burlington, Vt. 485 also. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thurs, Fri, 8:30-9:30 pm, music. Sun, 7:30-8:30 pm, church services. Central.

WCAY, Carthage, Ill. Carthage College. WCE, Minneapolis, Minn. Fidelity Elec. Co. WCF, St. Louis, Mo. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm, Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCW, Austin, Tex. Univ. of Tex. WCN, Worcester, Mass. 485 also. 100 mi. Clark Univ. Daily, 11:15 am, 8:15 pm, weather. Evening program irregular. Eastern.

WCX, Detroit, Mich. 400 and 485 only. 1,000 mi. The Detroit Free Press. Daily ex Sun, 10:35 am, WCX Woman's Club; 2 pm, news; 2:15, stock reports; 2:50, weather markets; 4:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec 11 and alternate weeks thereafter, concert; 7-8:30 pm, week starting Dec 18 and alternate weeks thereafter, concert. Sun, 2:30 pm, 4 pm, church services. Central.

WDAC, Springfield, Ill. Illinois Watch Co. Time and weather, spark only.

WCAD, Lincoln, Kans. 485 also. 200 mi. Wm. F. Harrison. Tues, Thurs, Fri, 9:30 pm, entertainment. Central.

WDAE, Tampa, Fla. 485 also. 500 mi. Tampa Daily

Times, Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 400 and 485 only. 2,000 mi. Kansas City Star. Daily ex Sun, 3:30-4:30 pm, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. J. Laurence Martin. WDAI, Syracuse, N. Y. 485 also. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Wed, Sat, evening concert.

WDAJ, College Park, Ga. 485 also. 2,000 mi. A. & W. P. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Central.

WDAK, Hartford, Conn. 150 mi. Hartford Courant. Sat, 8 pm, concert. Eastern.

WDAL, Jacksonville, Fla. 485 also. 250 mi. Florida Times Union. Daily, 11 am, weather; 4-4:30 pm, music; 8-9, entertainment; 9:30, reports. Eastern.

WDAD, Dallas, Tex. Automotive Elec. Co. WDAQ, Chicago, Ill. 2,000 mi. Drake Hotel. Daily ex Sun, every half hour from 9:30 am to 1:30 pm, quotations, reports; 6 pm, news. Tues, Thurs, Sat, 10 pm, concert. Sun, 9 pm, 10, concert. Central.

WDAS, Worcester, Mass. Samuel A. Waite. WDAU, New Bedford, Mass. 500 mi. A. H. Smith; 7-7:50 pm, music. Sun, 10:30-12, 10-11, 5-6 pm, church services. Eastern.

WDAX, Centerville, Iowa. 500 mi. First Nat'l Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thurs, 7:30-9 pm, concert.

WDAY, Fargo, N. D. 485 also. 300 mi. Fargo Radio Club. Daily ex Sun, 9:30 am, Tues, Thurs, Sat, 7:30-8:15 pm, reports, news, music. Central.

WDM, Washington, D. C. 50 mi. Church of the Covenant. Sun, 11 am, church service; 8 pm, church service. Eastern.

WDI, New York, N. Y. Ship Owners Radio Service. WDJ, Tuscola, Ill. 100 mi. James L. Bush. Daily ex Sun, every half hour, 9:30 am-1:15 pm, Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. Fallin & Lathrop. Radio Equip. Co. Daily ex Sun, markets every 30 min. from 9:40 am-1:20 pm; 5:15 pm, 7-8, music; 8:15, bedtime story; 9:45, weather. Wed, Sat, 10-11:15 pm, dance music. Sun, 10:30 am, 4:30 pm, 7:30, church services. Central.

WEAC, Terre Haute, Ind. 485 also. 75 mi. Baines Electric Service Co. Daily ex Sun, 10:15 am, weather; 12-1 pm, 5-6, music. Central.

WEAD, Atwood, Kan. N. W. Kansas Radio Supply Co. Temporarily discontinued.

WEAE, Blackburg, Va. Polytechnic Inst. WEAH, New York, N. Y. 400 only. 1,500 mi. Western Elec. Co. Daily ex Sun, 4:30-5:30 pm, Mon, Wed, Thurs, Sat, 7:30-10 pm, Tues, Fri, 7:30-8 pm, Eastern.

WEAG, Edgewood, R. I. Nichols-Hindline-Bassett Lab. WEAJ, Wichita, Kan. 485 also. 500 mi. Lander Radio Co. Daily ex Sun, 9:30 am, 10:40, 11:40, 12:40 pm, 2 reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAL, Rhine, N. Y. Cornell Univ. WEAU, New York, N. Y. S. D. Univ. of S. D. Temporarily discontinued.

WEAK, St. Joseph, Mo. 100 mi. Julius B. Abercrombie. Thurs, 8-9:45 pm, concert. Central.

WEAM, North Plainfield, N. J. 75 mi. Borough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 485 also. 50 mi. The Shepherd Co. Daily ex Sun, 12-1 pm, 4-5, 6-7, music, weather, concert. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8, church services. Eastern.

WEAD, Columbus, O. 375, 485 also. 1,000 mi. Ohio State Univ. Daily ex Sun, 1:30 pm, 4:30, reports, music. Thurs, 7-9 pm, lecture, concert. Central.

WEAP, Mobile, Ala. 485 also. 50 mi. Mobile Radio Club. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. First Mon of each month, 11 pm-1 am, concert. Central.

WEAR, Baltimore, Md. 485 also. 200 mi. News & American Pub. Co. Daily ex Sun, 2-2:30 pm, 6:30-7, 8:30, music, news. Tues, Thurs, 7:30-9:30 pm, Eastern.

WEAS, Washington, D. C. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm, Wed, Fri, 7-8 pm, Eastern.

WEAT, Tampa, Fla. John J. Fogarty. WEAU, Sioux City, Ia. 200 mi. Davidson Bros. Co. Daily, Sun, 10 am, 11, 2 pm, reports, markets, news. Mon, Wed, Fri, 8:30 pm, concert. Sun eve, church service. Central.

WEAV, Rushville, Neb. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm, concert, news, etc. Mountain.

WEAW, Anderson, Ind. 25 mi. Arrow Radio Lab. Mon, Wed, Fri, 7:30-8:30 pm, concert, news, etc. Central.

WEAX, Little Rock, Ark. T. J. M. Daly. WEAZ, Houston, Tex. 1,500 mi. Horwitz (Iris Theater). Daily ex Sun, 11 am, dinner hints, news; 12 m, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news. Wed, Fri, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 800 mi. The Greenwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4, Wed, 7-9 pm, Central.

WEH, Tulsa, Okla. (300 S. Main St., Eldorado, Kans.) Midland Refining Co.

WEV, Houston, Tex. 485 also. 500 mi. Hurlburt-Still Radio Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thurs, 8 pm, concert. Central.

WEW, St. Louis, Mo. 485 also. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2 pm, reports. Central.

WEI, Wichita, Kan. 485 also. 500 mi. Corrado Co. (Wichita Beacon). Daily ex Sun, hourly, 8:40 am-12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.

WEAA, Dallas, Tex. 400 and 485 only. 1,500 mi. Dallas News and Dallas Journal. Daily, 10 am, reports; 12:30-1 pm, address; 6:30-7, bedtime story; 8:30-9:30, music. Tues, Thurs, Sat, 11-12 pm, music. Sun, 2:30-3 pm, bible class; 9:30-10:30 pm, music. Eastern.

WFAB, Syracuse, N. Y. 100 mi. C. F. Woese. No definite schedule.

WFAC, Superior, Wis. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.

WFAD, Salina, Kan. 485 also. Watson Weldon Motor Supply Co. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 1:30 pm, reports. Tues, Thurs, Fri, 8 pm, concert. Sun, 11 am, church service; 8 pm, concert. Central.

WFAP, Poughkeepsie, N. Y. 200 mi. H. C. Strathey Radio Co. Daily ex Sun, 10-10:30 am, 11:30-11:45, 1:30-2 pm, 4-4:15. Tues, Thurs, Sat, feature program. 8:15-9:15 pm, Eastern.

WFAG, Watertown, N. Y. 340 only. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Port Arthur, Tex. 100 mi. Elec. Supply Co. Tues, Thurs, 10-11 pm, concert. Central.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAN, Hutchinson, Minn. Hutchinson Elec. Service Co.

WFAM, St. Cloud, Minn. 485 also. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAQ, Cameron, Mo. Cameron Radio Co. and Mo. Wesleyan College.

WFAT, Fort Wayne, Ind. United Radio Corp. WFAU, Stony Falls, S. D. 485 also. 400 mi. Argus Leader. Daily ex Sun, 10:15 am, 12:15 pm, 1:30, 2:30, reports, music. Tues, Thurs, Fri, 8-9 pm, concert. Fri, 11 pm, concert. Central.

WFAV, Boston, Mass. Edwin C. Lewis. WFAW, Lincoln, Neb. 485 also. 300 mi. Univ. of Neb. Daily ex Sun, 12:40 pm, weather. Mon, Thurs, 7 pm, lectures. Thurs, 8 pm, concert. Central.

WFAZ, Independence, Kan. 500 mi. Daniels Radio Supply Co. Daily ex Sun, 12 m, 4 pm, news. Mon, Tues, Wed, 7:30-8 pm, entertainment. Thurs, Fri, 7-8:30 pm, Sat, 7-9 pm, music. Sun, 11 am, church services. Central.

WFAZ, Charleston, S. C. 485 also. 400 mi. S. C.

Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thurs, 8-10 pm, Eastern.

WFI, Philadelphia, Pa. 400 and 485 only. 1,000 mi. Daily ex Sun, 10 am, reports; 1 pm, news; 2, music; 3:30-4:30, concert; 6:30-7, children's hour. Wed, Sat, evenings, concert. Wed, Fri, 10:30 pm, dance music. Mon, 3:30 pm, organ recital; 4, church services. Eastern.

WGAB, Houston, Tex. 250 mi. QRV Radio Elec. Co. Daily ex Sun, 8:45-9:15 am, news. Sat, 7 pm, news; 8:15 pm, concert. Central.

WGAC, Guaymas, Porto Rico. 250 mi. Escuela Hispano Americana de Radio Telegrafia, Inc. Sat and Sun, etc.

WGAF, Tulsa, Okla. Goller Radio Service. WGAH, New Haven, Conn. New Haven Elec. Co. WGAJ, Shenandoah, Ia. 740 mi. W. H. Gass. Mon, Thurs, 7-8 pm, Central.

WGAK, Macon, Ga. Macon Elec. Co. WGAJ, Lancaster, Pa. 35 mi. Lancaster Elec. Supply & Construction Co. Mon, Wed, Fri, 7-8 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAM, Orangeburg, S. C. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time; 4 pm, Radio talk, markets, sports; 6, music, lecture; 10, time, weather, entertainment; 11 pm, 10 am, church service; 11:55, time; 10, time, weather, music. Eastern.

WGAN, Pensacola, Fla. Cecil E. Lloyd. WGAQ, Shreveport, La. 500 mi. Glenwood Radio Corp. Daily ex Sun, 5:30-6 pm, 8, music. Sun, 1 am, 7:30 pm, church service. Central.

WGAJ, Fort Smith, Ark. Northwest American. WGAJ, Lincoln, Neb. 300 mi. Am. Legion, Dept. of Neb. Fri, 9 pm, music, announcements, patriotic addresses. Central.

WGAU, Wooster, O. Marcus G. Limb. WGAZ, Alcona, Pa. Ernest C. Albright. WGAZ, Washington, C. H. O. 75 mi. Radio Elec. Co. Daily ex Sun, 12 m, music, news; 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGAZ, Madison, Wis. 100 mi. North Western Radio Co. Daily ex Sun, 10 am, weather; 11:30, news; 1 pm, Univ. activities; 4:30, news. Sun, 10:30-12 am, sermon. Central.

WGAZ, South Bend, Ind. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Eastern.

WGF, Des Moines, Iowa. 485 also. 300 mi. Register and Tribune. Tues, Fri, 7:30 pm, entertainment. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 485 also. 500 mi. Am. Radio & Research, Ia. Corp. Daily, 5-6:45 pm, Children's Hour, reports, codes. Tues, Sat, 8:30-10 pm, concert. Wed, 6:45-8:30 pm, Thurs, Fri, 9:30-11 pm, concert. Tues, Fri, 2 pm, Amrad Women's Club. Sun, 4-5 pm, 8:30, 9, church services. Eastern.

WGL, Philadelphia, Pa. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern.

WGM, Atlanta, Ga. 400 only. 1,500 mi. The Atlanta Constitution. Daily ex Sun and Wed, 6-7 pm, orchestra concert; 9:30-10:30 pm, music. Sun, 3:30-4:30 pm, recital; 9:30-10:30 pm, music. Wed, 12-1 am, concert.

WGR, Buffalo, N. Y. 485 also. 1,000 mi. Federal Tel. & Tel. Co. Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agrigrams); 2, 3, 4, 5, music, reports; 7:30, bedtime story, news. Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern.

WGV, New Orleans, La. 400 mi. Interstate Elec. Co. Mon, Tues, Wed, 8-9 pm, music, talks. Mon, Wed, Sat, 11-12:30 pm, Sat, 7:30-8:30 pm, Central.

WGY, Schenectady, N. Y. 370 and 485 only. 1,000 mi. Central. Daily ex Sun, 12 m, 12:30 pm, 6-6:10 pm, reports, time, sports. Mon, Tues, Thurs, Fri, 2-2:30 pm, 7:45, concert. Fri, 10:30 pm, special. Sun, 10:30 am, 4:30 pm, 7:30 pm, church service. Eastern.

WHI, Madison, Wis. 485 also. 1,000 mi. Univ. of Wis. Daily ex Sun, 11:59-12 m, time signals, weather; 7 pm, lectures, news. Mon, Thurs, 7:20 pm, agrigrams, concerts, sports. Central.

WHAA, Iowa City, Ia. 200 mi. Univ. of Iowa. Mon, Tues, Wed, Fri, 8:30 pm, lecture, concert, news. Sat, 9 am, weather. Central.

WHAB, Galveston, Tex. 300, 485, 600 also. 500 mi. Clark W. Thompson Co. Daily ex Sun, 9:45 am, 3:30 pm, 5, reports, music, news. Tues, Thurs, Sat, 8 pm, entertainment. Sun, 10 am, church service. Central.

WHAC, Waterloo, Ia. 150 mi. Cole Bros. Elec. Co. Daily ex Sun, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Central.

WHAD, Milwaukee, Wis. 100 mi. Marquette Univ. Daily, 7:30-8:30 pm, music, entertainment. Central.

WHAE, Sioux City, Ia. 200 mi. Automotive Elec. Service Co. Daily ex Sun, 12:30-5:30 pm, music, reports. Thurs, 7:30 pm, music. Central.

WHAG, Cincinnati, O. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAI, Joplin, Mo. Hafer Supply Co. WHAJ, Davenport, Ia. 30 mi. Radio Equip. & Mfg. Co. Daily ex Sat and Sun, 2-2:30 pm, 4:30-5:30, 10-11, Sat, 10-11 am, 2-2:30 pm, 5-5:30, 11-11:30. Central.

WHAK, Clarksburg, W. Va. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 200 mi. The Capital News. Daily ex Sun, 12:30 pm, 2:45, 4:30, Mon, Wed, Fri, 7:45 pm, Sat, 12 midnight. Sun, 2:30 pm, Central.

WHAM, Rochester, N. Y. Univ. of Rochester. WHD, Savannah, Ga. 100 mi. Frederick A. Hill. Daily, 8-9 pm, Eastern.

WHAP, Decatur, Ill. 100 mi. Otta & Kuhns. No definite schedule.

WHAQ, Washington, D. C. 75 mi. Semmes Motor Co. Mon, 8-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. Paramount Radio & Elec. Co.

WHAS, Louisville, Ky. 485 also. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9 pm, Sun, 2:15-4:15 pm, 4-5 pm, church service. Mon night, silent. Central.

WHAV, Wilmington, Del. 200 mi. Wilmington Elec. Spec. Co. Daily ex Sun, 12-1 pm, music. Mon, Wed, Fri, 6-8 pm, concert. Tues, Thurs, 6-7 pm, music. Eastern.

WHAW, Tampa, Fla. 200 mi. Pierce Elec. Co. Temporarily discontinued.

WHAY, Huntington, Ind. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m, 3 pm, music; 6 pm, markets, news, weather. Mon, Wed, Fri, 8 pm, concert. Sun, 3 pm, sermon; 4 pm, concert. Central.

WHAZ, Troy, N. Y. 400 only. 2,000 mi. Rensselaer Polytechnic Inst. Mon, 8:15-9:30 pm, music. Transcontinental second Monday of each month, 12-1:30 pm, music. Eastern.

WHB, Kansas City, Mo. 400 and 485 only. 1,000 mi. Sweeney Auto & Tractor School. Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morantown, W. Va. W. Va. University. Temporarily discontinued.

WHK, Cleveland, O. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:20-2 pm, 4-4:30, music; 6-6:30, news, music. Wed, Sun, 8-9:45 pm, sermon, concert. Eastern.

WHM, Brooklyn, N. Y. 250 mi. Associated Broadcasters, Inc. Daily ex Sun, 7-8 am; 9:15-10:55, 12:55-1:15 pm, 2:15-2:30, 4:15-5:30, 6:15-7, 7:30-8:30, 10:30-12 m, Tues, Wed, Fri, 7:30-8:30 pm omitted. Sun, 1-5 pm, 5-6, 10:30-12 m, Eastern.

WHN, Ames, Iowa. Ia. 50 mi. Iowa Radio Corp. Daily, 4:30-5:30 pm, music, special. Central.

WIAB, Rockford, Ill. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm, music. Central.

WIAC, Galveston, Tex. 485 also. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm, Eastern.

WIAE, Vinton, Ia. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 3 pm, hand concert. Sun, 2:30 pm, music. Central.

WIAF, New Orleans, La. 300 mi. G. A. DeCortin. Tues, 9-10:30 pm, Thurs, 12-1 am, music. Central.

WIAH, Newton, Ia. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Mon, 7:30-8 pm, Central.

WIAI, Springfield, Mo. 100 mi. Heer Stores Co. Daily ex Sun, 10:30-11, reports, news. Tues, Thurs, Sat, 7:30-8:30 pm, music. Central.

WIAJ, Neenah, Wis. Fox River Valley Radio Supply Co.

WIAM, Omaha, Neb. 485 also. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 200 also. 200 mi. School of Engineering. Mon, Tues, Thurs, Fri, 10:15-10:30 am; 11:30-11:45, news; 11:45-12:10, lecture; 5-6 pm; news; 7-7:15, music; 7:15-7:30, music. Central.

WIAQ, Marion, Ind. Chronicle Pub. Co. WIAJ, Paducah, Ky. 150 mi. Paducah Evening Sun. Daily ex Sun, 3:30-4 pm, reports, news, music, 7-8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 400 mi. Hawk-Eye Home Elec. Co. Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. Leon T. Noel. WIAU, Le Mars, Ia. Am. Trust & Savings Bank. WIAV, Binghamton, N. Y. N. Y. Radio Lab. WIAW, Saginaw, Mich. Saginaw Radio & Elec. Co. WIAZ, Washington, D. C. 200 mi. Woodward & Lothrop. Daily ex Sun, 10:30-11:30 am, 2-3 pm, music. Tues, 8-9, Fri, 6:45 pm, reports. Sat, 8-9 pm, concert. Sun, 4:45 pm, vesper services. Eastern.

WIAZ, Miami, Fla. Flagler St. Elec. Supply Sales Co. WIK, McKeesport, Pa. 500 mi. K. & L. Elec. Co. Daily ex Sun, 6:50-7 pm, Tues, Thurs, 9:30-10:30 pm, Sun, 1:30-2:30 pm and 6:30-7 pm, Eastern.

WIL, Washington, D. C. 200 mi. Continental Elec. Supply Co. Daily 5:30-7 pm, music, entertainment. Eastern.

WIP, Philadelphia, Pa. 400 only. 2,000 mi. Gimbel Bros. Daily ex Sun, 2:30-3:30 pm, Daily, 1:30-2 pm, 7-7:30, Tues, 7-12, Fri, 7-9:55 pm, Sat, 10:10-12 m, Sun, 2-3:30 pm, concert. Eastern.

WIZ, Cincinnati, O. 485 also. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central.

WJAB, Lincoln, Neb. 800 mi. Am. Elec. Co. Mon, Tues, Thurs, 9:30-10:15 pm, music, special. Sun, 7:40-8:40 pm, church services. Central.

WJAD, Vaco, Tex. 485 also. 500 mi. Jackson's Radio Engng. Lab. Daily ex Sun, 12:30-1 pm, markets, news, music; 3:30-4, news, music; 6-6:15, sports; 8:45-9:45, concert, news. Sun, 11-12 am, church service; 3:30-4 pm, music; 6-6:15, sports; 8:45-9:45, music. Central.

WJAF, Muncie, Ind. 200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, church services. Central.

WJAG, Norfolk, Neb. 485 also. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 3:30, 5, 5:30, reports, code school. Central.

WJAJ, Dayton, O. Y. M. C. A. WJAK, New York, N. Y. 250 mi. White Radio Lab. Daily ex Sun, 10:30-10:50 am, music; 11:05-11:20, reports, news; 6-6:30, music, news. Wed, 8-9 pm, concert. Sun, 2-2:45 pm, church service. Central.

WJAM, Cedar Rapids, Ia. 50 mi. D. M. Perham. Mon, Wed, Fri, 8-9 pm, music. Central.

WJAN, Peoria, Ill. 300 mi. Peoria Star. Daily ex Sun, 9 am, 11:30, 1:30 pm, 3, markets, weather, agrigrams. Tues, Thurs, Sat, 9:15-9:45 pm, concert. Central.

WJAP, Duluth, Minn. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music. Mon, Thurs, Sat, 10:30-12 midnight. Sun, 11-12 m, pipe organ, 12-1 pm, 7:30-9 pm, church service. Central.

WJAQ, Topeka, Kan. 200 mi. Capper Publications. WJAP, Duluth, Minn. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music

RECEIVING RECORDS? SEND 'EM IN—

By The Contest Editor

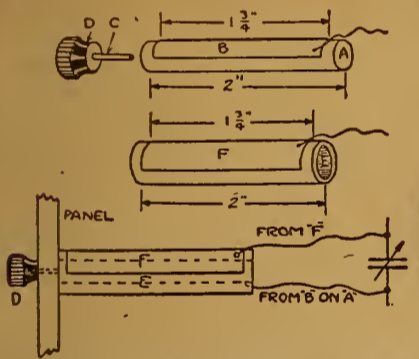
HERE we are again with 46 old records beaten and 18 new ones added to the list. Mr. Arthur Chapelle of Woodburn, Oregon seems to hold the record for the most stations received this time. Who have YOU heard this week? See if you can't beat these distances. When you send in your stations be sure to measure them AIRLINE, and submit the distances you measure. Otherwise they are ineligible.

The records for the week appear below: Station—Miles Away—Who Heard it?

- CHCS—2125, Arthur Chapelle, Woodburn, Ora.
DM4—1700, Arthur Chapelle, Woodburn, Ora.
K0Z0—2175, H. S. Olding, New Glasgow, N. S., Can.
KPAD—2125, Mrs. A. S. Mawhinney, New York, N. Y.
KFAW—1325, M. L. Johnson, Atchison, Kans.
KFCC—1175, M. L. Johnson, Atchison, Kans.
KFCL—1300, M. L. Johnson, Atchison, Kans.
KFGH—1475, M. L. Johnson, Atchison, Kans.
KFW—1750, A. L. Ober, North Manchester, Ind.
KFZ—2175, A. A. Ackon, Jersey City, N. J.
KGG—1650, Vernon Adams, Joplin, Mo.
KHO—1000, Arthur Chapelle, Woodburn, Ora.
KSO—4000, Walter Lee, Lost Harbor, Alaska.
WAAB—1325, C. H. Yule, Florence, S. C.
WAAF—1850, L. W. Beretta, San Mateo, Calif.
WAAP—1400, Arthur Chapelle, Woodburn, Ora.
WAAW—1300, A. R. Butlers, Los Angeles, Calif.
WBAM—1825, H. S. Olding, New Glasgow, N. S., Can.
WBAQ—1200, H. S. Olding, New Glasgow, N. S., Can.
WBZ—2500, Arthur Chapelle, Woodburn, Ora.
WCAS—1450, Arthur Chapelle, Woodburn, Ora.
WCM—2174, H. S. Olding, New Glasgow, N. S., Can.
WCX—2075, L. W. Beretta, San Mateo, Calif.
WEY—1250, Mrs. A. S. Mawhinney, New York, N. Y.
WHAK—2175, Arthur Chapelle, Woodburn, Ora.
WHAM—2225, Arthur Chapelle, Woodburn, Ora.
WHAS—1950, Arthur Chapelle, Woodburn, Ora.
WJAN—1700, Arthur Chapelle, Woodburn, Ora.
WKAL—1850, Arthur Chapelle, Woodburn, Ora.
WKAQ—3850, Arthur Chapelle, Woodburn, Ora.
WLAG—1575, L. W. Beretta, San Mateo, Calif.
WLAL—1525, Arthur Chapelle, Woodburn, Ora.
WLW—2025, L. W. Beretta, San Mateo, Calif.
WNAE—1450, Arthur Chapelle, Woodburn, Ora.
WOAP—1950, L. W. Beretta, San Mateo, Calif.
WOL—1550, L. W. Beretta, San Mateo, Calif.
WQQ—1475, Arthur Chapelle, Woodburn, Ora.
WDR—4300, Jack Costa, Hinkley, Minn., T. H.
WPAH—1650, Arthur Chapelle, Woodburn, Ora.
WPAK—1250, Arthur Chapelle, Woodburn, Ora.
WPE—1475, Arthur Chapelle, Woodburn, Ora.
WRW—2550, L. W. Beretta, San Mateo, Calif.
WSY—2050, Arthur Chapelle, Woodburn, Ora.
WTAW—1525, L. W. Beretta, San Mateo, Calif.
WTC—1375, Arthur Chapelle, Woodburn, Ora.
WVAO—1050, M. L. Johnson, Atchison, Kans.
ZLO—3175, S. F. Richards, Janesville, Wis.

Vernier Condenser Made from Pencil and Tinfoil

The illustration shows a novel vernier condenser and an interference eliminator. The body A is made of a pencil about 2 inches long with a strip of tinfoil 1 1/2 inches long laying half way around the pencil. A wire is represented at C, which passes through the panel, and at the end



a knob, D, is used. The pencil A loosely fits into the paper tube E, which also has a piece of tinfoil, F, glued to its outside. By rotating the knob D the two pieces of tinfoil are brought close together or separated as desired. The tinfoil is connected to the regular condenser as shown.—Lester V. Hegman, New York, N. Y.

Useful Hints

If your tuner is wound with bare wire on a threaded core and the wire has worked loose put it in the refrigerator over night, so that the chill will contract the tube. Immediately upon removing it work the wire tight and fasten. As the tube warms it will expand and tighten the wire.

Silk is one of the best materials for keeping the surface of rubber and nickel parts bright.

Rub old and discolored panels with some cheesecloth saturated in household ammonia and finish with a piece of silk dipped in crude oil.—Allen Bartlet, Milwaukee, Wis.

NATIONAL RADIO and SUPPLY CO.

Table with 2 columns: List Price, Our Price. Items include Switch Points, Switch Levers, Grewol Detector, Four in. Dials, Binding Posts, W. D. 11 So-sets, Spaghetti Tubing, Radio Mags, Baldwin Phones, Trimmm Phones.

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Complete Parts for Reinartz Sets, \$11.45

Table listing components for Reinartz Sets: 7x18 Formica Panel, Remler Bakelite Socket, Howard Vernier Rheostat, 23 Plate Variable Condenser, 11 Plate Cuni Variable, 3 Switch Levers, 2 Dozen Switch Points, 1 Schoonhoven Reinartz Coil, Freshman Variable Grid Leak, 8 Binding Posts, 25 Feet Tinned Wire, Baseboard for Mounting, Blueprint with Complete Instructions for Assembly and Wiring.

Table listing various components: Moulded Variometers, 180° Moulded Variocouplers, Mahogany Variometers, 180° Bakelite Variocouplers, Freshman Variable Grid Leak and Condenser, CRL Adjustable Grid Leak and Dubilier Condenser, Master Baldwin Type C Units with Cord, Master Baldwin Type C Head Sets.

Complete Parts for Knocked-Down Receiving Set \$17.95

Table listing components for Knocked-Down Receiving Set: 2 Variometers, 1 Variocoupler, 3 Bakelite Dials, Remler Bakelite Socket, Howard Rheostat, Cunningham C-300 Detector Tube, Mahogany Cabinet, Genuine Formica Panel, 8 Binding Posts, Switch Lever, 12 Switch Points, Freshman Grid Leak and Condenser Combined, Complete Drawing for Assembly and Wiring.

Table listing VARIABLE CONDENSERS: \$4.30 Value, 43 PLATE, now \$1.75; \$3.70 Value, 23 PLATE, now \$1.45; \$3.30 Value, 11 PLATE, now \$1.35; \$3.10 Value, 5 PLATE, now \$1.25; \$2.70 Value, 3 PLATE, now \$1.15.

U.S.A. SIGNAL CORPS WESTERN ELECTRIC PHONES, \$7.95

Each Phone Cap is covered with soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

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These are the Genuine Nathaniel Baldwin "Mica Diaphragm" Phones, complete with silk cord and headband. Special at \$9.95. Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special at \$4.65.

3000 Ohm GUARANTEED HEADSETS, \$8.50 Value \$3.65 | MAGNAVOX, LOUD SPEAKERS, Type R3 . . . \$27.45

Table listing JACKS, HONEYCOMB COIL, and CABINETS. Includes items like Patent Single Circuit, Patent Double Circuit, Federal Single Circuit Filament Control, Federal Double Circuit Filament Control, 1500 Turns, 1250 Turns, 1000 Turns, 750 Turns, 250 Turns, 150 Turns, 100 Turns, 75 Turns, 50 Turns, 35 and 25 Turns, 6x 5 1/2" by 6" deep, 6x 7 1/2" by 6" deep, 6x 1 1/2" by 6" deep, 6x 1 1/2" by 6" deep, 6x 2 1/2" by 6" deep, 6x 1 1/2" by 7" deep, 6x 1 1/2" by 5 1/2" deep.

Table listing RHOEOSTATS, SIGNAL CORPS SUPER SENSITIVE, SPAGHETTI TUBING, ANTI-CAPACITY SWITCHES, Grewol Detectors, Signal Corps Super Sensitive, Spaghetti Tubing, Lightning Arresters, 2-Slide Tuning Coils, Phone Caps, Microphone Transmitters, 2-Slide Tuning Coils, Phone Caps, for mostly all phones.

FORMICA PANEL, 1/8" thick, Black or Brown, Square Inch . . . 1 1/2c

We guarantee all merchandise purchased of us. Mail orders receive immediate attention

Complete Parts for Single Tube Reflex Circuit \$32.65

Table listing components for Single Tube Reflex Circuit: 43-Plate Vernier Variable Condenser, Radion Loop Aerial, Cunningham C361-A Tube, Grewol Glass Inclosed Detector, All American Radio Frequency Transformer, All American 5 to 1 Radio Audio Frequency Transformer, .001 Micon Condensers, .002 Micon Condenser, Howard Potentiometer, Howard 25 Ohm Rheostat, 8 Binding Posts, 9x10 1/2 Formica Panel, 9x10 1/2 Genuine Solid Mahogany Cabinet with hinged top, Complete instructions for drilling, assembling and wiring furnished so that anyone with no technical knowledge can easily follow.

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Army Teaching by Radio

RADIO has a very important part in the education of army officers in communication and the instruction in which important subjects has recently been standardized. A definite program of instruction in Radio, as a part of the schooling of all signal corps officers and other officers assigned for training from the regular army, national guard, reserve corps, has been laid down by the board of army officers.

The course for company officers includes approximately 1,300 hours of study for signal corps officers and 1,285 hours for officers of other arms. Courses extend over a period of nine months, commencing in September. Radio telephony and telegraphy covers a period of 180 hours and includes theoretical and practical instruction in the fundamental electrical principles.

Tactical Radio procedure is studied during twenty hours. Advanced studies in Radio are prescribed in the tactical and administrative course for signal corps officers assigned to units larger than divisions. This is also a nine months' course and covers study and instruction periods totaling 1,235 hours. Thus Radio enters into the studies of the army officer and it becomes a part of his daily routine the same as other subjects.

Factor in Everyday Life

A Necessity in Every Home Like the Telephone

RADIO promises soon to become a necessity in every home. Although the science is still young its growth has been tremendous. Already it has been playing an important part in transcontinental and transoceanic communication. Messages and weekend letters are being flashed through the air night and day in almost illimitable numbers, and this traffic is increasing so fast that large Radio concerns have had difficulty in keeping up with it.

The place where the receiving set is already a necessity is the farm. Now, with one of these sets tuned to a large central broadcasting station, the farmer gets first hand information about the weather, about crop movements and prices and about all other matters on which his existence depends. He is brought closer to the city. His evenings heretofore dreary and uninteresting, are made cheerful and profitable through the Radio set. He finds that he can keep the farm hand down on the farm. The girls have less desire to see the big city. And a happier, more prosperous agricultural population is the result.

Out at sea, Radio is not only a necessity, but it is required by law. This is to protect lives of passengers and crews on ships.

By the same token, Radio sets on every train in the country can be imagined—not only as an entertainment but as an actual requirement by law. Many an accident could be prevented by such installation, and it would repay the railroad company in a short time.

As a Base for a Scenario

An Opening for the Play of Imagination

WRITERS of scenarios find much help in Radio. One serial that has become widely known depends almost entirely upon Radio for its action and its plot.

The time is about ripe for Radio as an every day means of communication to be visualized in the movies. Instead of the heroine frantically jiggling the hook as the villain tries to get access to her room, will be shown an aerial on the housetop; then the young lady rushes over to her set and sends the call for the leading man, and in jig time he is on the scene. Millions of feet of costly film will be saved and the whole performance speeded up.

Radio opens a new field for the clever director of the movies. The very mystery of the art itself leaves an opening for the play of the imagination in stimulating the passage of the sound. What a chance the old ghost in the haunted house will now have to raise the old hob and stir things up with the superstitious.

Condensed

By DIELECTRIC

After listening to the broadcasting of an opera, a certain gentleman was so engrossed in the performance that at its conclusion he started to leave his home, thinking he was present at the opera house. Perhaps he did; perhaps not. It speaks well for the broadcasting station capable of transmitting so perfectly as to cause a listener in to forget his whereabouts. Also, it shows how thoroughly this class of music is enjoyed by some of the Radio audience. While listening to the broadcasting of the drama "The Green Goddess," from Station WGY recently, I pictured the whole thing so vividly that between the acts I had to go out and get a—fresh cigarette. Someone in speaking of these Radio dramas complained of the loss of effect in not being able to see the scenery. Perhaps my imagination is well developed in comparison with this friend, for the scenic effect of the drama mentioned was all that could be desired and a trifle better than is sometimes found upon the stage.

The Germans claim to be experiencing one of the detractions to broadcasted concerts noted by some of us. They protest against the seeming intentional interference from the French station in Eiffel Tower with their broadcasting of that famous, though disliked, song "Deutschland Uber Alles." It may be a coincidence. There have been times when you and I have particularly desired to heard a number from a certain station, and we had listened to the preceding numbers without interference, but just as this interesting feature began a nearer station came crashing in on the same wavelength. That WAS a matter of coincidence, but we used stronger terms in describing it. Not so very long ago Germany was given to understand that the song in question "had words, but they didn't make sense." They appear to have gone "up in the air" over the thing and the French are repeating the lesson through the ether.

When RADIO DIGEST scooped the Flewelling circuit something was started that made fans all over the country sit up and take notice. It made some other Radio journals hump themselves to catch up with the demand for information on the subject. The "Flivver" has made a place for itself in Radio history, and, as was to be expected, is one of the most talked of and copied sets in existence. Now that the prize contest, conducted by this paper, is settled we can get back to work on DX stuff and try to improve our records against the day when a prize may be offered for the greatest distance obtained with a "Flivver." I know of five fans in my neighborhood constructing these popular sets and when I finish writing this there will be another one on the job.

Dr. Steinmetz almost shattered my ground conuention some months ago when he assailed the ether theory. Then "a voice from the South" took up the cry and Mr. Artzinger came along with his banner announcing a substitute: hydrogen ions! All that has passed and we still talk in terms of ether. At present I am trying to convince myself that the Electrical Wizard from Schenectady is correct in his prognosticating the elimination of static in the near future. That old static broadcaster is the most detrimental foe of Radio bacilli. When he's gone forever, then you'll see Radio bugs multiply as never before.

Station WQAM has made friends over a considerable portion of the United States since its first concert. I wonder how many of the Radiophans sojourning in Miami, Florida, for a few months of the year carry their receiving sets with them. It would seem to me pretty hard to leave the set at home, depending on a kind acquaintance to tune in your native cit's broadcasting station for you. Perhaps they are content to listen to the programs from this competent station in their midst. It is evident that the dance music from WQAM is enjoyed by guests in the hotels in that vicinity, for a number of the hotels have receiving sets installed and tune in Tasillo's orchestra for their benefit. That reduces one item of expense, incidentally, for the management may dispense with the services of an orchestra.

What is likely to become one of the most popular of all Radio Clubs is the Radio Broadcasting Club, of San Jose, Cal. This is to become a national organization according to the plans of the promoters. One of the objects of this new club is to establish its own sales organization, whereby members may profit from reduced cost of parts. If you never bought parts for a set you may not appreciate what this will mean to thousands of fans. In purchasing a complete set one is liable to remain ignorant of the oftentimes excessive cost of certain units. Yet the owner of a receiving set is generally dissatisfied until he has experimented in building a set for himself, and to such the R. B. C. will have a decided appeal.

Broadcasting of the forecast from the Weather Bureau has occupied a regular place on the daily program of stations all over this country, providing a much appreciated service in quarters where impending weather changes could be taken into account in planning certain business operations. The certainty of forecast and the earlier it can be given are of prime importance to its worth. From the report of a station to be established in the Arctic zone, financed by the Norwegian government, we may look for an increase in both of these two essentials and place greater credence in what the "weather man" has to say. The starting point for either good or bad weather appears to be in the Arctic region, hence our interest in having a Radio station there. The observer should be supplied with some variety of sand which may effectually prevent any such storm as swept over the country a few weeks ago.



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.)

We'd Lots Rather Seem

Dear Indi—I see where a set of bells is being cast at Troy (N. Y.) for a manufacturer in Cincinnati. Radio tests already made show that these chimes can be heard in the Sandwich Islands. The next step is to arrange things so that the belles of the Sandwich Islands can be heard on the Atlantic coast.—POLLY.

They Thought It Was a Tin Cabinet

Sir Indigest—A Montana news item says, "Forty boys taking Radio." An automobile owner in New Jersey is wondering whether they can be connected with the fan who took his Radio—and the "car" (?) that he had it installed in.—JIMMIE III.

Radio

What is it that's all the rage
And sets the world all ablaze
And every one has the craze?
Radio!

What is it when you're alone,
You listen quietly on the phone
To music of the sweetest tone?
Radio!

What is it that fills the air
With music, song and speech so clear
And brings to all who listen, Cheer?
Radio!

What is it that's most erratic,
Full of noises, squeals and static
That drives the listener nearly frantic?
Radio!

Alas, what is it makes you rash
To spend all your spare cash
And sends your bank account to smash?
Radio!

—E. H. P.

Aw Shux—You Gawan

Dear Indi—I see Mr. Pearl, a member of the Institute of Radio Engineers, broadcasted a lecture on the past, present and future of Radio. Mr. Pearl's words were without doubt, jewels of thought.—LILLIAN G.

Sure, You Win the Cut Glass Antenna

Dear Indi.—Here is a cortical titillation I broadcasted spontaneously the other night. My girl says to me, says she, "Why do you call mother Radio?"

I says, says I, "'Cause she is allus listening in!"—just like that.

How's that for a snappy comeback? Would like to know if you offer a prize for good ones like this?
—SPIDER WEBB.

Judging by Our Steno-S Failure

Indigest—Radio should go a long way in the cure of the one who talks too much. The Radiophan will eventually get the habit of being a good listener.—ISADORE

Next week, "The Radio Tramp," by Walt Drummond, will appear in Indi-gest. This poem is probably, so far, the only Radio epic written. Watch next week!—Indi.

A. B. C. Lessons for Radio Beginners

Chapter XIV—Radio Frequency Amplification

By Arthur G. Mohaupt

RADIO frequency amplification, as the name suggests, is the process of amplifying the signals received at a receiving station while they are at a Radio frequency. This method of amplification is employed when it is desired to reach out to far distant stations from which the signals would ordinarily be too faint and weak to efficiently operate the detector tube.

Radio frequency amplification is thus employed ahead of the detector tube, and may consist of one, two or three stages depending upon the amount it is desired to amplify the oscillations before they are sent into the detector tube for rectification. Two stages of Radio frequency amplification will generally be sufficient, and it is seldom necessary to use more than three. When more than three stages of Radio frequency amplification are employed, the tuning process becomes rather complex due to the adjustments that are necessary.

electrical oscillations of greater intensity to be set up in the plate circuit. These are sent through the Radio frequency trans-

Another regenerative circuit to which Radio frequency amplification can be added very easily and with advantage, is the

The rheostat controlling the filament current of the detector tube should preferably be of the vernier or micrometer

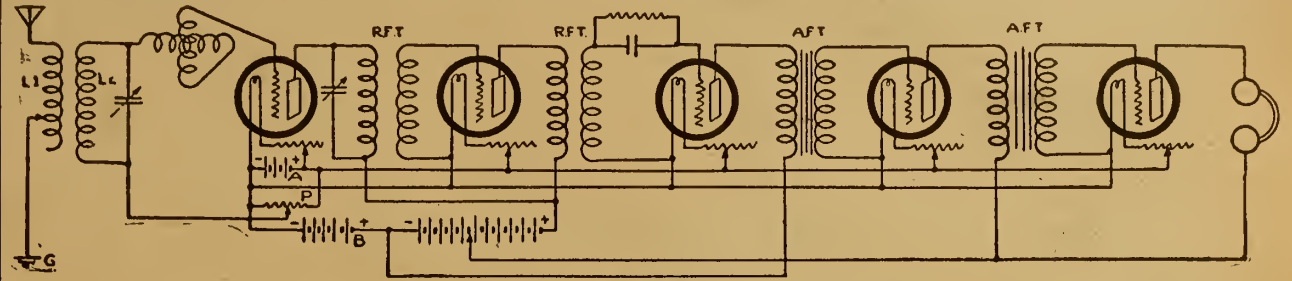


Figure 50

former where they are stepped up to a higher potential, and from the secondary are impressed upon the input circuit of the

familiar two-variometer circuit. This circuit, it will be remembered, contains a variocoupler for tuning the antenna circuit, and a variometer in the grid and the plate circuit of the detector tube for tuning these circuits into the resonance with the received oscillations.

type, for with the detector tube of today, containing as it does still small quantities of gas, a delicate adjustment of the filament current is a very important factor in the tuning process.

For the plate circuit of the detector tube a pressure of from 18 to 22½ volts is needed, depending upon the gaseous condition of the tube. In the operation of the set this plate pressure should be varied until the tube functions best. In general, the entire circuit is operated like the corresponding detector circuit.

Two Steps of R.F. Amplification

When it is desired to greatly increase the range of a receiving station, or when an inferior indoor antenna is employed, two stages of Radio frequency amplification can be effectively employed ahead of the detector. A circuit employing two steps of Radio frequency amplification, a detector, and two steps of audio frequency amplification, is illustrated in Fig. 50.

The operation of the circuit is as follows: From the tuning circuit at the left the oscillations are set up in the grid circuit of the first amplifying unit. This

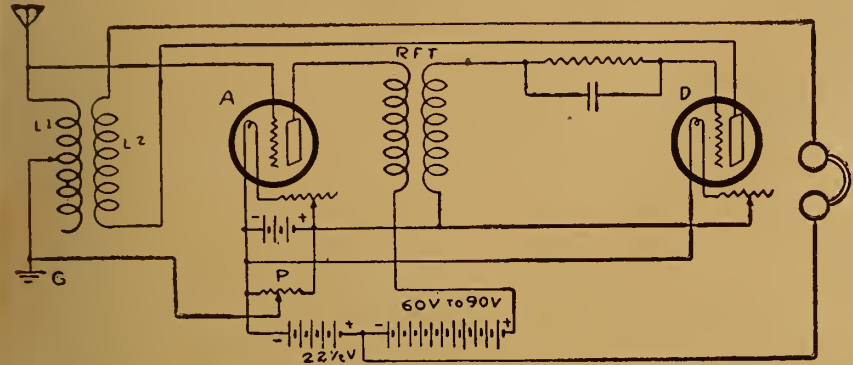


Figure 48

Two Stages Radio Frequency

By means of one or two stages of Radio frequency amplification it is not only possible to effectively receive more distant stations, but the amplification process does not involve the unpleasant introduction of numerous extraneous noises which become so prominent when audio frequency is employed. The reason for this is that these noises practically always occur at an audio frequency, and are thus very slightly, practically not at all amplified in the amplification circuits which are designed primarily for Radio frequency oscillations. Another advantage gained is that by tuning the Radio frequency amplifying circuits the receiving circuit can be rendered more selective, that is, it is possible to more efficiently tune in a desired station without experiencing as much serious interference from other stations operating at or nearly at the same wave length.

detector tube. Here they undergo rectification and further amplification.

The plate circuit pulsations in flowing through the coupler secondary L2, boost those in L1 with the result that the regenerative action is brought into play and the signals are further intensified. The potentiometer P has a resistance of 200 ohms and is employed for obtaining the necessary grid potential. A 90-volt B-battery pressure is necessary in the plate circuit of the amplifier tube, while for the detector tube only from 18 to 22½ volts are necessary.

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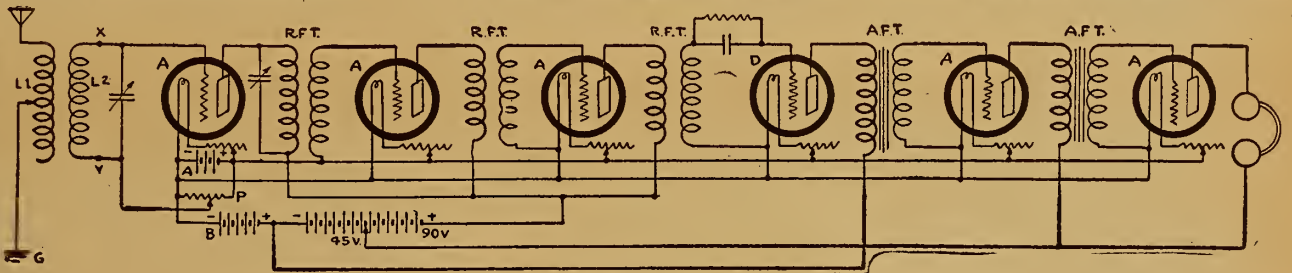


Figure 51

Style of Coupling

To this plate circuit is also coupled the input or grid circuit of the detector tube through the fixed condenser C of about .001 mfd. capacity. This style of coupling the Radio frequency amplifier circuit to the detector unit is often referred to as impedance coupling, since it is a combination of inductance and capacity effects. The resistance unit R is a variable high resistance and should have a range of from one-half to two megohms in order to suit the individual needs of the particular circuit used.

circuit is tuned into resonance by means of the variometer V. From the output circuit of this first amplifying unit, the (Continued on page 12)

R.F. With Regenerative Circuits

A very efficient receiving circuit employing the regenerative feed back principle is that in which a standard variocoupler is employed with the rotor or secondary connected into the plate circuit of the detector tube. The primary is connected into the antenna circuit with the variable contact to the ground terminal. The current pulsations set up in the plate

In general, the circuit is easy to construct, is simple to operate, and gives very good results. If signals of great volume are desired, one or even two stages of audio frequency amplification can further be added to the receiver.

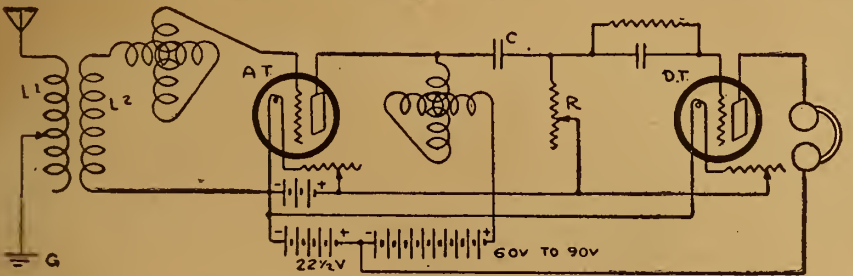


Figure 49

circuit in flowing through the coupler secondary reinforce the oscillations in the primary, and thus cause an increased variable potential to be impressed upon the grid of the detector tube. This, in turn, further intensifies the current oscillations in the plate circuit.

Radio frequency amplification can be added to great advantage to this circuit, and the received signals will as a result not only come in louder but stations at much greater distances can be reached. This circuit arrangement is illustrated in Figure 48. The Radio frequency circuit, it can be seen is very similar to the plain detector circuit ordinarily employed.

The Antenna Condenser
The condenser C-1 in the antenna circuit is of the 43-plate type and is used in connection with the primary L1 of the variocoupler for tuning the antenna circuit to the frequency of the incoming oscillations. The potential variations thus set up across the "active turns" of the coupler primary are then impressed across the grid and filament of the Radio frequency amplifier tube. This tube acts as a relay by causing

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We consider ourselves fortunate in having purchased a limited number of Radio Corps Aeriotron Vacuum Tubes, Type W R 21A Amp. and W R 21D Detectors.
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Charges Two Sets of B Batteries

Device Saves Second Half of A. C. Cycle

In using an electrolytic rectifier for charging B batteries with a toy transformer giving a maximum of 29 volts, only one 12-cell battery can be charged.

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.

It occurred to me that time could be saved by charging a second battery with the other side of the A. C. current cycle that was not being used. The illustration shows the connections necessary to make this circuit.

The same results can be had with one battery if it were arranged so that it could be opened between the sixth and seventh cell. It not only does the work but seems to be easier on the aluminum plates.—H. J. Linkins, Springfield, Ill.

A. B. C. LESSONS

(Continued from page 11)

electrical pulsations are impressed upon the primary of a Radio-frequency amplifying transformer. The primary of this transformer is tuned into resonance by means of a 5-plate or 3-plate variable condenser connected directly across the two primary terminals.

The secondary of the amplifying transformer feeds directly into the grid and filament circuit of the second amplifier unit. In this tube the oscillations are again relayed and amplified and finally impressed across the terminals of a second Radio-frequency transformer. If very sharp tuning is desired, the primary of this second transformer can also be shunted by means of a 3-plate variable condenser. The disadvantage resulting from such practice, however, is that too many controls are introduced, and these make the tuning process too complex.

The secondary of the second Radio frequency transformer then impresses the intensified oscillations upon the grid or input circuit of the detector tube, and from the output circuit of the detector tube the oscillations are further sent through two stages of audio frequency amplification.

The circuit as just described is really quite easily constructed and is also rather simple to tune. It will probably be found that the most important adjustment in the tuning process is the condenser connected across the primary of the first Radio frequency transformer. It is also advisable to employ a vernier rheostat for controlling the filament current to the detector tube. The potentiometer P also plays an important role, for with it the first grid circuit is biased to the necessary extent.

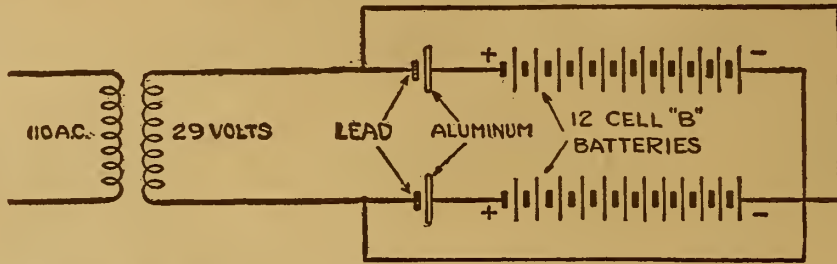
For the plate circuit of the detector tube a pressure of from 18 to 22½ volts is necessary, while for the two stages of audio frequency amplification about 45 or 67 volts will be found very effective. For the plate circuits of the Radio-frequency, amplifier units, B-Battery pressure as high as 90 volts can be used to very good advantage. Otherwise the circuit contains nothing extraordinary or of unusual design.

Another condition that will be found to exist is that the condition of the amplifier tubes also is an important factor, and often surprising results can be effected by merely interchanging two or three of the tubes. The writer has also found that with many amplifier tubes the filament current also enters into the tuning process in order to obtain not exactly the loudest but chiefly the clearest signals.

Three Stages of R.F. Amplification

Three stages of Radio-frequency amplification are employed when an indoor loop aerial is employed, for with this form of antenna the amount of energy received from the incoming oscillations is so small that considerable amount of amplification is necessary before the oscillations are

DOUBLE RECTIFIER CONNECTIONS



sufficiently strong to effectively operate the detector tube. For this reason three stages of Radio-frequency amplification are needed. With a fairly good outdoor antenna, however, the third stage is superfluous, and involves not only excessive first cost but also greatly increases the drain on the A-battery.

The details of construction and operation of loop aerials will be taken up in the next chapter. At present we will merely consider the receiving circuit that is to be used in connection with this form of aerial.

Three Stages of Radio Frequency

An interesting circuit employing three stages of Radio-frequency amplification, and one that can be used very effectively in conjunction with a loop aerial is illustrated in Fig. 51. Although the tuner at the left is shown as employing a variocoupler (which would be the case with an outdoor antenna), the same arrangement can be used with a loop aerial by omitting the coupler and connecting the terminals of the loop directly across the points XY. The reason for this is that the loop contains the necessary amount of inductance which is otherwise supplied by the coupler. The only adjustment then needed to throw the loop circuit into resonance is the tuning condenser C-2. A 23-plate condenser with a vernier adjustment will generally be found to be very satisfactory for this purpose.

The Radio-frequency amplifier units are very similar to those illustrated in the previous circuit diagram except that a third step is employed before the oscillations finally are impressed upon the input circuit of the detector tube. The operation of the entire circuit is in general quite the same as that of Fig. 50, and the same suggestions given there also apply to this circuit. The circuit can also be expanded somewhat by introducing a variometer into the plate circuit of the detector tube.

Chapter Fifteen

Chapter Fifteen will be devoted to the subject of loop aerials. The principles of operation of this type of aerial, as well as the practical construction of one, will be set forth in great detail. Those interested in this form of Radio reception will find the chapter very interesting and well worth while reading.

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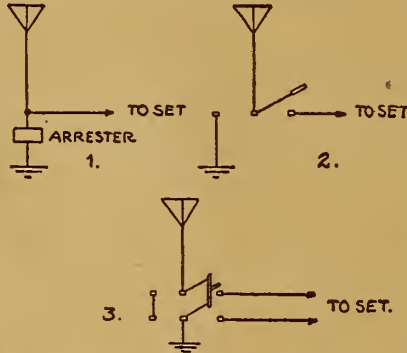
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Lightning Protection Hook-Ups

There are two instruments used in the protection of the Radio outfit from lightning—the switch and the arrester. If a switch is to be used, which is the best means, and a single ground employed for both aerial and ground, the switch should

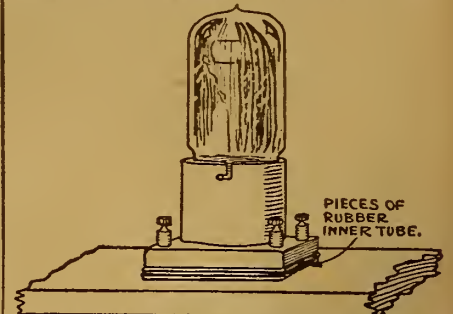


be of the double pole double throw kind. If the latter is the case the ground must be outside of the building. The illustration shows three hook-ups using switch and the arrester. One shows a hook-up for the arrester, one with the switch employing two grounds and one with one ground.—Vernon Hagelin, Geneseo, Ill.

The University of Wisconsin Radio station had one of the first Radiophone broadcasting stations in the U. S.

Rubber Socket Pads Reduce Tube Noises

By placing several layers of soft rubber, which can be cut from old inner tubes, under the tube socket, tube noises can be



reduced. Jars are absorbed in this manner and capacity between the socket and base is reduced.—John F. Dwigings, Petersburg, Pa.

Grounded Wire Causes Trouble

In a certain section of a village owners of receiving sets were bothered by the interruption of the service. Various reasons were given for the trouble. Many thought it was the instruments in use. Finally it was decided to have the local electric company make an investigation. The trouble was finally found in a grounded wire in a lamp near a corner street. The lamp was one of the new lighting system just installed. Not all the trouble comes from static.—H. C. S.

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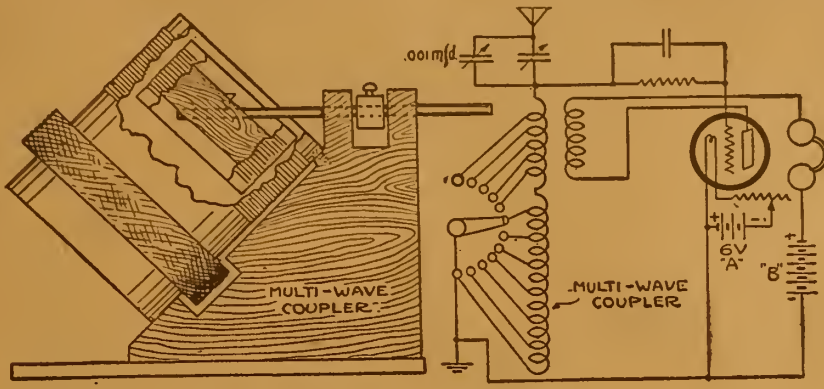
How to Make a Multi-Wave Coupler

Meter Range Increased With New Construction

The multi-wave set shown in the illustration has a range of 180 to 3200 meters. The construction of the coupler is clearly shown. The primary winding is on a 4-inch tube 4 3/4 inches long. The short wave section is straight wound, with 60 turns of wire, tapped every 10 turns. The long wave winding is wound the same as a duo-lateral coil and consists of 400 turns tapped at every 25 turns.

The secondary, which acts as a tickler, is a 3-inch tube, 1 1/4 inches long, and is wound with 48 turns of wire. The set is equally efficient on long or short waves. I am obtaining very good results, receiving from both coasts and also from Canada and Cuba.—Arthur Klinger, Staunton, Ill.

COUPLER AND HOOK-UP DIAGRAM



Another cause of fading and weak signals is poor aerial insulators. Porcelain cleats are commonly used on receiving aerials and serve the purpose very well until they become corroded or covered by smoke. Smoke or corrosion is composed chiefly of carbon which is a very good conductor of electric waves. The glazed kind give better results but because of the fact that only three of the four sides are glazed they will not perform their duty any great length of time. The aerial should be stretched very tight so the capacity between it and the ground cannot vary in the least and cause your set to fail to tune in the long distance stations.

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.

Testing the Storage Battery

A voltmeter will always indicate the exact state of charge or discharge of a storage battery. When making a test of this sort, it is advisable to use the battery for a few minutes before taking a voltage reading to determine its condition. This

A battery that is being used and is completely discharged will show a reading of about 1.8 volts. By discharge is meant that the battery should not be used any longer until after it has been recharged, since although the battery will continue to supply current until the voltage per cell drops to zero, such procedure will generally in permanent damage to the battery.—P. J. M. Clute, Schenectady, N. Y.

Regulation of Filament Current

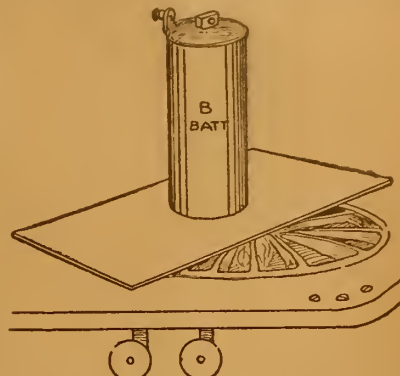
When the filament current of a vacuum tube is too high, its life will be materially shortened. Even a very small excess of current will reduce the life of the tube twenty-five per cent.

It is quite unsatisfactory to endeavor to regulate the current by observing the brightness of the filament, for while this is often done, it is quite uncertain, inasmuch as what one person may consider the proper brightness, another person would consider either too low or too high. Although ammeters are sometimes used, the makers of vacuum tubes announce that the best results from the tubes are secured when the filament current is regulated by using a voltmeter.

If the voltage at which the tube should be operated is not printed on the tube itself or on its container, the voltmeter should be connected across the filament circuit at the socket, and the rheostat adjusted so that the voltage reading is as low as possible at the time the receiver is giving the loudest reproduction. This voltage at which the tube will operate the best should be marked on the base of the tube for future reference.—P. J. M. Clute, Schenectady, N. Y.

Lengthen Dry Cell Life By Heat on Gas Range

There are a large number of Radiophans who have B batteries made up of two-cell flashlight batteries. I use the following method for renewing these batteries and have considerable success with it. Place



a piece of sheet iron over a flame and put the batteries on it one or two at a time and allow them to heat until the wax on the top bubbles. This is well worth trying for it will reduce your B battery cost.—Clyde Hensley, Stockton, Cal.

A three-plate vernier condenser should be connected in shunt to a larger one and not in series.

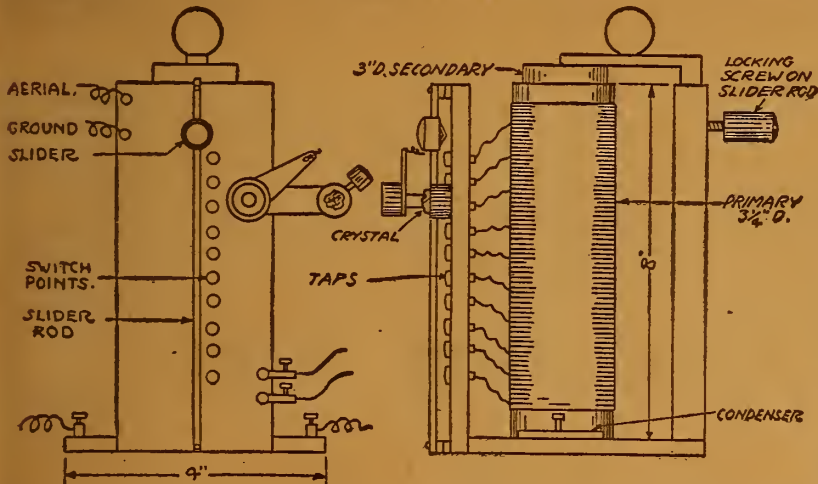
Interference of Receiving Sets

It has been a matter of common experience that two Radio receiving sets in the same building or in adjacent buildings will interfere with each other when tuned to "listen in" on the same transmitting station. This is especially true when the antenna leads or wires run from a common pole. To reduce this consequent effect as much as possible, the antenna wires and the lead-in should be strung as far as possible away from any other antenna system. If possible, the wires should be strung at right angles to any neighboring system.

It is surprising that even the scratching occasioned by making the necessary fine adjustments on the crystal detector, will be audible on adjoining tube receivers, causing much interference and annoyance.—P. J. M. Clute, Schenectady, N. Y.

Vertical Loose Coupler

The vertical loose coupler shown in the illustration has the crystal detector mounted on the side of the panel, which is a great convenience. The crystal cup has a short bolt in the center which slides back and forth in the slot of the bracket to one side of the panel. The knob on the back of the cup serves as a locknut to hold the crystal cup after the adjustment. The cat whisker is soldered to the outer



end of the switch lever which is turned by the knob, thus giving a semicircular swing up and down and lateral adjustments on the slotted bracket.

To get the proper pressure on the crystal it is only necessary to bend the outer end of the switch lever up and down.

This is the best detector idea I have ever tried or seen. I am about 80 miles from Chicago and I have picked up jazz and piano music right along.—Lewis Ellithorp, Clinton, Wis.

Possible Cure for Fading

The cause of fading has puzzled many Radio experts for many years but the U. S. Bureau of Standards has taken careful observations on this subject and its possible cure.

In the first place, what is fading? All persons who have ever "tuned" a receiving set are aware of the fact that when the desired station is tuned in perfectly it sometimes fades away gradually but more often very suddenly. They then blame the receiving or sending set, when the trouble is not with either, and cannot be "cured" very easily.

If you have this trouble you will notice that there are large metallic objects near your aerial such as steel-frame buildings, windmill towers, trolley wires, telephone or telegraph wires, and very high soft wood trees. All these objects absorb the weak waves sent out by the broadcasting station and send them to the ground instead of to the receiving set. The waves are not very strong when they leave the transmitter and any loss through absorption leaves a small amount of current to be picked up by your detector tube, and consequently very weak signals.

is accomplished by turning the current on the tube filaments. This precaution is necessary, since most storage batteries, even when almost exhausted will show a voltage reading of about 2 volts per cell, if the test is made after the battery has been standing idle for a time. Readings of each cell of the battery should be taken.

When recharging a battery after discharge, its state of charge may be easily determined by connecting the voltmeter across the terminals of each cell in succession, while the battery is being charged at a normal charging rate. A completely recharged cell should show a voltage reading of 2.5 to 2.7 volts.

REINARTZ CIRCUIT!

New Ultra Circuit Coupler and Diag. \$4.75; built to specifications, page 13, of March 24th Radio Digest, and Ruby Mica-Copper-Bakelite mounted Condensers, N. P. binding posts, .00015, 50c; .0015, 60c; .0025, 70c. Reinartz coil, doub. green silk-Bakelite Spider \$1.95. Reinartz plate circuit chokes (triple adjustable) \$1.70. Complete set Reinartz tuner and detector parts \$10.65. Tuner, Det. and 2 Stage \$17.95. Two Stage Outfit \$8.35.

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How to Construct a Flewelling Super Set

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

By Lawrence M. Blakey

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

WHILE the world in general may still be ignorant of the fact that Major Armstrong developed, a few years ago, the now famous regenerative circuit, as used in Radio receiving sets, and which was named after him, it is certain that the Radio world is well aware of the fact. The Radio world is also aware of the fact that this noted inventor later startled Radio enthusiasts with the announcement of the development of what are now known as the "Armstrong Super-Regenerative" circuits. These proved a great success for the inventor, but others of less experience and patience found them to be practically an absolute failure, each of the three systems being too critical of adjustment.

This, however, showed that the audion, or vacuum tube, could be made to perform wonders, and it only remained for our friend, Edmund T. Flewelling, of Wakefield, Mass., to bring out a circuit with these super-regenerative qualities, minus the critical disadvantages of the Armstrong circuits, and at the same time reducing the number of pieces of apparatus necessary for such a set.

It, therefore, is the purpose of this article to describe in a non-technical and comprehensive manner the design, construction and operation of such a set.

Design

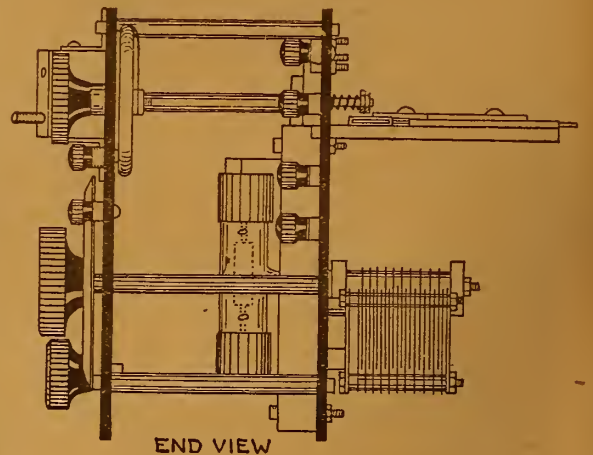
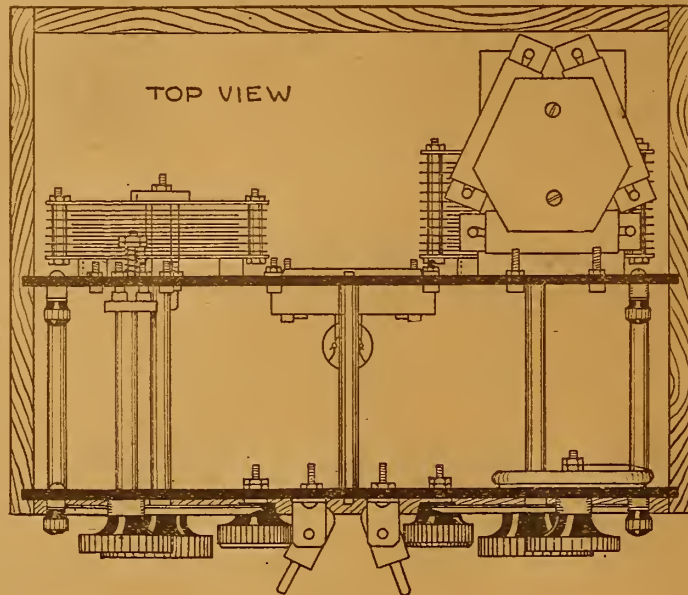
In designing a Radio set of any description, a number of things should be taken into consideration, a few of which are listed below. It will be found that most of these are self-explanatory and no further description will be given, as the object of this list is simply to get the build-

instruments of this circuit. Briefly, in the mind of the author, the Flewelling circuit comes nearer answering all of these than

advantages, disadvantages and the best design of each.

Referring to the circuit diagram, we

chief disadvantage of these condensers lies in the fact that it is hard to make good contacts. Also, unless tightly wrap-



any other that are known to him. It is true, of course, that this does not answer all twelve, either, but in the few exceptions the design of the assembly will counterbalance the faults in the circuit. For instance, as will be explained later, the Flewelling circuit falls down completely in

will first take up the variable condensers. Much has been said by various manufacturers as to the absolute necessity of having a good, reliable condenser. While this is entirely true, it has led many readers to believe they must pay enormous sums for good instruments. Of course, the more expensive ones are more desirable from a constructive point due to balancing, verniers, etc., but for the proper functioning of these instruments, these things are not essential. The writer used variables which cost him \$1.25 and \$1.35 respectively, and no better results could be desired than these instruments have produced.

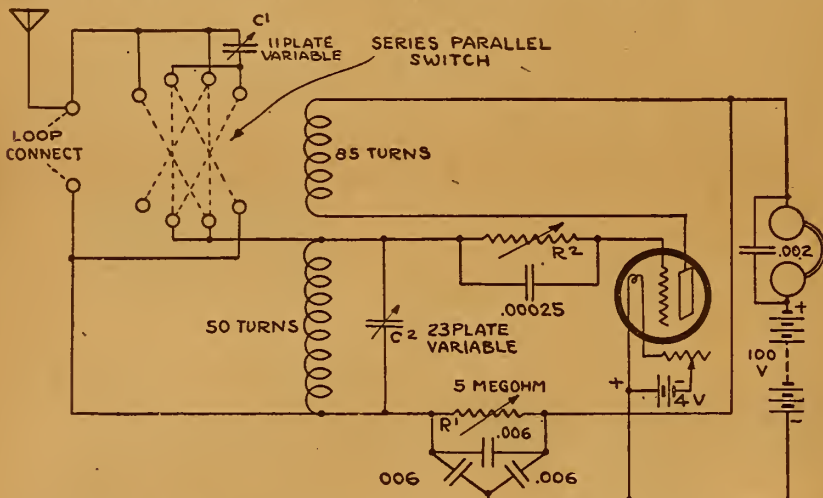
While discussing condensers it seems desirable that the various fixed units be taken up next. When this circuit was first introduced, it was almost impossible to secure condensers of the .006 mfd. size. These have been placed on the market recently, however, for the benefit of those who care to purchase them, and most of them seem to be excellent for the purpose for which they are intended.

Mica Condensers Best

It is highly desirable that mica condensers be used for this size, but since paper condensers are much cheaper, they may be used with very good results. The mica, they have a tendency to pop and

crackle in the receiver, which is very annoying, and at times even throws the set out of adjustment for some certain station. This is due to the variation of the

(Continued on page 15)



er's mind directed along the proper channels in order to better understand what follows:

List of Requirements

1. Sensitiveness as a receiver or capability of picking up distant stations.
2. Maximum output from minimum input, or a design for efficiency.
3. Simplicity and ease of operation over the average or required range of wave lengths.
4. Selectivity, making it possible to receive clearly one of several stations operating on nearly the same wave length.
5. Cheapness of construction without loss in efficiency—accomplished by the reduction of expensive apparatus.
6. Freedom from body capacity effects, which is necessary to enable accurate tuning.
7. Designed for expansion, so that in the future a more powerful receiver can be made by means of additions without alterations.
8. A set capable of being converted into a portable receiver on desired occasions.
9. A circuit adaptable to surrounding conditions, such as available ground and aerial connections.
10. Clarity of received signals without undue distortion.
11. Compactness of units (without crowding, which would reduce efficient operation, howling, etc.), thereby saving space and reducing cost of construction.
12. Neatness of construction and set so that it may be presented on any occasion.

After the prospective builder has read over this list, he is at a loss as to what circuit will answer these requirements, and after picking out his circuit, which will be the best method of assembling the

coming up to requirement No. 6. In fact, body effects are very noticeable in this circuit, due to its extreme sensitiveness and "super" characteristics. However, this can be overcome by proper construction and assembly.

Experiments Made First

Before the actual construction of this set was undertaken by the writer, some experiments with the circuit were performed, in order to better determine the peculiarities of it and thereby enable better assembly of the various parts. As these may be of general interest to the reader, a few of the results obtained will be given at this time.

Excellent results were obtained in these preliminary tests and many undesirable features found, one of which was the effect caused by bringing the hands within a few inches of the wiring in order to tune the set. It was almost impossible to put the hands on the condenser knobs without completely losing a station, and served to demonstrate the absolute necessity of some kind of non-conductor for this purpose. This is what was meant by No. 6 in the list of requirements.

Another noticeable requirement was the necessity of verniers on the two condensers. While verniers might be advantageous if placed on the coupling adjustments, they are not necessary if vernier condensers are used, due to the fact that fine adjustments can be made with these condenser verniers which will compensate for the rougher adjustments of coupling, or the tickler.

Materials and Construction Design

Since this was to be a Radio fiver set and we could not afford an expensive set, yet desired something more than a crystal receiver, that would reach out, the writer decided to build it as cheaply as possible without lowering the efficiency noticeably by using inferior apparatus. With this idea in view in this article, we will first take up the various increments which go to make up the whole set and discuss the

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I wish to thank you for your kindness in forwarding these resistances. I would have no hesitancy in recommending the use of these resistances in my circuit or any other radio circuit using a variable resistance. I am

Very truly yours,

E. T. Flewelling

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Arthur Pudlin Variable Resistance"

so far the only one that meets all the requirements

capacity which is caused by the varying charge placed upon the tinfoil sheets. As this charge varies, the attraction or repulsion between the plates vary, which in turn causes a vibration within the condenser which results in the variation of the capacity. This can be overcome to a great extent by placing these three condensers as shown in the elevation sketch of the assembled set. Here the condensers are mounted in triangular form on a fiber support and securely held in place by the six-sided fiber fastening placed on top of them. This is screwed down tightly enough that it keeps the tinfoil sheets pressed firmly against the separating dielectric, thereby eliminating electrical vibration. In this manner little trouble is experienced.

All other capacities are indicated on the circuit diagram and may be purchased at the local dealers.

Variable Resistances

The variable resistances R_1 and R_2 will be next in the order of the discussion. R_1 is not at all critical and is of very low value, though good results may be obtained over a large range. It seems that about one-fourth megohm is about right for this. This, being non-critical, can be of the pencil mark or ink type and is placed on the front of the rear panel between two switch points, these in turn passing through the panel and connecting to the .006 mfd. condenser.

R_2 is rather critical for best results and it is advisable that a variable grid of some standard make be used. One with a knob adjustment and not the pencil mark kind are the ones required. However, one constructed as follows is giving excellent results on the set under discussion. It, too, is mounted on the front of the rear panel, and may be seen in the photograph, though the sketch does not show it. This consists of an india ink mark on the panel, about 4 inches long and $\frac{1}{8}$ inch wide, placed in semicircular form and varied by means of a knob and lever arm, the arm being about $1\frac{1}{4}$ inches long. At one end, a switch point passing through the panel makes connection with the ink mark, the other end being open. This is shunted across the .00025 mfd. condenser as indicated in the circuit diagram. The exact value of this depends entirely upon the make of the tube used, the value of the high voltage or B battery potential, and the amount of current flowing in the filament circuit. The value, while rather large, can be determined only by experiment; therefore the necessity for the variable leak of this character.

The rheostat may be of any reliable make and need not be a vernier, as hard tubes are used and the ordinary variation is fine enough for practically all purposes.

Series-Parallel Switch

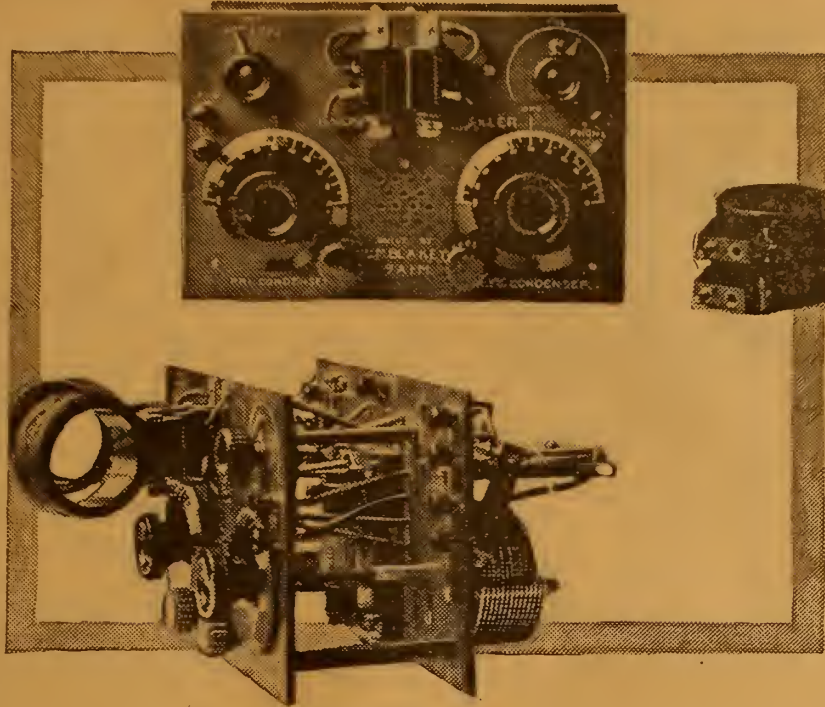
It was found advisable in preliminary tests to use a series-parallel switch for the first condenser, which gives an added range in wavelength, and in view of the fact that this set is built with the idea that as longer wave lengths are assigned (which is sure to be the case in a very short time) more capacity will be needed as larger coils are used. Then by switching this into the parallel position, it is adding capacity to the other condenser.

Also, as various aeriels may be used, the condenser may be required to function either as a series or parallel unit. In operation, if the condenser is used in series, it decreases the natural wave length of the aerial, therefore, this position should be used on long aeriels. For aeriels of the proper length for the set, the condenser may be turned to the "out" position, and for short aeriels where longer wave lengths are required and the other condenser cannot supply this, the parallel position is used, thereby increasing the wavelength of the antenna circuit.

Eliminating Body Capacity

Since it was absolutely essential that body capacity effects be eliminated in some way in order to obtain efficient operation, it was considered best to use some kind of insulating rod or handle. In order to produce a neat-looking set, it became necessary for these to extend from the dials and knobs back through the panel. This required the use of some means for mounting the instruments farther back, so it was considered advisable to use a second panel, of the same size, fastening them together in such a way as to make them self-supporting and independent of any cabinet mounting. This also increases accessibility in case of repairs and in the original construction. The method is clearly shown in the sketches and photographs. Just how far back this second panel

COMPACT ARRANGEMENT OF SET



should be to insure maximum diminution of capacity effects without being farther than necessary, was the next question. Since it was decided to mount the honeycomb coils on the front panel, the rear panel need be no farther back than these coils would be from the hands while working the verniers, which were placed low on the panel for this reason. That, therefore, will be left for the individual builder to decide, but should this same layout be used, this was found to be approximately $3\frac{1}{2}$ inches.

A Myers tube was used in this set and there was found plenty of room on the front of the back panel to mount the tube, it being within $1\frac{1}{2}$ inches of the panel when mounted.

Panels and Panel Material

This leads us the choice of the panels to be used, and it was found that the minimum size panel that could be used successfully was 6 by 9 inches, and these cost \$1.25 each. Since it is advisable that formica, or some other good panel material, be used instead of wood, this presents another expense problem, since two of these are required. A short search, however, revealed a store that carried regular formica panels, polished and unpolished, so two unpolished ones of the right size were purchased, at a total cost of \$1.00. By using emery cloth and sandpaper, the panels were grained along their longest dimension, thus producing the dull finish now used by a large number of leading Radio manufacturers today. The panels were then laid out, drilled and engraved. As space will not permit, and as the average builder will probably not care to do his own engraving, this process will not be discussed at this time, though with a little practice almost any one can engrave their own panels satisfactorily.

The coil mountings are both of the swivel type, it having been found in the preliminary tests that a full 180 degree

coupling is advantageous in many cases. The photographs illustrate these mountings in place on the front panel.

The coils are two De Forest coils of 50 and 100 turns, the tickler being the larger of the two. However, after a little experimenting, it was found that 85 turns worked better, and so the 100-turn coil was reduced to this size.

Another feature in the design of this set is in constructing it in such a manner that an amplifier unit may be added, both audio and Radio frequency, should the builder ever get that ambitious, and we are sure many will. This accounts for the fact that the A and B battery binding posts are placed at each side of the panel. At present, only one set on the writer's panel is in use, no connection having been made through, for at present no Radio frequency amplifiers have been developed, to our knowledge, but that, too, is only a matter of time.

Hand Capacity on Dials Reduced to a Minimum

When using metal dials that are not insulated from the shaft, they may be used to advantage in reducing hand capacity.

On the condenser, if used in parallel with the inductance or in series with the ground lead, the rotating side of the condenser should be on the grounded side.

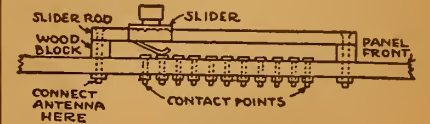
On the variocoupler, use pigtail connections, but instead of following the ordinary custom of fastening wire to the shaft then pigtail to the shaft, bore a hole on each side of the rotor and sink a couple of brass screws, bring out the wire to these screws and then pigtail to the screws, soldering the whole to insure perfect connection. The shaft should now be again pigtailed, this time to the ground circuit.

If the dials are not the metal type, they may be easily grounded by giving them a couple of coats of aluminum paint.

On a set thusly shielded, I have found it impossible to detect the slightest trace of the annoying "hand capacity effect."—E. A. Johnstone, Pocatello, Idaho.

Straight Line Switch Contacts

In building my Radio outfit I had a lot of trouble in getting a good tight connection with the regular switch arms. They were always coming loose, so I finally thought of the method shown in the illustration. Instead of using a switch arm a slider and a slider rod takes its place.



As the contact points are placed in a straight line it is very easy to make. I now have no trouble in loose connections.—William M. Funk, Phoenixville, Pa.

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ALL Radio Parts

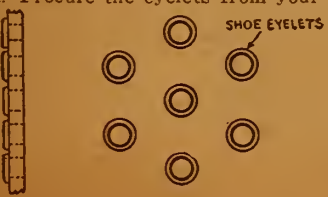
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Drill the holes necessary and of a size to take the body part of a shoe eyelet. Five or seven holes are most generally used. Procure the eyelets from your local



shoemaker of a color to match your panel—in most cases black. Insert these in the holes with finished part out, or on the front. This will improve the appearance greatly.—Lloyd Dearolph, McDonald, Pa.

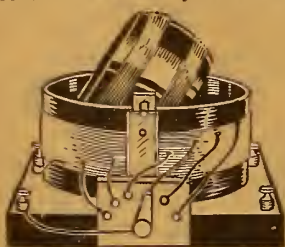
About Radio Parts

The Variocoupler

The variocoupler closely resembles the loose coupler in many respects. In the loose coupler the primary winding has a slider for tuning adjustments; in the variocoupler the adjustments on the primary are usually controlled by means of taps and a switch. The taps are numerous to provide for as much range in adjustment as possible. Occasionally the primary is furnished with a double contact switch, one to give rough adjustments, the other to give finer adjustments, that is to say, the one has taps perhaps for every 10 turns, while the other further subdivides one of these taps with a separate contact on each turn. The tuning is first adjusted on the contacts with 10 turns then is finely adjusted per turn through the other.

In the loose coupler the inductance effect is controlled by sliding the secondary winding in and out of the primary winding but the variocoupler has no sliding adjustment between the coils; it operates under a different mechanical adjustment. In this instance the secondary winding is rotated about its shaft on the inside of the end of the primary tube, then the secondary will receive the full inductive effect when the cores or insides of the tubes are in line; in this way the variations of coupling are controlled.

The current flowing through the primary creates a magnetic field in the core of the primary; this magnetic field in turn induces a current in the secondary but the strength of this current varies depending on whether the secondary is receiving the



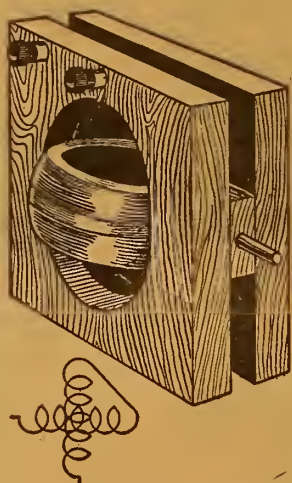
full benefit of this magnetic field. In turning the secondary around the number of lines of magnetic force that flow through the core of the secondary winding are decreased, therefore decreasing the strength of the induced current.

For short wave work the variocoupler makes a neat compact unit for panel mounting while the loose coupler is rather bulky and not as neatly adapted to this use. If it is necessary to increase the sizes for larger wave lengths it will be found that the loose coupler may be expanded with less difficulty. The variocoupler becomes too bulky for practicable purposes. Of course loading coils may be added but even here it will be found that the loose coupler responds more readily to longer wave lengths.

The Variometer

The variometer as a rule is one of the persistent curiosities of Radio apparatus. Most amateurs have not tried to analyze fully its operation or its theory, yet it is actually a very simple device. It consists of two coils connected in series, the one turning inside the other. The same effect and control of the induction is utilized as before but instead of two separate circuits there is only one. The coils of a variometer should both contain the same length and size of wire so that the induced current is the same as the initial current. The initial current then goes through both coils but in addition there is the effect of the induced current in both coils of the

series. Note here that we write of the effect of the induced current! This induced current may add to the initial current or it may subtract. If the current flows through both coils in the same direction the magnetic fields assist each other and the self induction of the variometer is at a maximum. If the inner coil is rotated so that the current flows through the coils in opposite directions the magnetic fields oppose each other and the self induction is at a minimum. The self induction of the variometer therefore depends on the relative positions of the coils; by the rotation of the inner coil a continuous variation of inductance may be obtained.



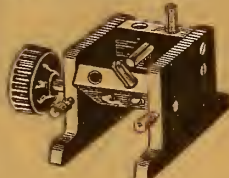
series. Note here that we write of the effect of the induced current! This induced current may add to the initial current or it may subtract. If the current flows through both coils in the same direction the magnetic fields assist each other and the self induction of the variometer is at a maximum. If the inner coil is rotated so that the current flows through the coils in opposite directions the magnetic fields oppose each other and the self induction is at a minimum. The self induction of the variometer therefore depends on the relative positions of the coils; by the rotation of the inner coil a continuous variation of inductance may be obtained.

Connecting Headsets

For best results when using more than one pair of telephone receivers on the same receiving set, they should have about the same resistance and should preferably be of the same type and manufacture. The pairs of headsets should be connected in series, similar to the way the two receivers composing a headset are connected. If two or more sets of receivers are connected in series the energy delivered to the output terminals of the receiving set is divided between the several sets of receivers, depending upon the various resistances of the sets. Thus, it is apparent that matched headsets are advisable.—P. J. M. Clute, Schenectady, N. Y.

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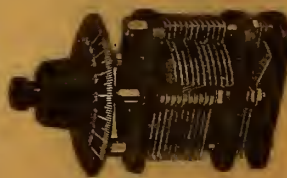
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Construction of the Ultra Reinartz Receiver

Part III—Tuning Unit Details and Mounting

By H. J. Marx

It is quite obvious that the efficiency of the Ultra Reinartz Receiver is centered in the tuning unit. Because of this its construction has been analyzed to the fullest details. The parts required for the mounting of the unit on the panel and also for the assembly of the rotor of the secondary circuit are easily made up and in some cases were selected from the usual

shaft is first pulled tight to the support, with one nut and then locked in place with a second nut. Considerable care should be taken in this assembly so that the shaft alignment will be continuous and the rotation of the rotor will be eccentric.

Shaft Bearings

The bearings for the shaft as indicated by the numerals 6 and 7 were taken from

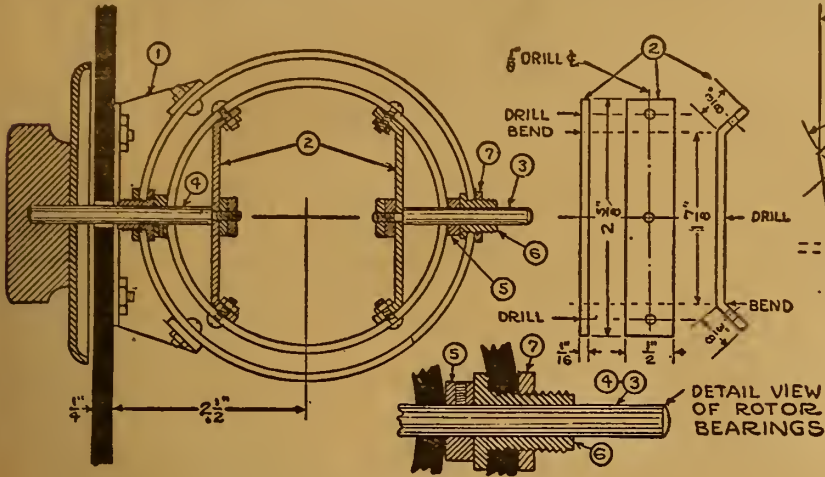
shaft nut can then be turned down in place loosely. The same operation is now repeated for the other side. The shaft nuts can then be tightened and the locknuts added. If the spacing collars have set screws they should be tightened, as it will prevent them from turning and wearing against the rotor tube. It must not be overlooked that the shafts and rotor are

After the tuning unit has been completely assembled, the panel supports can be attached by means of short 6-32 machine screws and nuts. Then the location of the rotor shaft should be checked on the panel. If satisfactory the unit can be secured to the panel with four 1/2 inch long counter-sunk head 6-32 machine screws.

Tuning Record Simplifies Set

Users of Radiophone receivers will find that if they keep a record of tuning adjustments from day to day, it will help them in bringing in the same stations on subsequent occasions. The record consists of a blank with one dually space for the station, another column for the location of the station, distance, or mileage from the receiving station; the wave length of the station; a column for the antenna condenser, another for the taps, one for the tickler and one for the vernier rheostat, in the order named.

By reference to this record, it will be a comparatively easy matter to determine what adjustment is the best for bringing in any particular station desired. A little study of the conditions surrounding a particular set, such as metal roofs or steel structures near by whether on a hill or in a hollow and such matters, will help, with a study of the daily chart kept, to solve many of the difficulties experienced in bringing in a station, and help to calibrate the receiving set to the approximate wave length point for any station.—F. N. Hollingsworth, Boston, Mass.



miscellaneous collection of odds and ends (usually called junk) that will accumulate in the hands of every Radiophan.

Unit Support

The support used for mounting the unit on the panel is shown as number one in the illustrations. Two of the patterns shown are cut from 1/8-inch sheet brass. The cutting is best accomplished with a scroll saw and retouched with a file afterwards.

The 1/4-inch holes can be drilled after the bending operation in order to assure proper locations. In bending the turns should be made sharp as possible and at right angles. If the brass is very hard and brittle, it would be advisable to heat it to a red heat and then bend it while hot in order to avoid cracking at the bend. The lugs on the inside of the circular segment should be bent down until the inner face is flush with the curved edge of the support. That is the reason the inside edge of each lug is slotted back 1/8 inch as shown, and in this way provides bending clearance. Do not use sheet iron or steel for these pieces, due to their reaction in the magnetic field of the tuning unit.

Rotor Shafts and Supports

The rotor shafts are supported and fastened to the rotor tube by means of the two supports indicated and detailed as number 2 in the illustration. These also are made of 1/8-inch sheet brass stock, bent and drilled as indicated. If possible it is best to slightly curve the lug on each end of these supports to fit the contour of the inside of the tubing. Small 6-32 machine screws and nuts (brass) can be used to fasten these to the rotor tube.

The shafts, numbers 3 and 4, are both of 1/8-inch brass rod but the one used on the panel side is 1/2 inch longer to accommodate the dial. The end is turned down 3/8 inch from the end and a 6-32 thread is cut back to the shoulder. In assembling, the

two switch levers that were found in the odds and ends. They had been drilled for a 1/8-inch shaft. If the ones on hand happen to be 1/4 inch—then 1/4 inch brass rods can be substituted for the shafts. The length is not very important except on the panel side. There, any excess can usually be accounted for by a few strokes of a file.

The spacer collars indicated by the number 5 were also found in the odds and ends. Here likewise it may be necessary to file off the sides slightly in order to get the proper thickness. The exact dimensions cannot be given as they will depend on the thickness of the flanges on the shaft bearings.

Assembly

The rotor should be assembled in the tuning unit before the whole is mounted on the panel. The shaft supports are fastened in the rotor and the bearings are attached to the large tube. The rotor is then held in position inside and the shaft inserted from the outside, at the same time slipping the spacing collar in position. The

to act as one unit and rotate together. A poor job will mean a loose rotor and impractical tuning.

Connections

Before the locking nuts are fastened on the rotor shafts—the ends of the rotor winding should first be looped around the shaft—one end to each shaft. In this way the two shafts are used to carry the circuit from the rotor and pigtail connections are avoided. The end of the grid winding on the unit can be looped under the front bearing nut before it is tightened down. A terminal lug can be inserted over the rear bearing and the grid lead can easily be soldered to it, when the unit is mounted in place.

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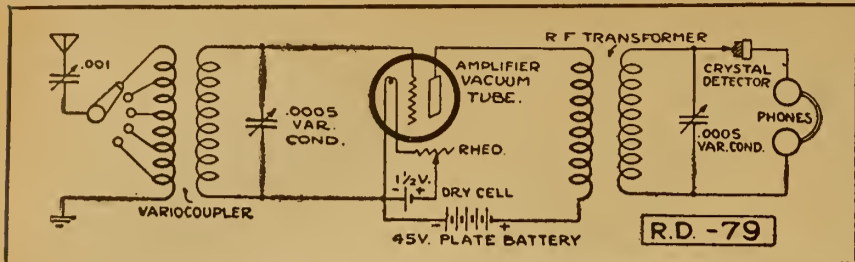
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1/16" THICK	3/4¢ PER SQ. INCH
3/32" THICK	1¢ PER SQ. INCH
1/8" THICK	1 1/2¢ PER SQ. INCH
3/16" THICK	2¢ PER SQ. INCH
1/4" THICK	2 1/2¢ PER SQ. INCH
3/8" THICK	4¢ PER SQ. INCH
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ADDING R.F. TO CRYSTAL SET



FOLLOWING the plan of alternating the R. D. diagrams with both simple and more complicated types of circuits, the one shown this week illustrates a simple method of adding a stage of Radio frequency to a crystal detector set. It must be realized that the crystal detector has the untold advantage of rectifying the received current with no distortion. Its weakness lies in the fact that weak currents are unable to pass through. If, therefore, a stage of Radio frequency amplification is added to it, this primary difficulty is overcome.

In hook up R. D. 79 it is assumed that the crystal detector circuit uses a variocoupler and a 23-plate variable condenser as the tuning unit. The additional parts then are another condenser, the amplifier vacuum tube, the socket, the rheostat, transformer and necessary batteries. The 43-plate or .001 Mfd. variable condenser is used in series in the antenna circuit. The one variable condenser tunes the secondary circuit of the tube. The other variable condenser tunes the secondary circuit of the transformer for what may be called the crystal and phone circuit. Forty-five to 60 volts can be used in the plate circuit of the amplifier tube.

Radio Parts Made from Old Storage Batteries

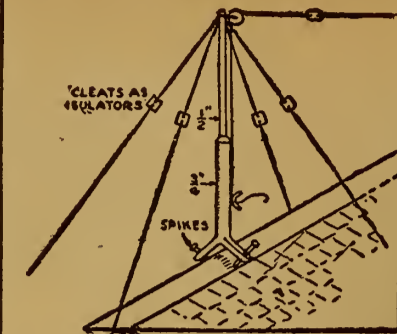
There are many uses for the parts taken from a storage battery that are a great help to the Radio amateur. The material for constructing the apparatus which I am going to describe can be procured for a few cents from a local garage.

Everyone knows that the sides of a battery jar can be used for making panels and dials but what are you going to do with the remaining part after all four sides have been cut away? This part has the form of a box with small pieces separating it into five small sections. It can be used to hold several sizes of nails or screws. A cover for this tray can be made out of the narrow side of the jar by fastening it with small hinges. I have three of these trays made up exactly as described which I use to hold screws and nuts of different sizes and threads. You can even reserve one for your table and use it for an ash tray. It can be polished by rubbing the surfaces with oil.

Dials can also be made with these parts. The knobs that cover the holes for pouring the electrolyte in the jars can be used for the knobs. These knobs are hollow so that a screw can be fastened in one by pouring the melted material of phonograph records in around the shaft. The dials are cut out of the sides of a jar with a fret saw.

Next comes the making of condensers. The forms for making small phone condensers can be easily cut from the narrow sides of the jar. A grid condenser can be made by taking 2 pieces of tinfoil 1 inch wide and 5 inches long, and 3 pieces of waxed paper 1 1/2 inches wide and 6 inches long. Place a piece of tinfoil between the pie pieces of paper and wind the whole on one of the forms mentioned. A binding post must be placed at each end of the form in holes which have been drilled through it so that direct connection to the tinfoil can be made with thin copper or tinfoil. This constitutes a good grid condenser whose capacity is .00025 mfd. Other capacities can be calculated.—Eugene Schmidt, Utica, N. Y.

fit the angle of the roof at the ridge. Two nails may be necessary for anchoring it to the ridge boards. A pipe reducer can be used to bring the pipe down to 1/2 inch.



An efficient 15 or 20-foot pole can be made rigid with but one set of guy wires.—Charles L. Marshall, Atchison, Kan.

If distortion is noted in the amplifier, this may be overcome by using power tubes which will stand very high plate voltages.

A variometer makes a good variocoupler if the stator is unsoldered from the rotor.

Book Reviews

Amateur Radio Call Book. In this book there will be found a complete list of all amateur, special amateur and Radiophone broadcasting stations. Just the book to have near you when listening in on stations and new call letters are heard. There is a large two-color map included, also how to construct and operate a honeycomb coil set, detector and two stage amplifier. Price, \$1.00.

Getting Acquainted With Radio Receivers. By Paul Godley. Describes the necessary parts. How to put an aerial, tuning, regeneration, loud speakers, dry cell tubes, connecting the receiver, operation, faults and their remedies. Price, 25 cents.

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

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

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

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, \$2.00.

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

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in

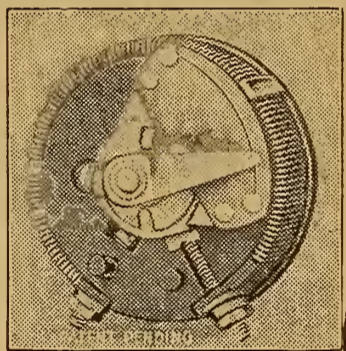
simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, \$1.50.

Letters of a Radio Engineer to His Son. By John Mills. A series of interesting letters written to a boy. Each letter is full and complete and the most advanced student can skip over some of the letters and get just the information he desires. Price, \$2.00.

Radio Communication. By John Mills. The fundamental principles and methods upon which recent developments are based are emphasized. The vacuum tube is treated in a simple, fundamental and up-to-date manner. Present methods and tendencies of the art are explained in a chapter which is non-mathematical. Price, \$2.00.

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

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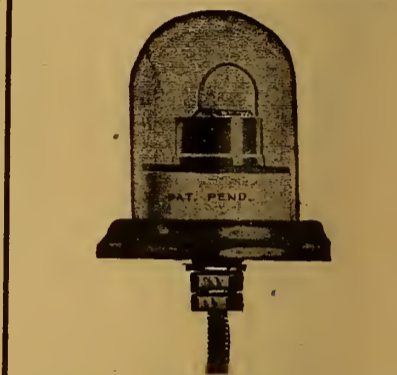
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DIAGRAMS AND WORKING DRAWINGS

Antenna Pole Roof Support

In erecting a pole for an aerial on top of a barn or house it is sometimes necessary to mount it without cutting a hole in the roof. One way to do this is to use a 3/4-inch pipe for the base by cutting one end of the pipe and spreading the parts to



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Questions and Answers

Loop Aerial

(2784) EDC, Tecumseh, Neb.
Wrote you some time ago concerning some information on the Reflex circuit shown in the January 6 number of Radio Digest. Have my set completed now, but so far have had but little luck with it. I am inclosing hook-up, which while altered considerably in appearance, is exactly in every way the same as the one printed in the January 6 issue. Would you be so kind as to check over the hook-up? I have used the best materials obtainable here in my outfit and am very anxious to make it "work" on a loop. Flow large and how many turns of wire on loop for the reception of broadcasts on 485 meters or less? The plate voltage? Are the fixed condensers of the proper capacities? Are they properly placed?

A.—Noting your difficulties in operation of Reflex circuit appearing in Radio Digest and sketch submitted will advise that so executed it should function with satisfactory results, your experience to the contrary. It is impossible to determine where your trouble lies without a personal inspection of set. Some slight discrepancy is acting as a deterrent and when remedied will remove your trouble.

For loop aerial use eight turns of No. 18 wire on a 3-foot square frame. This should be effective.

Use about forty-five volts on the plate. Fixed condensers as indicated are of right capacity and properly placed.

Three-Tube Reflex

(2815) WHP, Brooklyn, N. Y.
In the Radio Digest of January 27 you published an article on Reflex circuits under the heading of "The By-Pass Condenser in the Reflex Circuit;" also three different hook-ups.

As I have used a two-tube Reflex circuit published by you for some time with the finest of results, I decided to build the three-tube and crystal-detector circuit with jacks as published by you in Figure 3 in the above issue, but I cannot understand how these jacks work as you have them in your drawing. I can see where the first A.F. jack might work all right, but where are the connections for the second jack? When the plug is inserted and the body of the jack having no connection,

there is but one connection for the plug. Should the body of this jack be connected up as the first jack?

I have built this set, but I do not get any difference in volume between the first and second jack, although the volume is good and very clear it is not enough louder than my two-tube Reflex to warrant using the extra lamp, and I do not think it works as well on my loop aerial as my old set.

Being unable to get a 10 milhenry choke coil I used a five hundred-turn honeycomb coil, and in place of the 50,000-ohm resistance I got the smallest I could, which was one-tenth of a megohm. Perhaps these values being wrong have upset the whole works.

I would be pleased if you would explain the operation of the jacks as you have them drawn in this circuit and would like to have you give me any other information that would enable me to get out of my trouble, and if you have a blueprint of this circuit kindly mail me one and I will send you a check for same and also for your trouble.

A.—Answering your inquiry with reference to three-tube Reflex circuit appearing in Radio Digest, will advise that in the connection of the jacks the prong which is connected to positive B and the .002 condenser should be connected to the body of jack. Diagram is missing in that detail.

It is not our belief that the substitution of apparatus differing from specifications will affect functioning of the circuit materially.

Connection of jacks described should afford sufficient volume.

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.

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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.

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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

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

"Use, is the test."

WD-11 Not Suitable

(2666) WJC, Johnstown, Pa.
I am now interested in the Reflex circuits published in December 30, January 6 and January 20, 1923, and your answers to a few questions will be much appreciated. Is the tube WD-11 suitable in Reflex? With an outdoor aerial which is best, loose coupler, variocoupler or H. C. coils? How to connect up this aerial circuit in that case? Can another tube be used instead of crystal? If a crystal is better is there a type that will keep its adjustment? Can a potentiometer be used on a 1½ volt cell?

A.—Referring to Reflex circuit appearing in December 23 issue, will advise that a WD-11 tube is not suited to this type of receiver.

Use a variocoupler with the out-of-door aerial. Manner of connecting antenna is shown in the diagrams.

It is necessary to use a crystal detector in Reflex circuit and it cannot be replaced with a tube, as suggested. Dutec or Million Point detectors should not lose their adjustment.

A potentiometer can be used on a 1½ volt cell.

Reflex Apparatus

(2597) LGG, Philadelphia, Pa.
In the diagram No. 1 calling for two tubes, two A. F. transformers, two R. F. transformers and a crystal detector, what

apparatus did you find to work the best? Ratio of Radio transformers and make? Ratio of audio transformers and make? Type of tubes? (Have on hand U. V. 200-201). Dielectric in fixed condensers mica or paper? In circuit No. 2 what is the high, variable resistance of 600 to 2,000 ohms used in plate circuit?

A.—Answering your inquiries with reference to Reflex circuit appearing in Radio Digest will advise that any standard apparatus of rugged construction will serve effectively.

Transformers should be of three or four to one ratio.

U.V. 201 tube is highly desirable. Hard tubes are used.

Use mica dielectric in condensers.

A graphite variable resistance of six hundred to two thousand ohms is indicated for plate circuit.

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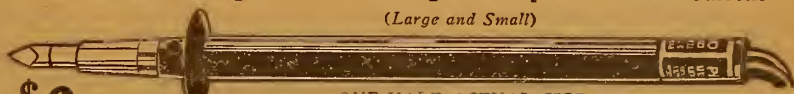
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Radio

Illustrated

Rosalie De-neve, of New York, on one of the largest re-productions of a Radio set ever put on exhibition. It was a big feature at the recent Radio show, Hotel Pennsylvania, New York
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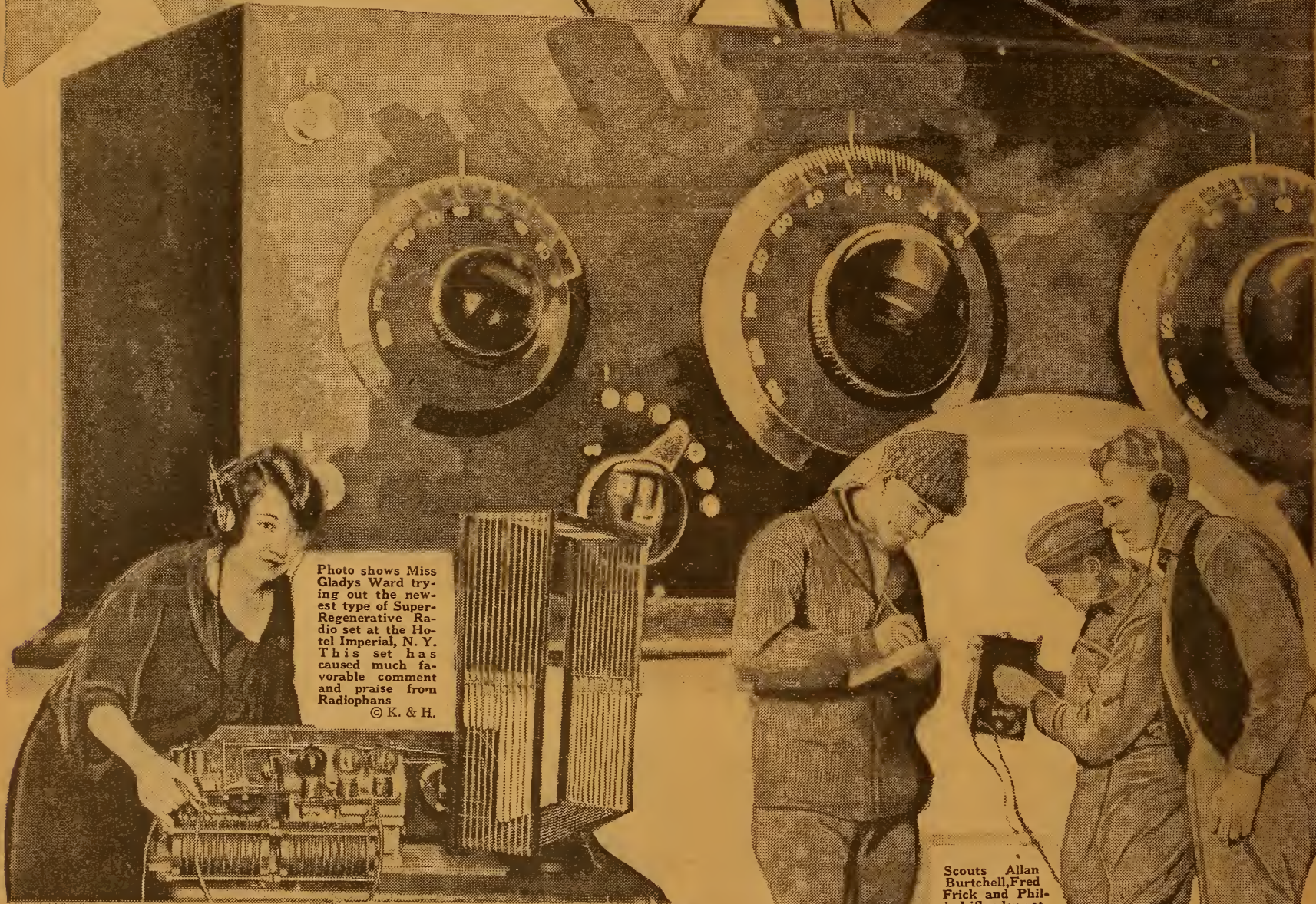
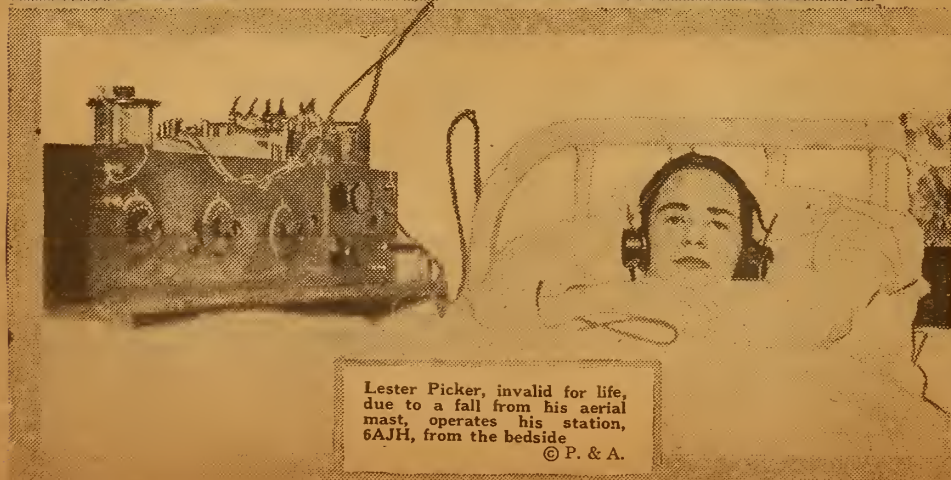
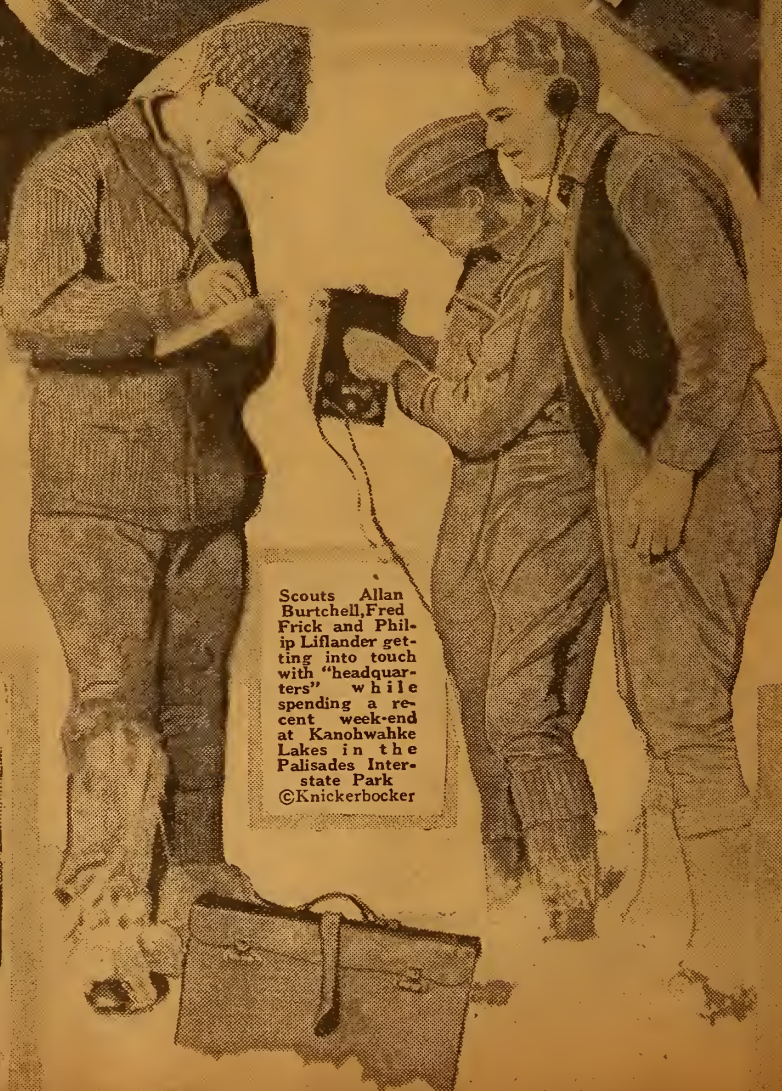


Photo shows Miss Gladys Ward trying out the newest type of Super-Regenerative Radio set at the Hotel Imperial, N. Y. This set has caused much favorable comment and praise from Radiophans
© K. & H.



Lester Picker, invalid for life, due to a fall from his aerial mast, operates his station, 6AJH, from the bedside
© P. & A.



Scouts Allan Burtchell, Fred Frick and Philip Liflander getting into touch with "headquarters", while spending a recent week-end at Kanohwahke Lakes in the Palisades Interstate Park
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