Picture Hook-Up; New Reinartz; Making a Super

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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FORD DENIES STORIES

AIR COMPASS BARS "DOC" COOK STUFF

RADIO NEEDLE TO PROVE POLAR PARTY'S POSITION

Naval Airship to Rely on Stations South as Guide on Trip to Top of World

By Carl H. Butman

WASHINGTON.—When the great Naval Airship ZR-1 goes to the North Pole, she will carry Radio to the top of the world, whether it is late this summer or early next spring. If she reaches that northern pinnacle (and experts insist there is no reason to doubt her ability), the naval airship will be able to prove the fact by virtue of her bearing from northern Radio stations. In these days of scientific achievement, proof is required, and in the event an arctic explorer gets to the pole with a Radio compass or a transmitting set, there can be no doubt of his exact position.

Together with a complete Radio receiving and transmitting set, the ZR-1 is equipped with the latest type of Radio compass, which at the pole would show all Radio stations picked up as bearing directly south, while at all Radio stations within communication distance, her position would be due north.

Radio to Exact Pole First Time

By the time the aerial explorers are ready to start their northern flight, toward the end of August, Captain MacMillan's experiments from the Bowdoin will have proven whether Radio will carry through the aurora, a point on which there seems to be some doubt. MacMillan, however, will not be able to take his set very near the pole, but will be forced to abandon it and the Bowdoin at the edge of the ice, leaving it to the navy to carry Radio to the pole itself.

Weather Bureau officials report that messages from Amundsen's Maude have been received by relay, and that a daily message on meteorological conditions is received regularly during the winter months from Spitzenbergen, located at Latitude 78 North. If it is possible to put Radio messages through from the far north, the world will hear of the ZR-1's progress and her arrival over the northernmost point on earth.

Day Versus Night Trip

Captain Evelyn B. Baldwin, arctic explorer, who suggested an aerial polar flight years ago, recently talked to the ZR-1 crew on polar exploration, answering innumerable questions. Among other things, he explained the advantages of a summer flight, as against one undertaken

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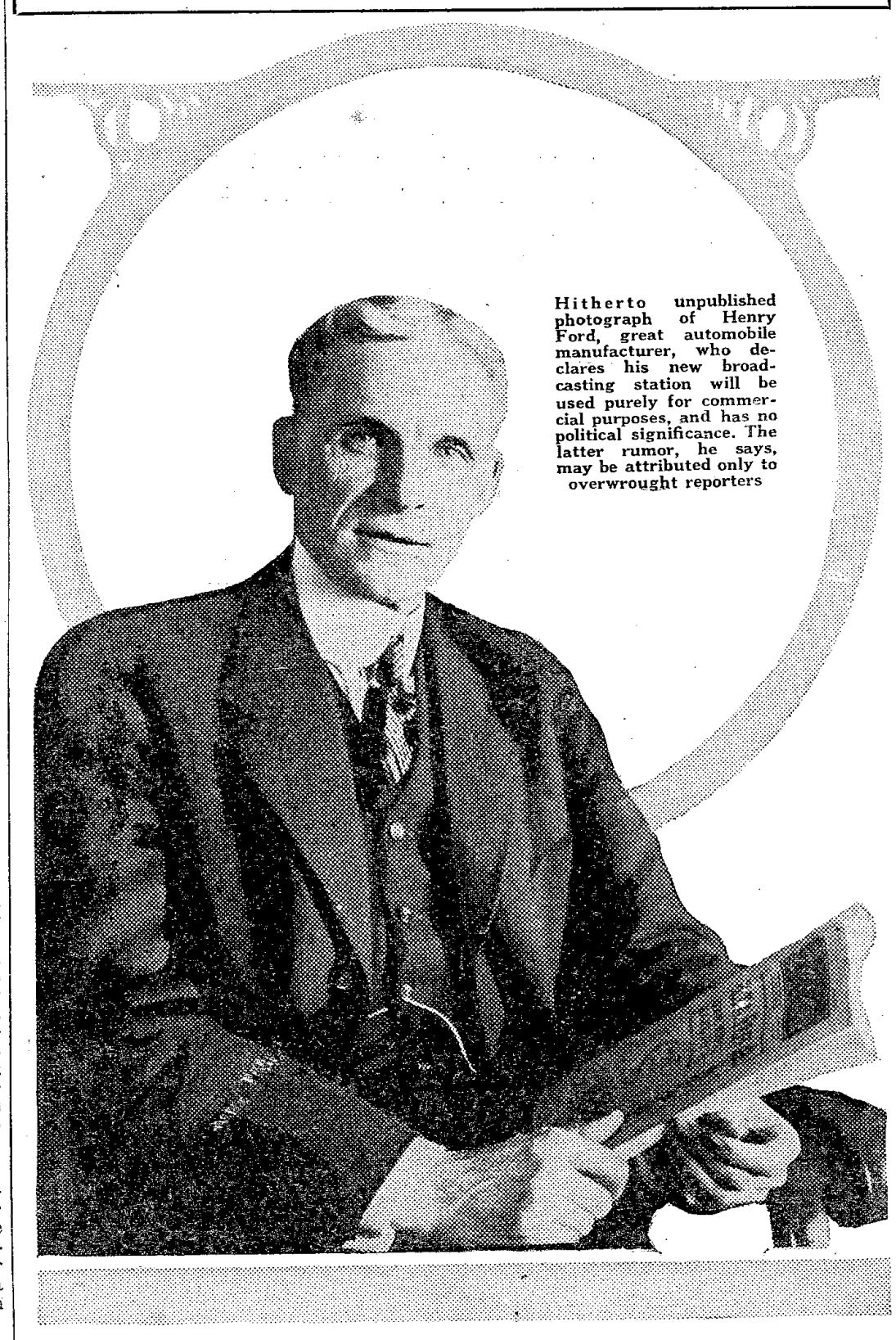
HIS PLANT NOT FOR POLITICS



Hitherto unpublished photograph of Henry Ford, great automobile manufacturer, who declares his new broadcasting station will be used purely for commercial purposes, and has no political significance. The latter rumor, he says, may be attributed only to overwrought reporters

NEW STATION FOR POLITICS RUMORS HINT

New Super Broadcaster at Dearborn, Mich., for Commercial Use Only

Quiet on Campaign Plans

Neither Denies Nor Affirms Presidential Intentions—Will Tell When Ready

By F. J. Huntley

DETROIT.—"Political broadcasting is the last thought in the building of our new broadcasting station," said Henry Ford, when interviewed recently about the building of a giant new station equal in size to the largest in the country. "The station is being built primarily to link up the various Ford manufacturing and assembling plants, as is its predecessor, WWI, but of course the new station will have thousands of miles range where the present equipment has hundreds. The story that has gained much circulation saying that political propaganda will be put on the air in behalf of my alleged presidential campaign is entirely mythical and the dream of an overwrought newspaperman," he continued.

Declines to Discuss Politics

The misstatement referred to by Mr. Ford has appeared in several Wisconsin newspapers and elsewhere, and evidently had its birth in the planned extensions to the service of Station WWI, the Ford broadcaster at Dearborn, Mich. Owing to the numerous rumors and concoctions made by various publications all over the country regarding Mr. Ford's political plans, he now declines to discuss politics with any one.

Mr. Ford has made no public announcement as to his presidential intentions. No one, not even his most intimate friend, knows what Mr. Ford intends to do.

He is not given to making vague insinuations. When he does make an announcement, if he ever does, it will be

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RADIO CALLS BRIDAL COUPLE TO SICKBED

BOSTON.—A broadcasting appeal by Radio for knowledge of the whereabouts of Mr. and Mrs. George A. Lange, who were known to be on a honeymoon tour of New England, recently resulted in locating the couple in a secluded inn at Lost River, N. H., whence they made their way home at once on receipt of a message that the bridegroom's mother, Mrs. Annie Lange of Jamaica Plain, was dangerously ill.

MUSIC BROADCAST MANY YEARS PAST

College Students Transmitted Harmony Over Five Miles Fifty Years Ago

SCHENECTADY, N. Y.—Radio broadcasting is a development of the past three years but the broadcasting of music goes back a great many years. George S. Pierson, a consulting engineer of Kalamazoo, Mich., writing Station WGY of the General Electric Company here, tells of a broadcasting stunt enacted by the students of Union College on a frosty March night in 1874.

The generator, he explains, was what is commonly known as a horse fiddle, a great wooden box on the main floor of a circular building, now the library, then in course of construction and roofless. The top boards of the box were well resined and a plank thirty-eight feet long used as the fiddle bow was also resined. With six men standing on the plank, the bow was drawn back and forth across the edges of the box. No one in Schenectady slept that night and the terrifying notes of the mammoth fiddle were heard five miles away.

"PALM READ, SIR?"; ALLOW WDT TO DO IT

NEW YORK.—Special arrangements have been made by Station WDT of this city with William Checker, noted palmist, for Radiophans to have a free palm reading through that station. Details will be broadcast by Radio and the date will be announced in the regular program of the station. Palmistry by Radio is one subject so far omitted from broadcasting station programs.

LETTERS TELL HOW PARTS OFFER WINS

APPRECIATION OF COUPON PLAN MOUNTS STEADILY

Missives from Arkansas, Iowa, New Hampshire and Massachusetts Indicate General Gratitude

SPECIAL REWARD OFFER
Coupon Number 10

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me — I Am Valuable

Not only does the number of answers to the special offer of Radio Digest grow but the appreciation of subscribers and other readers and their confidence in this publication continue to increase.

Of the very large number of letters received during the last few days the following excerpt from a missive sent from Rogers, Ark., indicates deep interest: "There are so many things I want but I don't know where to get enough coupons."

From 'way up in Rye Center, New Hampshire, a letter came bearing the following conclusion: "Thanking you for this opportunity to get first class material at a low price . . . ." A letter from Milford, Ia., said in part—"I think your coupon offers are just great. I am saving the other coupons for more valuable articles." And from staid Worcester, Mass.—"I thank you a whole lot for this opportunity to obtain Radio material at such a saving and I intend to take advantage of this unusual offer again in the near future."

The numbers of the coupons that you send to this office must be consecutive; they need not begin with Number One but they must run in order. The number of series that you may send is unlimited. Send as many coupons as you desire, choose the parts you want and send the money. The parts will be sent to you on the day we receive your letter.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutively numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Amsco 3-inch Dial; Amsco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, .002, .0025, or .003 mfd.); Teleradio V. T. Socket; B-Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever; Na-Ald Small Space Socket; Se-Ar-De Vernier Adjuster; Basco Switch Lever Assembly.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 601 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Amsco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat; Se-Ar-De Vacuum Tube Socket; Basco Crystal Detector Assembly; Basco Rheostat, 3-ohm or 6-ohm.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting; Thordarson Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Amsco Multiple Point Inductance Switch; Amsco 20-Ohm Rheostat; Amsco 50-Ohm Rheostat; Freshman Antenella; Freshman Micon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read 'EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector; Se-Ar-De Adjustable Vernier Condenser; Basco Tuning Coil; Basco Vernier Rheostat.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A); Thordarson Variable Condenser, .00025 mfd.; Amsco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted; Se-Ar-De Variable Grid Leak, with condenser mounting; Fil-Ko-Stat; R. S. C. Vernier Condenser, 3-plate; Basco Mahogany Cabinet.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket; Thordarson Variable Condenser, .0005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil; Na-Ald 3-Plate Vernier Condenser, with dial.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $(1.80) the following will be sent; 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordarson Variable Condenser, .001 mfd.; Amsco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate; Se-Ar-De 3-Plate Condenser.

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Demcal Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 1 Ratio; Thordason A. F. Transformer, 3.5 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Amsco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser; R. S. C. Variable Condenser, 23-plate.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B; Thordarson A. F. Transformer, 6 to 1 Ratio; Thordarson Variable Condenser, with vernier, knob and dial (.001 mfd.); T. B. H. Radio Heat Set, 2,000 ohms; Tulip Loud Speaker, 15-inch, white; Teleradio Vernier Condenser, 23-plate; Teleradio 2,000-Ohm Head Set; Na-Ald Tuned R. F. Transformer, one stage; Na-Ald 43-Plate Precision Condenser, with dial (.001 mfd.); Se-Ar-De 35-Plate Condenser; R. S. C. Variable Condenser, 43-plate; Basco Radio Frequency Transformer.

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Looking Ahead

Another Picture Diagram—One R. F. and Detector—will be given in next issue. Beginners are finding the picture hook-ups of great aid in building sets. You can't miss the various connections by following the picture diagram layout.

The Operation of Reflex Circuits—by Thomas W. Benson. Mr. Benson will take up this subject next issue in the next chapter of his series for beginners in Radio. Reflex circuits are interesting from the standpoint of their economy of tubes and clearness of reception.

Tube Constant Calculations—by H. J. Marx, August 11 issue. Mr. Marx will continue the article started on page 13 this issue, by showing how mutual conductance, the output impedance, and amplification constants are calculated.

Pictures of the Leviathan's Radio Equipment—Next week will be shown the Radio telephone and telegraph apparatus used by the largest ship afloat. This great vessel has an immense investment in its Radio room alone.

Part IV of the Radiophonist's Telephone Book—next issue will contain the state, city-station index, necessary in using the first three parts devoted to station schedules.

FORD DENIES STORIES

(Continued from page 1)

straight from the shoulder and so positive that there can be no doubt as to just what he intends to do.

Rumored Ford Would Make Sets.

Sometime ago a rumor gained much circulation in the Radio industry. This was that Ford was planning to go into the business of making "flivver" Radio sets. The rumor, widely told, was affirmed partly by a statement of Will Rogers, famous Follies lariat artist and philosopher, in an interview with a Radio Digest representative. Mr. Rogers is a personal friend of the "flivver king," and in the interview said that Ford had told him that he might go into the Radio manufacturing business. Upon careful investigation the Digest received a denial from Mr. Ford, who said that the idea had never even entered his head. The illustration, however, serves to show how many rumors there are of which the famous motor car builder is made the subject.

In perfect disagreement with the story circulated about the new super broadcasting station, the new equipment is being installed purely as an amplification of the big corporation's existing Radio facilities. The new station will have an antenna input of 1,000 watts, which means that it will be equal to the largest now permitted by the government to be built.

To Link Corporation's Holdings

Station WWI, the present equipment, is already carrying on telegraphic communications between Springfield, Ohio, and also Northfield, Mich. The communication between Springfield, Ohio, and the Dearborn plant deals primarily with operations of the D., T. & I. Railroad, which is owned by Mr. Ford and his son, Edsel. Radio has been found so successful even with the smaller plant now in existence that it was decided to expand its operations to other departments of the Ford interests.

It is the intention of the Ford Motor Company to use this new super station-to-be in immediate communication with its interests in various parts of the United States and Canada. Just how much farther this station will cover the engineers having the construction in charge decline to say. They do expect, however, to be in easy communication with Central America, and perhaps foreign points still farther away.

This plant has been in contemplation for a considerable time. It will be installed with the very latest in Radio construction. It will be housed in a new and specially constructed building some distance from the present structure. The only outside construction thus far is the erection of the high steel towers. These have been erected on the opposite sides of a small lake, which, it is believed, will materially aid in effective broadcasting. This is something out of the ordinary, and the engineers are quite interested in the experiment. They are assured, however, the scheme will be most effective.

Will Have Best of Equipment

F. L. Black, in control of the Ford Radio department, says the company has done but little in the way of Radio experimentation, but it has been a close observer, and that the equipment to be installed is the very latest in design. No expense is being spared in making this station the best equipped and most powerful of its kind in the United States.

"It is being installed," Mr. Black said, "primarily for commercial purposes. Communication between the Ford interests in all parts of the United States and Canada is enormous, and this plant is intended to do its share in relieving the situation.

"For a year or more now we have been broadcasting programs on Wednesday nights. We are planning to go into this somewhat more extensively with the new plant. The programs probably will be more elaborate and extended to two-hour periods, but we will only devote one night a week to this, as we are doing now. As I said before, this plant is primarily intended for commercial purposes."

The station will not be completed for about four months.

BARS DOC COOK STUFF

(Continued from page 1)

in darkness and cold. A winter trip, however, Radio experts point out, would aid Radio transmission materially. But with her Radio operating from a 300-foot antenna at a great height, it is felt that the aerial cruiser would be able to send satisfactorily in the Arctic day as well as in the night.

According to Ralph Upson's report on using Radio from his balloon during the recent balloon race at an altitude of over 3,000 feet, he encountered no static whatever.

Easy to Check Position

Radio stations in the North are fairly numerous, and it is believed that the ZR-1, once on her trip could keep in communication with several to check her course. In the event she was uncertain of her position, she would either call two or more Radio compass stations and ask for her position, or, having picked up two or more Radio stations and observing their bearings by her Radio compass, plot her own position.

RADIO BARES SPIRIT LIFE, WIZARD SAYS

SEES AIRPHONE INCREASE FORCES OF OCCULTISM

Thurston Predicts That Coming Attempts to Talk with Mars Will Prove a Hereafter

(Special to RADIO DIGEST)

NEWARK, N. J.—Howard Thurston, the internationally famous magician who recently created a big sensation at the annual dinner of the American Magicians' Society by openly stating that he had been converted into a Spiritualist, delivered a lecture, "Spiritualism," recently from Station WOR, L. Barberger & Co., of this city.

In an interview previous to the broadcast Mr. Thurston said:

"For the past ten years I have been carrying on experiments, in all parts of the world, which have firmly convinced me that there is something very definite back of this belief in spiritualistic communication. It actually has a tangible foundation, in spite of the fact that about ninety-five per cent of the professional mediums are frauds of the most contemptible type who should be suppressed without delay. I know that such a statement from me sounds paradoxical, but, never-the-less, I mean every word of it.

Was First Radio Magician

"I was the first magician to make use of Radio as you may know, and I have employed it for fifteen seasons. I have recently convinced myself, almost against my will, that there is a definite connection between Radio and the so-called 'occult forces' and I think the coming attempts to communicate with Mars and other planets by Radio, will be the cause of extraordinary revelations which will make dyed-in-the-wool Spiritualists of a new variety out of all of us. I want this strange assertion to go down on record right here and now. I, the most pronounced anti-psychic imaginable, wish to state that I actually believe that it is possible for us to communicate with unearthly forces which, for want of a better name, I will call spirits."

Psychic Discoveries Coming Soon

"Extraordinary psychic discoveries will be made during the next five years, unless I am badly mistaken, and I think I will eventually be given credit for one or two of them.

"However, I wish to stress the fact that I have not been converted to the spiritualistic beliefs professed by Sir Arthur Conan Doyle and Sir Oliver Lodge. I still disagree with them in almost every respect. But, I do believe that we are continually surrounded by unearthly forces, which may or may not be the spirits of our departed, who are trying to communicate with us. I am also of the opinion that these forces, what ever they may be, will soon succeed in getting in touch with us, without the aid of professional mediums with their crude magical apparatus.

Broadcasts Answers to Telegrams

"Of course, I will have to admit, that these unearthly forces may simply be the inhabitants of other planets trying to Radio to us.

"I will be delighted to have listeners in dispute my assertions, ask questions and volunteer information. I will gladly give personal consideration to all serious interrogators."

A special branch telegraph office was installed in the WOR studio to enable psychics and anti-psychics in all parts of the country to send messages to Mr. Thurston during his address. These telegrams, hundreds of which were received, were broadcast together with the eminent magician's replies.

Mr. Thurston, it will be remembered, first gave an inkling of his conversion to spiritualism to the press when he was interviewed several months ago by a representative of Radio Digest.

At one time during the past year there were 112 separate makes of Radio head receivers on the market.

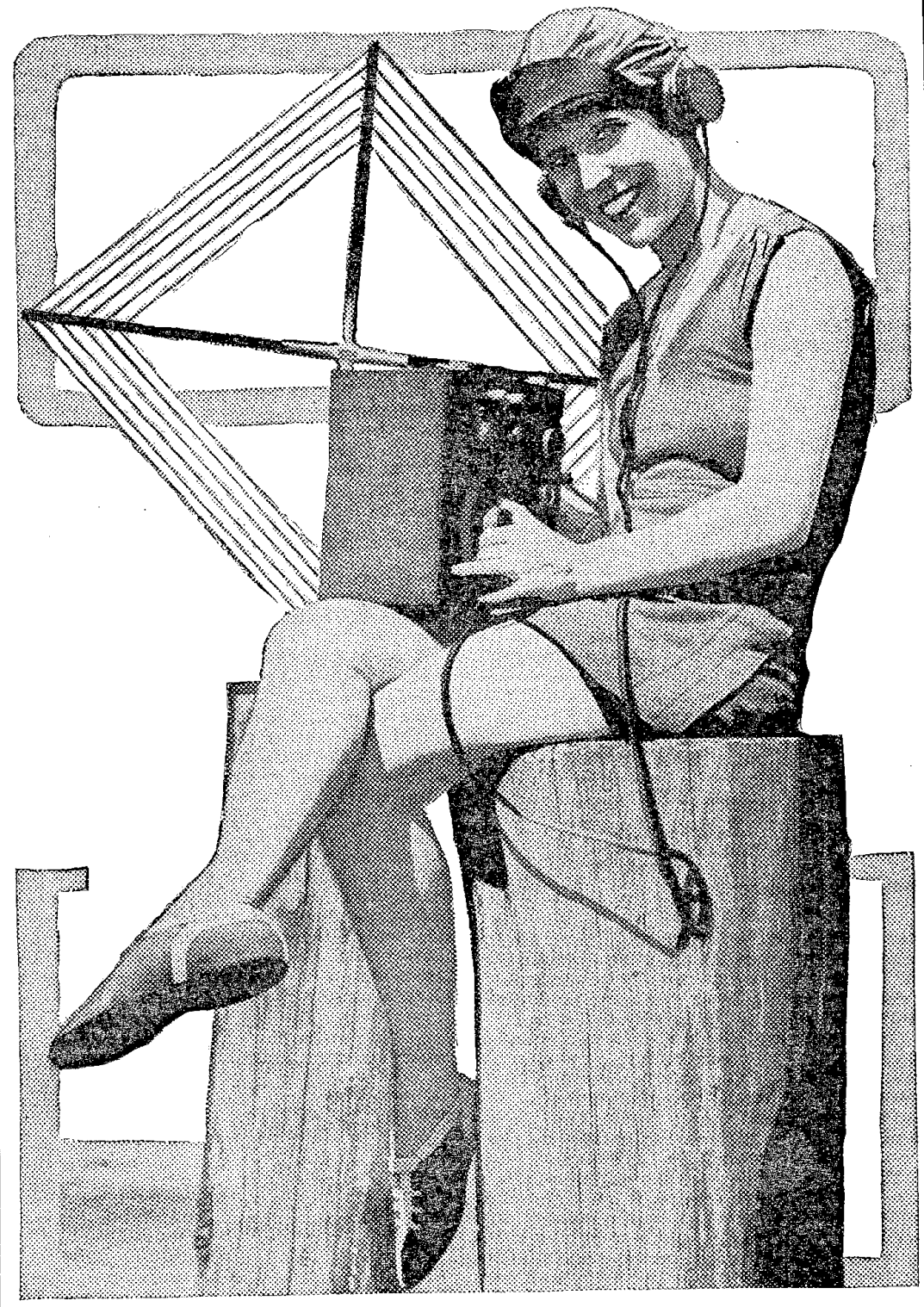
WLW BIDS YOU TO AIR NUPTIALS AT FESTIVAL

CINCINNATI, O.—Applications are getting more plentiful every mail from couples who wish to participate in the Radio wedding to be broadcast by WLW, the Crosley Manufacturing Company Station here, during the last week in August and the first week in September at the Cincinnati Fall Festival. There will be two weddings, one each week.

GIRL AGAIN TO TRY SEA CHAT BY RADIO

CHICAGO.—Miss Florence MacDonald, who maintained communication by Radio with her brother here through the Drake Hotel, station WDAP, during her voyage to Europe on the Berengaria last January, recently started homeward on the same liner. She intended to chat with friends at home all the way across the Atlantic, listening in on the set used previously.

ANOTHER WAY TO KEEP DRY



Zita Lockford of the "Passing Show," a real French girl and a marvelous athlete, listens to the American broadcasters at a Chicago beach. Zita can hardly understand English but enjoys the "moosick" anyway © Radio Digest

Vaughn de Leath, First Lady Announcer, Assumes New Role

NEW YORK.—Vaughn De Leath, popular with Radiophans through her frequent appearances before the microphone, has challenged the approval of Radio audiences in a new role—that of studio and program manager of Station WDT, new class B plant of this city.

Miss De Leath was the first woman in the United States, also the world, to broadcast vocal music for the benefit of the general public, with whom she has proved a decided favorite. She is widely known as the "Original Radio Girl."

Japs Plan Radio as an Aid to Fish Crews and Market

WASHINGTON, D. C.—The chief of the Nagasaki Perfectural Marine Products Bureau, together with a committee of men interested in marine products, is reported to be investigating the possibilities of installing Radiophone outfits on the larger sized fishing boats which have their base at Nagasaki, to enable them to communicate with shore when in difficulties, and to report the catch in time for their owners to realize on it.

Loud speakers cost from $5 to $175.

TESTS PROVE PUPILS LEARN CODE ASLEEP

NAVY EXPERIMENTS HELP STUDENTS OF AVIATION

Additional Data from Pensacola Reveal Success of Method to Teach During Slumber

By L. M. Lamm

WASHINGTON, D. C.—Further reports from the naval air station at Pensacola, Fla., on the success that has been attained in teaching Radio code to student aviators in their sleep, give interesting information on the progress of this novel and useful experiment. In fact it may be said that the experimental stage in the trials has been past and the method has become standard, as a means of saving students from failure in the course.

When the test was started twelve students were unsatisfactory in their progress in code study. After two nights during which Radio code was sent to the students in their sleep only two of the students were unsatisfactory. These two men had left before the experiment was finished, professing disbelief in it.

Watch Sleeping Students

The procedure has been to have the students sleep on the tables in the Radio room where the code is taught in the regular school periods. Operators send messages at varying speeds all night. The students concentrate on the messages that are sent through until they drop off to sleep. To quote a report on the subject:

"It is very interesting to watch the students during one of these night periods. If the operator intentionally and continuously makes errors in sending the students will toss around most unusually in their sleep. If the sending stops or the rate of sending changes appreciably, it is sure to disturb them, and in most cases will arouse them. Even in the midst of their deepest slumbers, the call 'SOS' a different rate of speed will awa' instantly."

It is planned to obtain ing machines to send away with the neces

DECIDE F FREC

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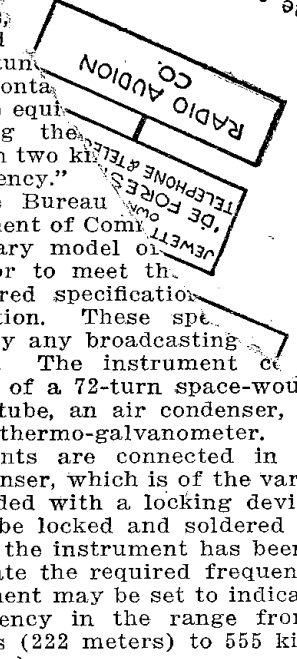
Nati ington things, should as a tun and conta or the equi taining the within two ki frequency."

The Bureau part of Comm liminary model o dicator to meet th prepared specificatio struction. These spe had by any broadcasting on request. The instrument c essentially of a 72-turn space-wound coil on a 3¾" tube, an air condenser, and a sensitive thermo-galvanometer. These three elements are connected in series. The condenser, which is of the variable type, is provided with a locking device so that it may be locked and soldered into position after the instrument has been adjusted to indicate the required frequency. This instrument may be set to indicate any Radio frequency in the range from 1350 kilocycles (222 meters) to 555 kilocycles (545 meters).

If an instrument is constructed according to the specifications and sent to the Bureau of Standards Radio Laboratory by a licensed broadcasting station, it will be adjusted for a nominal fee to operate at the frequency of the station.



THE ANTENNA BROTHERS — Spir L. and Lew P. — A Wicked B Battery

SURVEYS INDUSTRY'S TANGLE OF PATENTS

"Cooperative Competition" Leaves Maze of Stumbling Blocks for Independent Manufacturer

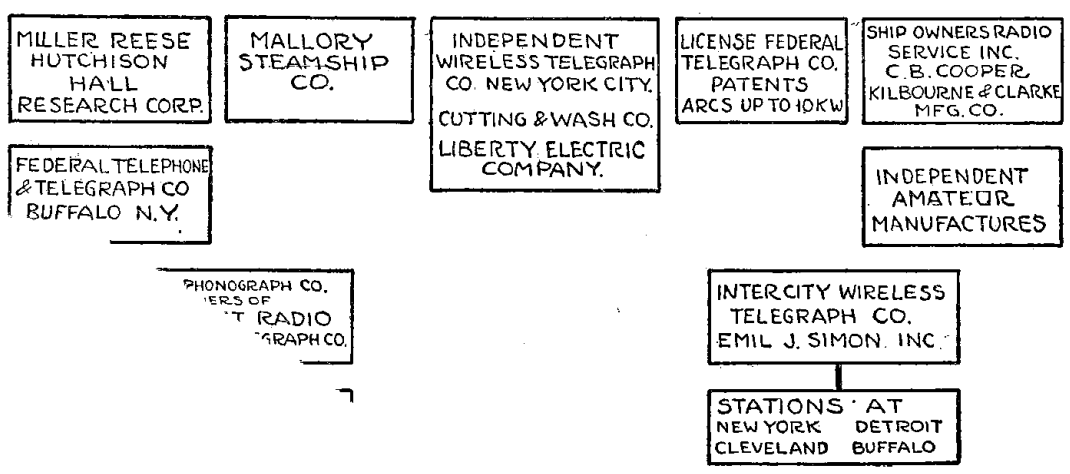
By John B. Brady

(Editor's Note.—Mr. Brady, a patent attorney of Radio repute, has achieved a remarkable survey of the network of patents, locking and interlocking the Radio industry in a veritable Gordian knot. His serial treatise on the patent situation started July 14 issue.)

PART IV

MANY claims for patent infringement were filed against the government for the manufacture and purchase of Radio apparatus from others than patent holders under the "save harmless" contracts, and many of these claims, although severely contested over a period of years, are still pending. The government in operating its chain of high power Navy Radio stations and Signal Corps net, appreciated the value of a patent situation and acquired where possible licenses in the several inventions indicated by the chart.

The Federal Telegraph Company by further negotiation with the government secured a retransfer of the title to its patents covering the arc transmission system and extended certain licenses thereunder for the broader commercializa-



nt Organization Chart

secured ne Federal Tele- were again potentially and, in working out the Chinese high power Radio station contracts entered into a license agreement with the Radio Corporation forming a Federal Telegraph Company of Delaware and of California.

Government Strengthens Situation

The government since the close of the war had also been perfecting its patent situation to a point where rights existed under the multiplex telephony patents of General Squier, the arc patents, alien owned Radio patents seized by the alien property custodian and purchased by the Navy, the Rogers and Lyon underground antenna patents, the Kolster direction finder patents, the Cohen statically coupled receiver patents, the Dubilier condenser patents, the Sperry airfan generator patents for aircraft Radio, the Vreeland beats and oscillators patents, the patents controlling the Hanson audio frequency system and piloting cable, and numerous inventions by employees of War, Navy, Commerce and Post Office Departments, including a license under the heterodyne, and patents of the International Radio Telegraph Company and Westinghouse Electric and Manufacturing Company.

Independent Organizations

Among the independent organizations represented on the chart herewith there is the Independent Wireless Telegraph Co., including the Cutting and Washington Co., who have recently been sued by the Wireless Specialty Apparatus Co., under the Pickard loop patent 876,996.

The Liberty Electric Corporation is licensed under the Federal arc patents by an agreement with the government whereby the government obtained licenses under certain inventions on the arc by engineers of the Liberty Electric Corporation. The license is restricted to arcs up to ten kilowatts.

The Inter-City Wireless Telegraph Co., has recently been successful in a mandamus suit against the Secretary of Commerce, compelling the Secretary to renew an operating license to the company. The suit was favorably decided for the Inter-City Co., by the supreme court of the District of Columbia and has now been appealed by the Secretary of Commerce to the United States Supreme Court to determine whether or not the Department of Commerce has authority to decline to reissue a license to any station previously found interfering with other traffic.

The DeForest Radio Telephone and Telegraph Co. has certain rights under the many Stone and DeForest patents. It was under the DeForest tube patents that the agreement was made with the Radio Audion Co., manufacurers of Myer tubes.

Course Open to Independents

The independent amateur manufacturers have been represented on the chart with these independent organizations. The striking analysis brought out by the chart is that if the independents are to share in the monopoly exercised by the Radio Corporation they must enter by way of a patent situation which the corporation must recognize. This is true of all of the patents gathered together under the cross license agreement in the Radio Corporation.

A well-known author once said, if a man writes a better book or preaches a better sermon or builds a better rat trap, even though he lives in the woods, the world will beat a path to his door. This is a policy which the small manufacturer should adopt by building such a patent situation that instead of the Radio Corporation forcing him out of the industry it will be compelled to welcome him into the industry and extend license privileges under its patents in reciprocation of license privileges under patents owned by the small manufacturer. The situation is one which compels concentrated effort in patents on the part of every manufacturer who wishes to grow in this remarkable industry.

(THE END)

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Types of Flewelling Supers

(Submitted by E. H. T., Seattle, Wash.)

Question. I have been using the Flewelling circuit for some time with honeycomb coils and the bank of three condensers but I would like to reconstruct the set to improve its looks and in doing so would like to take advantage of the simplified form of circuit which uses but one condenser. Would it be possible for me to use a variometer instead of the usual tickler coil, as I understand that the use of a tuned plate circuit is of more advantage on the short wave lengths?

Answer. When the first experiments were carried on with the Flewelling circuit we were unable, seemingly, to use a variometer in the circuit. In one of the earlier articles this was discussed. Mention was made that there was no reason why a variometer could not be used, but at the time we were unable to find one that was suitable. The answer to your question is that a variometer certainly can be used and does offer slight advantage, due to enabling the tuning of the plate circuit. In the first place any standard variometer will operate. We have found that a certain amount of advantage seems to result from the use of a bank wound variometer. This is a little touch of refinement; I would not recommend its use if you have one of the standard types on hand. Note also that you must give the circuit a small fraction of a second in which to go into operation when first starting. I speak of this because one is very likely to turn the variometer control so fast that they go past the point at which it works properly. Of course if you use a variometer you are always sure that your circuit will work upon finishing the set provided the wiring and the like are right, meaning by this that you will not have to worry about the proper polarity of the tickler coil as you would when using that type of circuit.

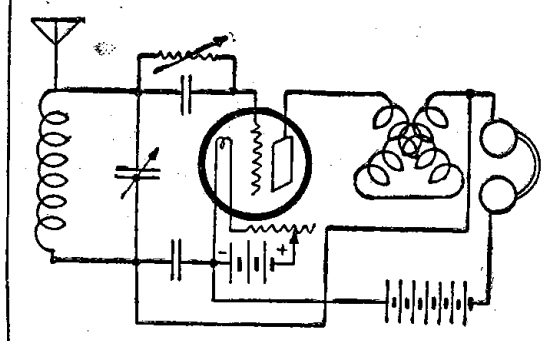


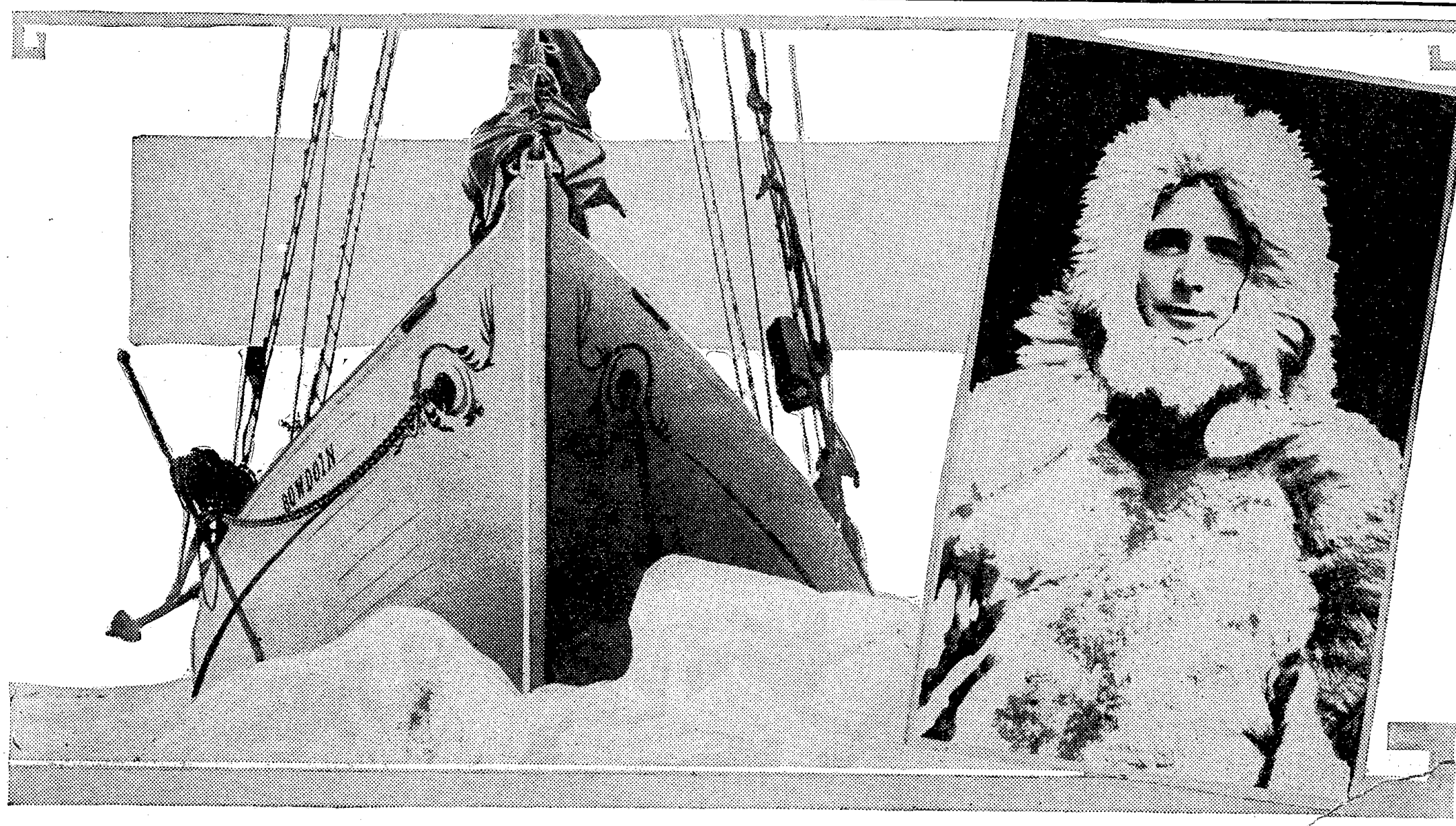
Figure 1

There have been so many inquiries covering the various types of Flewelling super circuit that I believe it would be a good idea to show a few variations of the circuit. Take, for instance, Figure 1. This diagram shows the type of circuit that you speak of with a variometer tuned plate circuit and an inductance coil for tuning.

This type of circuit may also be used

(Continued on page 8)

FIRST TO DEFY BOREALIS WITH RADIO



While most of the civilized world is panting under the sun or wondering about the fate of Europe or Babe Ruth, a staunch little schooner, the Bowdoin, true to name, is sturdily battling her way to the North Pole, not so much to do what others have done but to do what never has been done—solve the mystery of the Aurora Borealis or Northern Lights in relation to Radio. What her personnel, including Donald B. McMillan (picture above), captain, and Donald H. Mix, Radio operator, may learn under the polar skies, what they may tell the world as the Aurora Borealis and its effect on Radio, may revolutionize or upset many scientific theories. The crew of the Bowdoin, who regularly are airphoning their progress to the States day by day as they make their way through the ice fields, find their receiving apparatus a great source of entertainment as well as service. Many of the big American broadcasters are heard regularly, according to dispatches © U. & U.

Listener in Frees Youth from Prison

Fine of Boy Trombonist, Held for Speeding in Fort Worth, Paid by Radiophan

FORT WORTH, Tex.—Radio recently added another accomplishment to its list when it rescued an unfortunate trombonist repining in the local jail.

The Rotary Boys Band of this city was booked for the Friday night concert at WBAP, the Star Telegram station, but when 9:30 o'clock rolled around the director was missing. He came in a few minutes later saying one of the lead trombone players, a fifteen-year-old boy, had been "pinched" for speeding and the stern minions of the law at headquarters would not release him. An offer of Director King's check was spurned as was the offer of the Radio Department to guarantee the boy's bond, King said. Nothing but twenty iron men from Uncle Sam's Treasury would satisfy "the law" and the boy must remain in jail until it was paid, was the dictum.

Broadcast Plight

It was already twelve minutes past starting time at WBAP, so Director King started the music without the trombone player and the situation was broadcast to fans.

Charley Fowler, local Radiophan, reposing in the most comfortable position in the hot weather, with an electric fan at his elbow and the phones securely lashed on his head, heard the sad plight of the trombone player broadcast and rushed "to the rescue" in his automobile. The relief expedition, headed by Fowler, arrived at headquarters, paid over the twenty and the boy departed from his room at the City Hotel.

Air-Borne Appeals Help Oklahoma Flood Victims

When Telegraph and Telephone Fail, Radio Saves Many

SAND SPRINGS, OKLA.—Sticking to their Radio sets for three days and nights during the recent unexpected rise of the Arkansas River, Radio amateurs in this vicinity recently maintained communication between this place and Tulsa when floods swept a large section of Tulsa County.

The towns are connected normally by electric interurban, four telephone lines and the telegraph wire, but all were down except the latter and one telephone line. Scores of refugees who frantically besieged local telephones had to wait three hours before they could get a call, although the distance is only seven miles.

H. H. Friend, member of the American Radio Relay League, offered to send messages through by Radio, also bulletins on the rise of the river for the daily newspapers at Tulsa. He got in touch with R. U. McKinney, 5SG, and J. B. Lewis, 5WX, at Tulsa, also E. W. Abrey, 5GA, at Osceola, Ark. The first night the amateurs kept fifteen-minute schedules until 2 a. m. and the next two nights forty-minute schedules until after midnight.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:45- 7:45
CFCN, Calgary, Alta.	440	10:00-11:00	.....	.....	.....	11:30- 1:30	11:00- 1:00	.....
CKAC, Montreal, Que.	430	.....	6:00- 9:00	.....	6:00- 9:00	.....	6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	326	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	509	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00	.....	10:00-12:00	.....	10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00	.....	8:00-10:00	8:00-10:00	.....
KYW, Chicago, Ill.	345	.....	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas.	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 6:00	5:30- 8:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	.....
WDT, New York, N. Y.	405	.....	.....	5:00- 5:50	.....	9:00-11:00	.....	.....
WEAF, New York, N. Y.	492	.....	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	5:00- 5:30	5:00- 7:00	5:00- 9:30	5:00- 7:00	5:00- 5:30	.....	5:30- 6:30
WGI, Medford, Mass.	360	.....	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00	.....	6:00- 8:00	.....	6:00- 8:00	.....	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30	.....	7:30- 8:30	.....	7:30- 8:30	.....	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	8:00- 9:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 8:00	5:00- 5:30	6:00-10:00	.....
WJAX, Cleveland, O.	390	.....	6:30- 8:30	.....	7:15- 9:30	.....	.....	.....
WJY, New York, N. Y.	405	.....	5:30- 9:30	.....	5:30- 9:30	5:30- 9:30	.....	.....
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360	.....	9:25-10:55	.....	.....	.....	9:25-10:55	.....
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30	.....	5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WOAI, San Antonio, Texas.	385	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOAW, Omaha, Neb.	526	9.00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:45- 9:00	.....	.....	.....	5:45- 9:00	.....	.....
WOR, Newark, N. J.	405	6:00-10:00	5:15- 6:30	6:00- 9:00	5:15- 6:30	5.15- 6:30	6:00- 9:00	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSAI, Cincinnati, O.	309	.....	7:00- 9:00	.....	7:00- 9:00	.....	9:00-11:00	.....
WSB, Atlanta, Ga.	429	7:00-12:00	7:00-12:00	7:00-12:00	7:00-12:00	7:00 12:00	7:00-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30-11:00	7:30- 9:00	.....	6:30- 7:30

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. If in addition your city is using Daylight Saving Time, add one hour to this result.

London newspapers, as a rule, express the opinion that broadcasting helps rather than hinders the entertainment business as carried on in theaters and public halls.

FINE PROGRAM MARKS WOR, ONE YEAR OLD

Station in Newark Celebrates Anniversary with Notables

NEWARK, N. J.—An elaborate celebration marked the first birthday recently of WOR, the popular station of L. Bamberger & Company of this city. Two all-star programs were staged in which over a score of head-liners participated. In the afternoon there was a special Radio matinee of Broadway's latest and greatest musical-revue success, "Adrienne," in which Louis F. Werba presented Vivienne Segal, Richard Carle, Billy B. Van, a dozen other New York favorites and "the most animated chorus in the world." All of the charming features of Mr. Werba's huge production that were especially suitable for broadcasting were given and the principal comedians, Van and Carle, ably interpolated extra stunts written for this, their initial Radio "appearance" together.

In the evening program there were short addresses appropriate to the occasion by Gov. George S. Silzer of New Jersey; Frederick C. Breidenbach, mayor of Newark; U. S. Senator Edward I. Edwards of New Jersey and U. S. Senator Royal S. Copeland of New York.

In addition to the officials' talks there were speeches by Melville E. Stone of the Associated Press, Will H. Hays, director general of the moving picture industry, and Dr. Lee de Forest, inventor of the audion tube and the father of broadcasting.

Philadelphia Air Wedding Lags as Best Man Forgets

PHILADELPHIA.—This city had its second Radio wedding within one month recently when Miss Sarah Olsen became the bride of Alfred W. Ogden, at Station WDAR. Mr. Ogden is pianist and violinist of the station. Fans were kept waiting "on the air" for about one-half hour because John W. Nagle, Jr., best man, forgot that he had promised to call for Magistrate Atkinson Costello, who performed the ceremony. After the marriage ceremony, the groom stepped up to the microphone and invited everybody listening in to attend the wedding reception.

New Rules Benefit Amateurs

WASHINGTON.—The Department of Commerce has authorized a broadcaster band of wave lengths for general and restricted amateur stations, and created a new class of amateur operator's license to be known as Amateur Extra First Class.

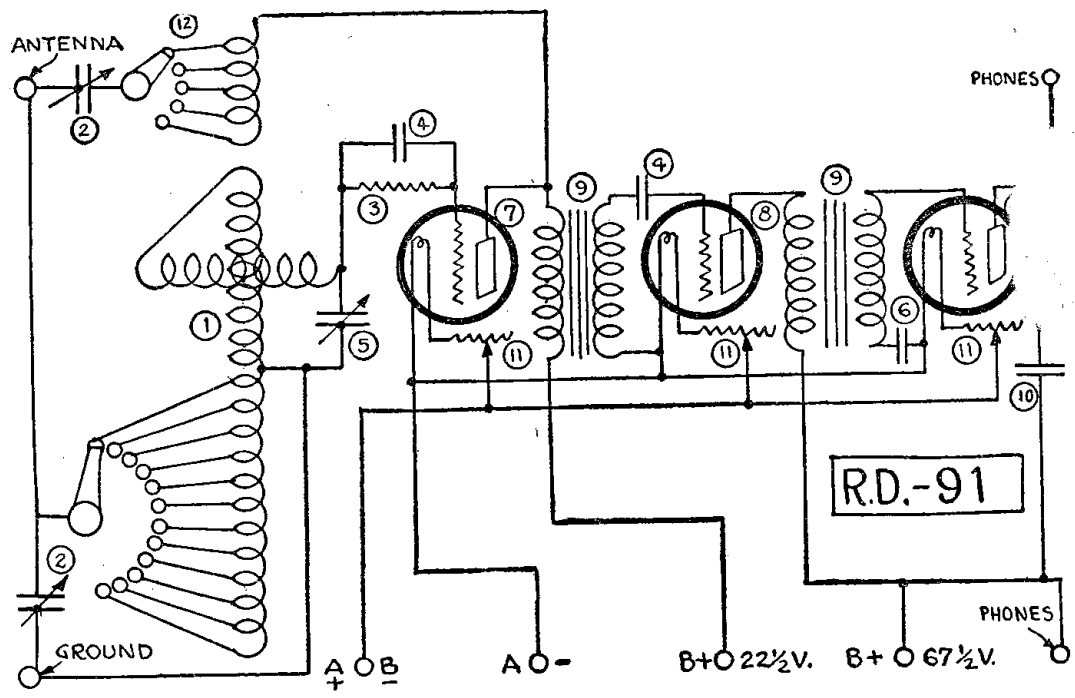
NEW YORK, N. Y.—The Benny Leonard-Lew Tendler fight was handed Radio and fight fans recently through Station WJZ, this city, direct from the Yankee Stadium, where the bout took place.

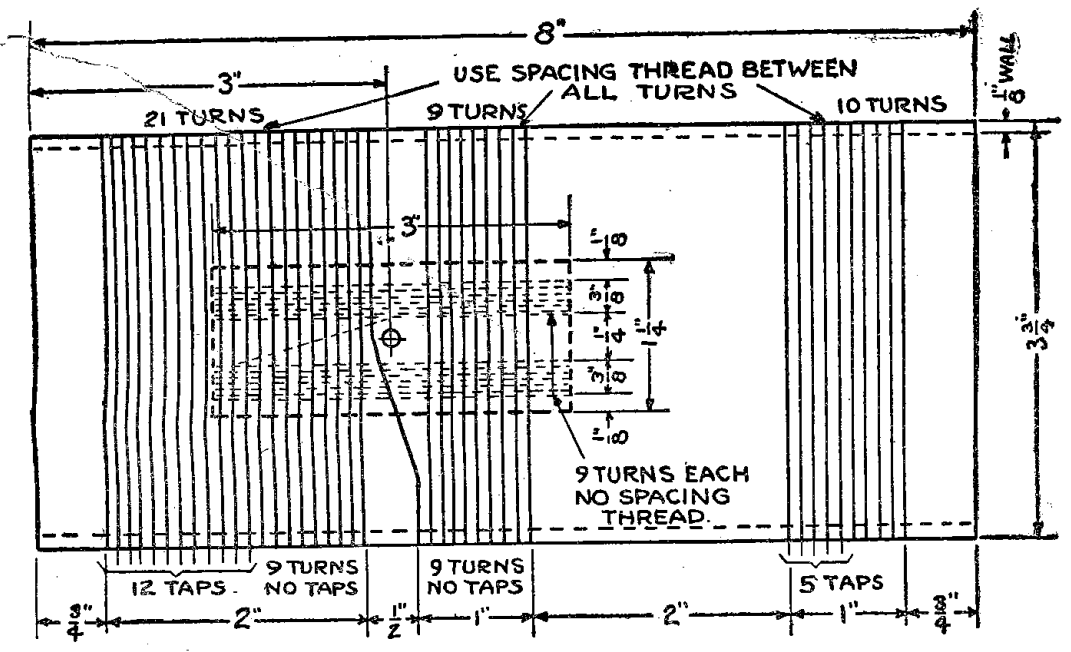
FAN MODIFIES ULTRA REINARTZ; LIKES RESULTS

THERE is always a certain amount of fascination, in changing a circuit around to see what happens. Sometimes the results are disappointing, and once in a while they surprise you. One fan tried it with the Ultra Reinartz and likes his revised set better, so here's his hook-up shown as RD-91.

The Ultra Reinartz articles started in the March 24 number. Since the same tuning unit as in the original was used, the illustration of the tuner is repeated with details for winding.

Fiber, bakelite or even cardboard tube can be used. The wire used in winding the tuning unit is Number 18 double cotton covered. In winding a spacing cord—any light-weight string or heavy thread will do—is kept between the turns of wire. Another method is to use some Number 20 bare copper wire, winding the two wires together. When finished, the tube and winding are given a coat of celluloid-acetone solution or other "dope." When this is dry, the bare copper wire is removed. This leaves the insulated winding fixed in position with even spaces and gives a minimum of between-turns capacity in the coil.





Turn Numbers and Taps

The primary winding starts with twelve turns tapped every turn. Then nine turns are wound without taps. After leaving a half-inch space nine more untapped turns are wound. The end of this winding is then connected with pigtail braid to the rotor winding.

The rotor winding consists of two sets of nine turns each, wound with Number 22 D.C.C. wire not separated by spacing thread. A quarter-inch space is left between the two sets of turns. The free end is connected to a terminal on the large tube by another pigtail connection.

Tickler Coil Winding

The feed back winding is spaced two inches from the finish of the last winding on the large tube. The first five turns are each tapped, but the last five are not.

All taps should be staggered around the tube so that sufficient clearance will be had for making soldered connections to the contact points of the switches without crossing and touching of the leads.

Identification of Parts

No. 1 is the tuning unit, No. 2 are both .001 mfd variable condensers, No. 3 one megohm grid leak, No. 4 are two .00025 fixed condensers, No. 5 is a .00005 mfd variable condenser, No. 6 is a .00015 mfd fixed condenser, No. 7 is a detector vacuum tube, No. 8 are two amplifying vacuum tubes, No. 9 are two audio frequency transformers. No. 10 is a .002 mfd fixed condenser. No. 11 are three rheostats suited for the tubes used. No. 12 is the tickler winding on the tuning unit.

This circuit is very selective and has no body capacity.

Blind Farmer's "Canned" Music Broadcast by WSB

Virginian's Old Tomato Containers Carry Sounds on Air

ATLANTA, GA.—Real "canned" music was recently broadcast by WSB, the Atlanta Journal, for the first time in history.

Lambdin Kay, announcer for the station, is the discoverer of the music, and Jafes Dunsford, a blind Virginian farmer, is the man who made the harmony. Kay stopped before a crowd congregated around Dunsford, who had announced he was about to give a concert.

"What do you play?" the blind musician was asked.

"Tin cans," he replied, and from a worn and tattered haversack he drew two pint-sized tomato cans. Each had two right angle slits in the top and from four prongs thus formed, Dunsford began to pick melodies. His repertoire consists of anything from the "St. Louis Blues" and "Yes, We Have No Bananas," to the sextet from "Lucia."

Kay says the blind musician just naturally made the old tomato cans talk, and accordingly he was put on the air by the popular southern broadcaster.

Vaudeville Theater Picks Up "Hermit Show" Tunes

CLEVELAND, O.—The Hermit club orchestra, under the direction of Frank B. Meade, was the attraction which kept local Radiophans delighted recently when Station WJAX of the Union Trust Company broadcast the Cleveland News concert.

It was an evening of tuneful music, some of which was heard at B. F. Keith's E. 105th street theater when the Hermits staged their annual play, "The Hermits in Mexico." Hits of former Hermit shows were played as well as numerous popular selections.

AMATEUR LOW WAVE AS GOOD AS LONG

LOS ANGELES 120-METER IS HEARD ALL OVER COUNTRY

Other Tests as to Length May Cause Further Changes in Making of Equipment

Will there be a scramble of all Radio interests to "get in" on the once supposedly worthless ether band below 150 meters wave length?

The onward march of Radio transmission has undergone so many changes within a period of mere months that even the most expert hesitate to express an opinion for fear of being called upon to retract. This has been true of most all predictions about the value of short waves.

In recent weeks there has been a great deal of comment on the possibility of long distance communication below 150 meters and it is only natural that the amateur should again demonstrate that he is the pioneer when it comes to this particular phase of Radio development.

During the recent short wave test under American Radio Relay League auspices, 6G1, an amateur station operated by A. Wade, of 465 N. Lake street, Los Angeles, Cal., transmitting on a wave length of 120 meters, was heard in every state in the union. This station holds the record for short wave transmission, the power being only five watts.

Other long distance records on short waves have been reported by amateurs who participated in the short wave tests. It would appear from this information that much better results can be obtained on 150 meters than is ordinarily the case on 200 meters, the band commonly used by amateurs.

As the more powerful commercial stations operate on wave lengths between 1,000 and 25,000 meters, the short wave tests are an indication that the most successful Radio transmission will be at the two extremes.

The Week's Advance Broadcast Programs

Tuesday, July 31

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Mirella," Star Orchestra; "Sunday," Mary Bothwell, contralto; "The Blue Danube," Orchestra; "From the Canebrake," Mannie Roth, violinist; "Solvieg's Song," Orchestra; "In Summer Fields," Mary Bothwell; Harry Adaskin, violinist; "Saphic Ode," Mary Bothwell; "Mignon," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, Ethel Edwards, soprano; James Traynor, first tenor; George Hurrell, second tenor; Evan Lloyd, baritone; Clarence E. Drylie, bass.

KGW (Pacific, 492), 3:30-4:00 P. M., Talk, Jeanette P. Cramer, Home Economics Editor of The Oregonian; **10:00-11:00 P. M.,** Dance program, George Olsen's Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; **2:30-3:30 P. M.,** Muiscal matinee; **6:45-7:30 P. M.,** Children's Hour, "Uncle John;" **8:00-10:00 P. M.,** De Luxe program, Don Milligan and his original compositions.

KSD (Central, 546), 8:00 P. M., Concert, Grand Central Theater talent.

KYW (Central, Daylight Saving, 345), 7:00 P. M., Musical program, Lithuanian music; M. Janauskas, soprano; J. Ramanauskas, tenor; K. Sabonis, baritone; J. Byanskas, pianist; A. Olis, pianist; **8:05 P. M.,** Book review, Llewellyn Jones.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Fred Cahoon's Texas Hotel Orchestra.

WBZ (Eastern, 337), 6:40 P. M., Talk, "Modern Bank Service," Member of Springfield National Bank; Talk, "Joy in the Underworld," Joseph Taylor, ex-bandit; **7:00 P. M.,** Concert, Maurice Freedman's Ensemble.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; **2:00-3:00 P. M.,** Children's Hour; **4:30-5:55 P. M.,** Song recital; Talk, "Affairs of the Heart," Betsy Logan.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical program, Henderson's Happy Six; Thomas Waller, pianist; Trixie Smith and her Down Home Syncopators; Rosa Henderson, Roland Irving, entertainers; Talk, "The Reason Why," Floyd G. Sneldon, editor of "The Tattler;" Trixie Smith; Henderson's Happy Six.

WFAA (Central, 476), 12:30-1:00 P. M., Address, De-Witt McMurray; **8:30-9:30 P. M.,** Musical program, Horace Adams, violinist, and assisting musicians; **11:00-12:00 P. M.,** Concert, R. W. Trowbridge's Saxophone Quartet; Krause's Orchestra.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; **3:00 P. M.,** Concert; **6:30 P. M.,** Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; **7:00 P. M.,** Bedtime stories, Cousin Sue; **8:00 P. M.,** Boy Scout Radio Corps; Song and piano recital; **10:30 P. M.,** Dance music, Meyer Davis Bellevue Stratford Dance Orchestra.

WGI (Eastern, Daylight Saving, 360), 12:15 P. M., Organ recital, E. Lewis Dunham; **3:00 P. M.,** "Hospitality Talk," Ida Bailey Allen; **5:00 P. M.,** "Skalalatoot Stories," George Ernst; **8:30 P. M.,** Business report, Roger W. Babson; Talk, "Bits of Wisdom," George Brinton Beal; Musical program.

WGY (Eastern, 380), 7:45 P. M., Musical program, "The Sea Hath Its Pearls," Mixed Quartet; "For You," Charles Selter, tenor; "Sweetest Story Ever Told," Mildred Schilling, soprano; Marvin J. Roeck, baritone; "A Cradle Song," "I'm Wearing Awa'," Theresa Milne, contralto; "American Beauties," "Romance of a Busy Broker," Ruth Schilling, reader; "Moonlight," Mixed Quartet; "Two Grenadiers," "A Love Song," Marvin J. Roeck, baritone; "Some Day Again," Theresa Milne, Charles Selter; "The Singer," "I Heard You Go By," Mildred Schilling; "When the Heart Is Young," Mixed Quartet.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; **7:30-9:00 P. M.,** Musical program, Carolyn Pell, soprano; Mrs. Edwin Horn, contralto; Al G. Crowder, George L. Gephart, banjoists; Byron Holloway, baritone; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; **3:00 P. M.,** Artist recital; **6:00 P. M.,** Dinner music, WIP Little Symphony Orchestra, Dick Regan, director; **7:00 P. M.,** Bedtime stories, Uncle Wip; **8:00 P. M.,** Short talk; **8:15 P. M.,** Artist recital; **8:45 P. M.,** Short talk; **8:55 P. M.,** Dance music; **10:00 P. M.,** Song recital.

WJAX (Eastern, 390), 7:30 P. M., Concert, Cleveland News.

WLW (Eastern, 309), 10:00 P. M., Musical program, "The Lazy Song," Sara Frances Johnston, singer; "Serenade," "Fairy Sailing," Mrs. Lucy McKeever, violinist; "Aida's Death," "Solsagdelco," Robert Trendler, pianist; Mrs. Emma Klein, reader; "Trinity Chimes," Irene Carter, pianist; "My Birthday," Sara Frances Johnston; "La Gitana," Mrs. Lucy McKeever; "My Eyes Have Told You So," Dr. A. W. Ganzel, singer; "Waltz in C Sharp Minor," Irene Carter; the Circle Orchestra.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Program by Grenn Dillard Gunn School of Music; **7:00 P. M.,** Babson report; Lesson in Syncopation, Axel Christensen; Talk on Home Economics.

WOC (Central, 484), 3:30 P. M., Educational Talk, A. G. Hinrichs; **5:45 P. M.,** Chinese concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital; Mary E. Vogt; **12:00-12:55 P. M.,** Luncheon music, Wanamaker Tea Room Orchestra; **4:45 P. M.,** Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; **8:30 P. M.,** Concert, News Orchestra; Town Crier; Lucile Lincoln, soprano; Aloha Trio; Alf D. Fleming, baritone.

Wednesday, August 1

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "La Source," Star Orchestra; "Daffodils a-Blowing," Kathleen Monk, soprano; "Mystic Beauty," Orchestra; "The Rosary," Harry Adaskin, violinist; "Extase," Orchestra; "In the Time of Roses," Kathleen Monk; "Old Refrain," Harry Adaskin, violinist; "The Fairy's Lullaby," Kathleen Monk; Selections from "Erminie," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, KDKA Orchestra; Chauncey Parsons, tenor; Leora Sage McKennan, soprano.

KGW (Pacific, 492), 3:30-4:00 P. M., Children's hour, Aunt Nell; **8:00-9:00 P. M.,** Musical progrma; **10:00-11:00 P. M.,** Dance program, George Olsen's Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; **2:30-3:30 P. M.,** Musical matinee; **6:45-7:30 P. M.,** Children's hour, "Uncle John;" **8:00-10:00 P. M.,** Musical program, Gladys G. Hill, soprano; Otto Ploetz, tenor.

KSD (Central, 546), 8:00 P. M., Concert, Letter Carriers' Band, J. H. McClure, director.

KYW (Central, Daylight Saving, 345), 7:00 P. M., Musical program, under auspices of Inland Electric Company; Cope Harvey's Orchestra; Herbie Mintz, pianist.

WBZ (Eastern, 337), 7:00 P. M., Concert, William Tilton, bass; Mrs. Percy P. Fletcher, soprano; Stanley Fletcher, pianist; WBZ Trio; **8:20 P. M.,** Bedtime story for Grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; **4:30-6:00 P. M.,** Song recital; Talk, "Affairs of the Heart," Betsy Logan; **7:30-8:00 P. M.,** Bedtime stories, Dream Daddy; **8:00 P. M.,** Features from Stanley Theater; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical program, Luckey Roberts and Mrs. Luckey Roberts, singers; Paul Pass, singer; **7:00 P. M.,** Musical program, "Calm as the Night," "Deep River," John Eckles, tenor; "The Dance of Desire," "Dance of the Reed Flutes," Hazel Thomas, pianist; "Just a Little House of Love," "Where My Caravan Has Rested," Blanche Smith-Eckles, soprano; "Scherzo Tarantella," "Ave Maria," Errington Kerr, violinist; "Celeste Aida," "The Star," John H. Eckles; "Bamboola," "Polonaise in E Major," Hazel Thomas; "Madame Butterfly," "Elegy," Blanche Smith-Eckles; "The Goblin Dance," "Eili, Eili," Errington Kerr.

WFAA (Central, 476), 12:30-1:00 P. M., Talk, "Co-operative Cotton Marketing," John T. Orr, president Texas Farm Bureau Ass'n.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00 P. M., Concert; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra.

WGI (Eastern, Daylight Saving, 360), 12:15 P. M., Organ recital, E. Lewis Dunham; **5:00 P. M.,** "Twilight Tales," Eunice L. Randall; **8:30 P. M.,** Talk, "Science Up to Date," Scientific American; Musical program.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; **7:30-9:00 P. M.,** Concert, Manning's Hawaiian and Jug Orchestra; Address, Major L. L. Pendleton; O. E. Ves Sells, baritone; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; **6:00 P. M.,** Dinner dance music; **7:00-7:30 P. M.,** Bedtime stories, Uncle Wip.

WLW (Eastern, 309), 8:00 P. M., Musical program; Accordion solos, Salvador Ercoline; "I Want the Moon," "That Lullaby Croon," LaVergne Sims, singer; Mandolins and guitar trio, Mrs. Nellie Fuerstenberger and son and Hazel Jacobs; "Uncle Harry's Laughing Comedy," Harry Brockmeyer; Mrs. Alma Jackson, pianist.

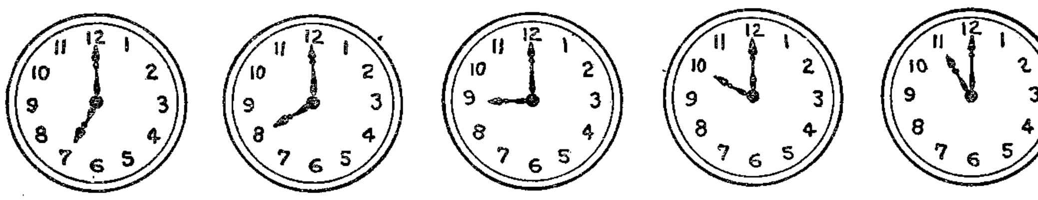
WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Program by Cosmopolitan School of Music; **7:00 P. M.,** Stories, Georgene Faulkner; Mr. and Mrs. Paul G. Hummel, pianist and soprano; **9:15 P. M.,** Concert, LaSalle Roof Garden Orchestra.

WOC (Central, 484), 3:30 P. M., Educational talk, Clyde G. Kern; **8:00 P. M.,** Organ recital, Erwin Swindell; **10:00 P. M.,** Musical program, Mrs. Sam Erwin, soprano; A. H. Lovett, baritone; Catherine O'Brien, reader; Howard Snyder, pianist; Mae Marshall, soprano; Hans Mettke, 'cellist.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; **12:00-12:55 P. M.,** Luncheon music, Wanamaker Tea Room Orchestra; **4:45 P. M.,** Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; **8:30 P. M.,** Concert, News Orchestra; Town Crier; Concert, Schmeman's Band.

What Time Is It?



Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

Thursday, August 2

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "English Airs," Star Orchestra; "Go to Sea," Arthur Fisher, baritone; "Song Without Words," Jaques Sterin, 'cellist; "Narcissus," Orchestra; Arthur Fisher, baritone; "Three Irish Pictures," Orchestra; "Aria," Jaques Sterin; "The Windmill," Arthur Fisher; Selection from "Floradora," Orchestra.

(Continued on page 9)

Radiophone Broadcasting Stations

Corrected Every Week—Part III

(Note.—The third part of the schedule list appears and is completed below. The fourth part consists of the state, city-station index and will appear next week.)

WJAZ, Chicago, Ill. 448 meters. 1,500 mi. Zenith-Edgewater Beach (Chicago Radio Lab.) Daily ex. Sun, 10 pm-2 am, music, entertainment. Sun, 5-8 pm, concert. Central Daylight Saving.

WJD, Granville, O. 229 meters. 100 mi. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Central.

WJH, Washington, D. C. 273 meters. 200 mi. White & Boyer Co. Daily ex Sun, 11:30 am, reports; 1-2 pm, music. Tues, 7:45-10 pm, concert; 8 pm, church services. Eastern.

WJX, New York, N. Y. 360 meters. De Forest Radio Telephone & Telegraph Co.

WJY, New York City. 405 meters. 1500 mi. R. C. A. Daily ex Sun, 4-6 pm, entertainment. Tues, Thurs, Fri, 7:30-11:30 pm, concert. Sun, 2:30-5 pm, 6-6:30. Eastern Daylight Saving.

WJZ, New York City. 455 meters. 1500 mi. R. C. A. Daily ex Sun, 3-6:30 pm, entertainment; 7:30-11 pm, special program. Sun, 10:30 am-1 pm, church service; 8:30-10:30 pm. Eastern Daylight Saving.

WKAA, Cedar Rapids, Ia. 360 meters. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 275 meters. 400 mi. The Lincoln Star. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. 240 meters. Charles Looff.

WKAF, Wichita Falls, Tex. 360 meters. W. S. Radio Supply Co.

WKAN, Montgomery, Ala. 360 meters. 200 mi. Alabama Radio Mfg. Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Grandston, R. I. 360 meters. Wilcox Flint.

WKAQ, San Juan, Porto Rico. 360 meters. 1,500 mi. Radio Corp. of Porto Rico. Tues, Sat, 11 pm-12:30 am, entertainment. Intercolonial.

WKAR, East Lansing, Mich. 280 meters. Mich. Agri. College.

WKAS, Springfield, Mo. 360 meters. 100 mi. L. E. Lines Music Co. Slogan, "Queen City of the Ozarks." Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. 360 meters. Laconia Radio Club.

WKAW, Beloit, Wis. 226 meters. 100 mi. Turner Cycle Co. Daily 12-12:15 pm. 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 231 meters. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. 360 meters. 100 mi. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.

WKC, Baltimore, Md. 360 meters. 100 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern Daylight Saving.

WKY, Oklahoma City, Okla. 360 meters. 500 mi. Radio Shop. Daily ex Sun, 7:30 pm, sports; "Raven Frolic." Central.

... 360 meters. U. S. Army.

...C. 360 meters. N. C. State College.

... Minn. 417 meters. 1,000 mi.

... Corp. Slogan, "The Call of ...h Brush." Daily ex Sun, ...30, 12:30, 1:30, 3:30 pm, ...; 7:30-8:30, lecture. concert. Sun, 10 ...ert; 5, children's

... mi. Samuel

...eco Elec. ...30 pm, ...sic.

...m

...ulsa, Okla. ... Putnam Hdwe. Co.

... meters. W. V. Jordon.

...Mich. 244 meters. 100 mi. A. E. ... No regular program. Central.

...AT, Burlington, Ia. 360 meters. Radio and Specialty Co.

WLAV, Pensacola, Fla. 360 meters. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. 360 meters. New York Police Dept.

WLAX, Greencastle, Ind. 231 meters. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. 360 meters. Northern Commercial Co.

WLAZ, Warren, O. 100 mi. 248 meters. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-9 pm, church services. Eastern.

WLW, Cincinnati, O. 2,000 mi. 309 meters. Crosley Mfg. Co. Slogan, "WLW, In the Queen City of the West." Daily ex Sun, 10:30 am, 1:30 pm, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music. Sat, 2 pm, special. Sun, 9:30-11 am, church services. Central Daylight Saving.

WMAC, Cazenovia, N. Y. 261 meters. 500 mi. C. B. Meredith. No definite schedule.

WMAD, Rock Port, Mo. 360 meters. Atchinson County Mail.

WMAF, Dartmouth, Mass. 360 meters. Round Hills Radio Corp. Slogan, "From the Land of the Pilgrim Fathers."

WMAH, Lincoln, Neb. 341 meters. 500 mi. General Supply Co. Slogan, "A Call from the Western Plains." Club, "Lincoln Hoot Owls." Daily, 2:15-3 pm, music; 8 pm, entertainment. Sun, 10 am, church services, 3:30-4:30, concert, 8, sermon. Central.

WMAJ, Kansas City, Mo. 275 meters. 600 mi. Kansas City Daily Drovers Telegram. Daily ex Sun. 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.

WMAK, Lockport, N. Y. 360 meters. 1,500 mi. Norton Labs. Tues, 8-9:30 pm, music. Sat, 7:30-8 pm, story; 10:30-11:30, music. Eastern.

WMAL, Trenton, N. J. 256 meters. 100 mi. Trenton Hdwe. Co. Slogan, "The Home of Good Music." Mon, Thur, 7:30-9 pm, music, lecture. Eastern Daylight Saving.

WMAM, Beaumont, Tex. 360 meters. Beaumont Radio Equipment Co.

WMAN, Columbus, O. 286 meters. 50 mi. First Baptist Church. Sun, 10:30-12 m, 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 246 meters. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.

WMAQ, Chicago, Ill. 448 meters. 1,500 mi. The Chicago Daily News. Daily ex Sun, Mon, 7-8 pm, 9:15-10. Daily ex Sat, Sun, 4:30-5 pm. Central Daylight Saving.

WMAT, Duluth, Minn. 266 meters. 500 mi. Paramount Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tues, Fri, 8-9:30 pm, concert. Central.

WMAV, Aubu.n, Ala. 250 meters. Ala. Polytechnic Institute. Daily ex Sun, 10 am, 12, weather, markets. Tues, Thurs, Sat, 7:30-8:30 pm, music. Central.

WMAW, Wahpeton, N. D. 360 meters. 50 mi. Wahpeton Elec. Co. Daily, 5:45 pm, sports, news. Fri, 10-11 pm. Central.

WMAY, St. Louis, Mo. 360 meters. 1,000 mi. Kingshighway Presbyterian Church. Slogan, "May Every By-Way Hear Kingshighway." Sun, 11 am, 8 pm, Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 268 meters. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMC, Memphis, Tenn. 500 meters. 2,000 mi. The Commercial Appeal. Slogan, "Station WMC, Memphis, "Down In Dixie." Club, "Midnight Frolic." Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets; 12:30-2 pm, concert; 8, music. Wed night silent. Tues, Fri, 11 pm, Midnight Frolic. Central.

WMH, Cincinnati, O. 248 meters. Precision Equipment Co. Temporarily discontinued.

WMU, Washington, D. C. 262 meters. 100 mi. Doubleday-Hill Elec. Co. Daily, 5:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

WNAB, Bowling Green, Ky. 360 meters. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 278 meters. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Mon, Wed, Fri, 6:30-7 pm. Tues, Thur, Fri, 8-10 pm. Wed, Sat, 9-11 pm. Sun, 11-12 am, 2:30-4 pm, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 360 meters. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

WNAL, Omaha, Neb. 360 meters. R. J. Rockwell.

WNAN, Syracuse, N. Y. 286 meters. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30 pm. concert, agriograms, etc. Eastern.

WNAQ, Charleston, S. C. 360 meters. Charleston Radio Elec. Co.

WNAP, Springfield, O. 360 meters. 200 mi. Wittenberg College.

WNAR, Butler, Mo. 360 meters. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman.)

WNAT, Philadelphia, Pa. 360 meters. 500 mi. Lennig Bros. Co. Wed, Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern Daylight Saving.

WNAV, Knoxville, Tenn. 360 meters. 1,000 mi. People's Tel & Telg Co. Tues, Thurs, Sat, 9-11:30 pm, concert. Sun, 10:30-12 am; 7:30-8:30 pm. Central.

WNAW, Fortress Monroe, Va. 360 meters. Henry Kunzmann.

WNAX, Yankton, S. D. 236 meters. Dakota Radio Apparatus Co. Daily, 10 am, reports. Wed, Sat, 9-10 pm, music. Central.

WNAY, Baltimore, Md. 360 meters. Shipowners Radio Service.

WNJ, Albany, N. Y. 360 meters. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WNO, Jersey City, N. J. 360 meters. Wireless Telephone Co. of Hudson Co., N. J.

WOAA, Ardmore, Okla. 360 meters. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 50 mi. 360 meters. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. 266 meters. Maus Radio Co.

WOAD, Sigourney, Ia. 360 meters. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. 360 meters. Medland College.

WOAF, Tyler, Tex. 360 meters. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 7 pm, weather, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. 224 meters. Apollo Theatre.

WOAH, Charleston, S. C. 360 meters. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 385 meters. 1,800 mi. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 7, news, markets. Tues, Sat, 9:30-10:30 pm, concert. Thurs, 7:30-8:30 pm, concert. Sun, 11 am, church services; 5-6 pm, concert. Central.

WOAJ, Parsons, Kans. 258 meters. 50 mi. C. E. Ervin. Slogan, "Queen City of the Plains." Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.

WOAK, Frankfort, Ky. 240 meters. Collins Hardware Co.

WOAL, Webster Groves, Mo. 360 meters. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 360 meters. 1,000 mi. James D. Vaughan. Temporarily discontinued.

WOAO, Mishawaka, Ind. 360 meters. 200 mi. Lyradion Mfg. Co.

WOAP, Kalamazoo, Mich. 360 meters. Kalamazoo College. Mon, Wed, Fri, 6:30-7:30 pm. Eastern.

WOAQ, Portsmouth, Va. 360 meters. Portsmouth Kiwanis Club.

WOAR, Kenosha, Wis. 360 meters. H. P. Lundskow.

WOAT, Wilmington, Del. 360 meters. Boyd Martell Hamp.

WOAV, Erie, Pa. 242 meters. 600 mi. Penna. Nat'l Guard. Tues, Wed, 8:30-10 pm, music. Fri, 9:15-10:45 pm, music. Sun, 7:45 pm, church services. Eastern.

WOAW, Omaha, Nebr. 526 meters. 1,000 mi. Woodmen of the World. Slogan, "Gateway to the East and West." Mon, Tues, Thurs, Fri, Sat, 9 pm, concert. Sun, 9:30 am, 9 pm, church services. Central.

WOAX, Trenton, N. J. 240 meters. 300 mi. F. J. Wolff. Intermittent schedule.

WOAZ, Stanford, Tex. 360 meters. Penick Hughes Co.

WOC, Davenport, Ia. 484 meters. 1,000 mi. Palmer School of Chiropractic. Slogan, "Where the West Begins and in the State Where the Tall Corn Grows." Daily ex Sun, Tues night, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, Sandman, sports; 7, concert; 10 pm, concert, Wed only; 9:30 pm, concert, Sat only. Sun, 9 am, chimes; 6 pm, concert; 7, church services; 8, concert. Central.

WOI, Ames, Ia. 360 meters. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 360 meters. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Central.

WOO, Philadelphia, Pa. 509 meters. 500 mi. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 12-1 pm, concert; 4:45 pm, organ recital; 10:55, time; 11:02, weather. Mon, Fri, 7:45-11 pm, music, concert. Eastern, Daylight Saving.

WOQ, Kansas City, Mo. 360 meters. 1,000 mi. Western Radio Co. Mon, Tues, Wed, Thurs, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 405 meters. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks, Mon, Wed, Sat, 8-11 pm, music, entertainment, lectures. Eastern Daylight Saving.

WOS, Jefferson City, Mo. 441 meters. 1,500 mi. Missouri State Marketing Bureau. Slogan, "Watch Our State." Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WOV, Omaha, Neb. 360 meters. R. B. Howell.

WPAB, State College, Pa. 360 meters. Pa. State College.

WPAC, Okmulgee, Okla. 360 meters. Donaldson Radio Co.

WPAD, Chicago, Ill. 360 meters. 500 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, music. Mon, 6:30-7 pm. Tues, Thurs, 8-9 pm, concert. Wed, Thurs, 9-10 pm, concert. Sun, 2:30-3:30 pm. Central Daylight Saving.

WPAF, Council Bluffs, Ia. 360 meters. Peterson's Radio Co.

WPAG, Independence, Mo. 360 meters. Central Radio Co., Inc.

WPAH, Waupaca, Wis. 360 meters. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 9:30 am, 10:30, 11:30, 12:30 pm, 2:30, 4:30, markets, weather, news, etc. Central.

WPAJ, New Haven, Conn. 268 meters. Doolittle Radio Corp.

WPAK, Fargo, N. D. 360 meters. North Dakota Agricultural College.

WPAL, Columbus, O. 286 meters. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. 360 meters. Awerbach & Guet

WPAQ, Frostburg, Md. 360 meters. General Sales & Engineering Co.

WPAR, Beloit, Kans. 50 mi. 360 meters. R. A. Ward. Fri, 8 pm, entertainment. Sun, 11 am, 8 pm, church services; 3 pm, music, talk. Central.

WPAS, Amsterdam, N. Y. 360 meters. J. & M. Electric Co.

WPAT, El Paso, Tex. 360 meters. Saint Patrick's Cathedral.

WPAU, Moorhead, Minn. 360 meters. Concordia College.

WPAZ, Charleston, W. Va. 273 meters. Dr. John R. Koch.

WPG, New Lebanon, O. 360 meters. 1,500 mi. Nushawg Poultry Farm. Slogan, "The Pulse of Miami Valley." Daily ex Sun, 12-12:15, news; 6-6:30 pm, markets. Mon, Fri, 8-9:45 pm, music, farm program. Central.

WPI, Clearfield, Pa. 360 meters. Elec. Supply Co.

WQAA, Parkersburg, Pa. 360 meters. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.

WQAB, Springfield, Mo. 236 meters. Southwest Missouri State Teachers College.

WQAC, Amarillo, Tex. 360 meters. 200 mi. E. B. Gish.

WQAD, Waterbury, Conn. 242 meters. 30 mi. The Whitall Elec. Co. Mon, Wed, Fri, 5:30-6:45 pm, music, Boy Scout news. Eastern.

WQAE, Springfield, Vt. 275 meters. 300 mi. Moore Radio News Station. Slogan, "Among the Green Hills of Vermont." Daily, 7-7:30 pm. Sun, 2:30-4:30 pm. Eastern.

WQAF, Sandusky, O. 240 meters. Sandusky Register.

WQAH, Lexington, Ky. 254 meters. Brock-Anderson Elect. Eng. Co.

WQAJ, Ann Arbor, Mich. 360 meters. Ann Arbor Times News.

WQAK, Dubuque, Ia. 360 meters. Appel-Higley Elec. Co.

WQAL, Mattoon, Ill. 258 meters. 100 mi. Coles County Tel & Telg. Co. Slogan, "The Buckle on the Corn Belt." Tues, Thurs, 9-11 pm, music, lectures. Central.

WQAM, Miami, Fla. 360 meters. 500 mi. Electrical Equip. Co. Slogan, "It is Always June in Miami." Tues, Thurs, 8 pm, music. Sun, 9-11 pm, music. Eastern.

WQAN, Scranton, Pa. 280 meters. 300 mi. Scranton Times. Slogan, "The Voice of the Anthracite." Daily ex Sun, 12:30-1:30 pm, 4:30-5:30, 7:30-8:30, news, reports, music. Tues, Fri, 8 pm, entertainment. Eastern.

WQAO, New York City, N. Y. 360 meters. 300 mi. Calvary Baptist Church. Sun, 8 pm, church services. Eastern Daylight Saving.

WQAP, Lincoln, Nebr. 360 meters. Am. Radio Co.

WQAQ, Abilene, Tex. 360 meters. 300 mi. Abilene Daily Reporter. Slogan, "The Capital of West Texas." Tues, Thurs, Fri, 8-9 pm. Sun, am, pm, church services. Central.

WQAS, Lowell, Mass. 266 meters. 100 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.

WQAT, Richmond, Va. 360 meters. 200 mi. Radio Equipment Corp. Daily ex Sun, 2-5:15 pm, music. Sun, 3-5 pm. Eastern.

WQAV, Greenville, S. C. 258 meters. 75 mi. Huntington & Guerry, Inc. Slogan, "The Textile Center of the South." Tues, Thurs, 8-9 pm, music. Sat, 8-8:30 pm, music. Eastern.

WQAW, Washington, D. C. 236 meters. Catholic University of America.

WQAX, Peoria, Ill. 360 meters. Radio Equipment Co.

WQAZ, Greensboro, N. C. 360 meters. Greensboro Daily News.

WRAA, Houston, Tex. 360 meters. 400 mi. Rice Institute. Mon, 8-9 pm, concert, college activities. Sun, 4:30 pm, extension lectures. Central.

WRAB, Savannah, Ga. 360 meters. Savannah Board of Public Education.

WRAD, Marion, Kans. 360 meters. Taylor Radio Shop. Daily, 12-12:45 pm, 5:15-5:45, markets, weather. Mon, Thurs, 8 pm, concert. Sun, 5-6 pm. Central.

WRAF, La Porte, Ind. 224 meters. Radio Club. Inc.

WRAH, Providence, R. I. 360 meters. Stanley N. Read.

WRAL, St. Croix Falls, Wis. 248 meters. Northern States Power Co.

WRAN, Waterloo, Ia. 229 meters. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.

WRAO, St. Louis, Mo. 360 meters. St. Louis Radio Service Co. Daily ex Sun, 4:15-5 pm, music, sports. Sun, 3:30-5 pm, music, sports. Central.

WRAR, David City, Nebr. 226 meters. 100 mi. Jacob C. Thomas. Daily, 6:30-7:30 pm. Tues, Fri, 7-9 pm. Central.

WRAS, McLeansboro, Ill. 360 meters. Radio Supply Co.

WRAU, Amarillo, Tex. 360 meters. 50 mi. Amarillo Daily News. Tues, Thurs, 8:00-9:00 pm, music. Central.

WRAV, Yellow Spring, O. 360 meters. Antioch College.

WRAW, Reading, Pa. 238 meters. Horace D. Good.

WRAX, Gloucester City, N. J. 268 meters. Flexon's Garage.

WRAY, Scranton, Pa. 280 meters. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m. reports; 3:30-5:30 pm, reports, music; 7, bedtime stories, music. Wed, 8:15-9:45 pm, music. Sat, 8:15-11:30 pm, music. Sun. 4 pm, chapel. Eastern.

WRK, Hamilton, O. 360 meters. 1,000 mi. Doron Bros. Elec. Co. Slogan, "The Oldest Station in Existence." Wed, Sat, 9-11 pm, music, lecture. Sun, 2-4 pm, music. Central.

WRL, Schenectady, N. Y. 360 meters. Union College Radio Club.

WRM, Urbana, Ill. 360 meters. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm, 9-9:30, Univ. news, talks, music. Central.

WRP, Camden, N. J. 360 meters. 250 mi. Federal Inst. of Radio Teleg. Temporarily discontinued.

WRR, Dallas, Tex. 360 meters. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.

WRW, Tarrytown, N. Y. 273 meters. 1,000 mi. Tarrytown Radio & Research Laboratory. Slogan, "Everything in Radio." Mon, Wed, Fri, 7:30-11 pm. Sun, 7:30-9:30 pm. Eastern Daylight Saving.

WSAA, Marietta, O. 360 meters. 50 mi. B. S. Sprague Elec. Co. Wed, 7:30 pm. Eastern.

WSAB, Cape Girardeau, Mo. 360 meters. Southeast Mo. State Teachers College.

WSAC, Clemson College, S. C. 360 meters. Clemson Agri. College.

WSAD, Providence, R. I. 261 meters. J. A. Foster Co.

WSAG, St. Petersburg, Fla. 244 meters. Loran V. Davis.

WSAH, Chicago, Ill. 248 meters. A. G. Leonard, Jr. Daily ex Sun, 5:30-6:30 pm. Fri, 8:45-10. Central Daylight Saving.

WSAI, Cincinnati, O. 309 meters. United States Playing Card Co. Tues, Thurs, 8-10 pm. Sat, 10-12 pm. Eastern.

WSAJ, Grove City, Pa. 360 meters. 700 mi. Grove City College. College activities. No definite schedule.

WSAK, Middleport, O. 258 meters. The Daily News.

WSAL, Brookville, Ind. 246 meters. Franklin Elec. Co.

WSAN, Allentown, Pa. 229 meters. Allentown Radio Club.

WSAP, New York, N. Y. 263 meters. Seventh Day Adventist Church. Sat, 10:45-12:45 am. Sun, 7:30-9:30 pm. Eastern Daylight Saving.

WSAQ, Dartmouth, Mass. 280 meters. Round Hills Radio Corp.

WSAR, Fall River, Mass. 254 meters. Doughty & Welch Elect. Co.

WSAT, Plainview, Tex. 268 meters. Plainview Elect. Co.

WRAZ, Newark, N. J. 233 meters. Radio Shop of Newark.

WSB, Atlanta, Ga. 429 meters. 1,500 mi. Atlanta Journal. Slogan, "The Voice of the South." Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12, music. Sun, 10:54 am, 5-6 pm, 7:30-9, church services. Central.

WSL, Utica, N. Y. 273 meters. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am. 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.

WSY, Birmingham, Ala, 360 meters. 2,000 mi. Alabama Power Co. Daily ex Sun, 9:30 am, 3 pm, 3:30, news, weather. Mon, Wed, Fri, 8 pm, music. Sun, 11 am, 7:30 pm, church services. Central.

WTAB, Fall River, Mass. 248 meters. Fall River Daily Herald.

WTAC, Johnston, Pa. 360 meters. Penn Traffic Co. Daily ex Sun, 10:15 am, 2:15 pm. Tues, Thurs, 7:30 pm. Eastern.

WTAG, Providence, R. I. 258 meters. Kern Music Co.

WTAK, Steubenville, O. 266 meters. The Swan-Bower Co.

WTAS, Elgin, Ill. 275 meters. Chas. E. Erbstein.

WTAU, Tecumseh, Neb. 360 meters. Ruegy Battery & Elec. Co.

WTAW, College Station, Tex. 254 meters. 200 mi. Agricultural and Mechanical College of Tex. No regular schedule. Central.

WTG, Manhattan, Kan. 360 meters. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.

WWAC, Waco, Tex. 360 meters. 1,500 mi. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.

WWAD, Philadelphia, Pa. 360 meters, Wright & Wright, Inc.

WWAX, Laredo, Tex. 360 meters. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.

WWB, Canton, O. 268 meters. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.

WWI, Dearborn, Mich. 273 meters. 200 mi. Ford Motor Co. Wed, 8-10 pm, music, lectures. Eastern.

WWJ, Detroit, Mich. 517 meters. 1,500 mi. The Detroit News. Daily ex Sun, 9:30-9:45 am, household hints; 9:45-10:25, health talks; 10:25-10:30, weather; 11:55-12, time; 12:05-12:45 pm, music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports. April 22, and every other week, 8:30-10 pm, concert. Thurs, 11-12 pm, "midnight special." Sun, 2 pm, 7:30, church services. Fill in weeks, 7-8:30 pm, concert; Sun, 11 am, 5:30, church services. Eastern.

WWL, New Orleans, La. 360 meters. Loyola Univ.

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

6KW, Tuincucu, Cuba. 315 meters. 1,500 mi. Frank H. Jones. Slogan, "If you hear the koo of the cuckoo you are in tune with Tuincucu." Mon, Tues, Thurs, Sun, 9 pm, music. Central.

(Note.—This completes the station schedule list. The fourth part of the directory consists of the state, city-station index, and will appear next week.)

FLEWELLING ANSWERS

(Continued from page 4)

in connection with a loop, using either the inductance coil in connection with the loop or tuning the loop alone, as shown in Figure 2.

It will be noticed that in this diagram

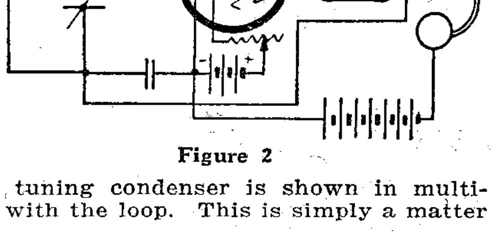


Figure 2

the tuning condenser is shown in multiple with the loop. This is simply a matter

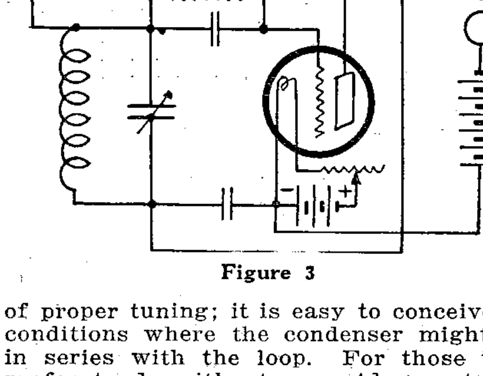


Figure 3

of proper tuning; it is easy to conceive of conditions where the condenser might be in series with the loop. For those who prefer to do without an outdoor antenna we may say that very wonderful results have been reported in relation to this circuit.

Then there is the original honeycomb tuned inductance tickler circuit, using either a honeycomb coil or tapping the coil for various tuning adjustments. This is shown in Figure 3.

Another type of circuit that has been used successfully and for which the claim as to stability has been made is that one which uses a rotor ball revolving within a cylindrical tube. The entire plate winding may be placed upon the rotor ball or, if an attempt is made toward stability, half of the rotor winding is placed upon the ball and the other half upon the tube, next to the tuning inductance winding, thus giving a combination of tickler and variometer plate control. This, too, is shown in Figure 3. The wiring diagram is of course the same, the only change being mechanical.

Testing B Battery Voltage

In testing a B battery for voltage, do not leave the voltmeter on the terminals any longer than is absolutely necessary. This is a dead short circuit, and will use up the battery in a hurry. The same thing holds true of any testing with either voltmeter or ammeter. Always test the storage battery with a hydrometer for the best results. When the solution reads below 1,150 it is time to recharge, and when the reading reaches 1,250 or 1,300 it is time to stop the charge.

Vertical Position for Tubes

When planning a vacuum tube set, place the electron tubes in a vertical position, or so that the filament lies in a vertical plane. A tungsten filament will lengthen when heated, and the filament must be placed in such a position that the sag will not cause it to touch the grid of the tube.

ADVANCE PROGRAMS

(Continued from page 7)

KDKA (Eastern, 326), 7:20 P. M., Concert, Christine Adams, 'cellist; Helen McAneny, soprano; Lida Kifer, accompanist.

KGW (Pacific, 492), 3:30-4:00 P. M., Child training program; **10:00-11:00 P. M.,** Dance music, George Olsen's Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; **2:30-3:30 P. M.,** Musical matinee, Naomi Sweeney Brown; **6:45-7:30 P. M.,** Children's Hour, "Uncle John;" **8:00-10:00 P. M.,** De Luxe program.

KYW (Central, Daylight Saving, 345), 7:00 P. M., Musical program, Lyon & Heavy Concert Department; Cope Harvey's Orchestra; Herbie Mintz, pianist; **8:05 P. M.,** "Twenty Minutes of Good Reading," Rev. C. J. Pernin, Loyola University.

WBZ (Eastern, 337), 7:00 P. M., Concert, Charles O'Connell, pianist; Mrs. McGertie, soprano; Mrs. Fife Donnahue, 'cellist; **8:20 P. M.,** Bedtime stories for Grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Daving, 395), 12:00-12:54 P. M., Organ recital; Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; Feri Sarkozi, director; **2:00-3:00 P. M.,** Dinner music, Arcadia Cafe Concert Orchestra; Song recital; Talk, Betsy Logan; **4:30-6:00 P. M.,** Song recital.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical Program; Talk, "The American Officer," Claude Levine; Harry Roberts, pianist; Joe Hollander, singer; Harry Roberts, pianist.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "The Juror in the Court System," Hon. Towne Young, Judge Special District Court, Dallas County; **8:30-9:30 P. M.,** Concert, Gussie Montgomery's Harmony Six Orchestra.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; **3:00 P. M.,** Piano recital, Loretta Kerk; **6:30 P. M.,** Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; **7:00 P. M.,** Children's Own Half Hour, stories by Cousin Sue; **8:00 P. M.,** Concert.

WGI (Eastern, Daylight Saving, 360), 12:15 P. M., Organ recital, E. Lewis Dunham; **5:00 P. M.,** "Twilight Tales," Eunice L. Randall; **8:30 P. M.,** Radio talk, Rachel Thompson; Radio drama, Amrad Players.

WGY (Eastern, 380), 7:45 P. M., Musical program, "Mammy Land," Joseph Eichner's Melody Boys; "Tomorrow Morning," "When All the World Forgets You," Melody Boys; "I'm Drifting Back to Dreamland," James De Long, tenor; "While You Were Making Believe," Melody Boys; Address, "Silver Black Fox Farming," Perry A. Cole; "Who'll Take the Place of the Songbird Now Gone," Melody Boys; "Down in Picardy," Melody Boys; "Why Don't My Dreams Come True," James De Long, tenor; "Wet Yo' Thumb," "Rio Nights," Melody Boys; "Mother's Love," James De Long; "Old King Tut," "Faded Love Letters," Melody Boys.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; **7:30-9:00 P. M.,** Concert, Bel Canto Male Quartette; Katherine Hannon, reader.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz; Germantown Theater; **3:00 P. M.,** Song recital; **7:00-7:30 P. M.,** Bedtime stories, Uncle Wip; **8:00 P. M.,** Travel talk; **8:20 P. M.,** Dance music, Ten Virginians, Hotel Walton Roof Garden; **9:00-9:30 P. M.,** Organ recital, Karl Bonawitz, Germantown Theatre.

WJAX (Eastern, 390), 8:00 P. M., Concert, Gregory Zwinitzky, violinist; Harry Dunham, baritone; Helen Wilkom, soprano; Charles Ruetschi, pianist; Richard Kimball, tenor.

WLW (Eastern, 309), 10:00 P. M., Musical program, Ruth Heubach, soprano; Ed Decker, tenor; Irwin McConnell, pianist; Budd Rudd Collegian Dance Orchestra.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Program, Lyceum Arts Conservatory; **7:00 P. M.,** Talk, "Auto Trails," Rockwell Stephens; Mrs. Rose Samuels Sequin, soprano; **9:00 P. M.,** Concert, LaSalle Roof Garden Orchestra; Mrs. Eva Ray, soprano; Leonard J. Huber, baritone; Edward Schreiner, tenor.

WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; **5:45 P. M.,** Chimes concert; **6:30 P. M.,** Sandman.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; **12:00-12:55 P. M.,** Luncheon music, Wanamaker Tea Room Orchestra; **4:45-5:00 P. M.,** Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; **8:30 P. M.,** Concert, News Orchestra; Schmeman's Band.

Friday, August 3

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Ruy Blas," Star Orchestra; "It Was a Dream," Ethel Cotteril, soprano; "In Old Vienna," Harry Adaskin, violinist; "Sans Souci," Orchestra; "She Wandered Down the Mountain," Ethel Cotteril; "Mazurka," Harry Adaskin; Selection from "Sometime," Orchestra; "A Perfect Day," Orchestra; "The Flight of Ages," Ethel Cotteril; March from "Tannhauser," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, KDKA String Ensemble.

KGW (Pacific, 492), 3:30-4:00 P. M., Lecture, "Fires and Careless Campers," Shirley Buck, National Forest Inspector; **8:00-9:00 P. M.,** Vocal solos; George Olsen's Orchestra; **10:00-11:00 P. M.,** Dance program, George Olsen's Orchestra; **11:00-12:00 P. M.,** Hoot Owls.

KHD (Pacific, 395), 12:30-1:15 P. M., Concert; **2:30-3:30 P. M.,** Musical matinee; **6:45-7:30 P. M.,** Children's Hour, "Uncle John;" **8:00-10:00 P. M.,** De Luxe program.

KSD (Central, 546), 8:00 P. M., Concert, Missouri Theater talent.

KYW (Central, Daylight Saving, 345), 10:00-11:30 P. M., Dance program, Cope Harvey's Orchestra; Herbie Mintz; Harry Geise.

WBZ (Eastern, 337), 7:00 P. M., Concert, Mrs. Gertrude M. Jenkins, contralto; Frances I. Bailey, violinist; Mrs. LaZazzera, accompanist; **8:20 P. M.,** Bedtime story for Grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; **2:00-3:00 P. M.,** Musical program; Short Talks, **4:30 P. M.,** Song recital.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical program, Harry Pease, Ed Nelson, singers; Jimmy Flynn, singer; Lewis Piotti, singer; Bob Miller, singer; Jack Val, pianist; **11:00-12:00 P. M.,** Musical program, Rome and Dunn, singers; Pianologue, Jack Smith; Orchestra; Kammnitz and Hall, entertainers; "Wet Yo' Thumb," Al Beilan, singer; "Bright Bits," Billy Gleason; Orchestra.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Mary Magdalene," Dr. Robert Stewart Hyer, Southern Methodist University; **8:30-9:30 P. M.,** Jewish Juniors, dramatic reading.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; **3:00 P. M.,** Recital; **6:30 P. M.,** Dinner music, Meyer Davis Bellevue Stratford Orchestra.

WGI (Eastern, Daylight Saving, 360), 12:15 P. M., Organ recital, E. Lewis Dunham; Talk, "The Pushcart Vendor," Dorothy H. Goodwin; **5:00 P. M.,** Girls' Story Hour, Eunice L. Randall; **8:30 P. M.,** "Silversmith Series," David M. Cheney; Musical program.

WGY (Eastern, 380), 7:45 P. M., Musical program, Radio comedy, "Her Own Money," WGY Student Players; **10:30 P. M.,** Musical program, "Theme and Variations," Doris Francis, pianist; "Were You to Call," Isabel Franklin, soprano; "Indian Lament," William Helm, violinist; "Gavot-Musette," Doris Francis, Mrs. W. J. Loane, pianists; "April Ecstasy," "Dan Cupid," Isabel Franklin; "Song of India," William Helm; "Papillon," Doris Francis; "Pinin' Just for You," Isabel Franklin; "Serenata," "Viennois," William Helm.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; **7:30-9:00 P. M.,** Myrtle George Stinger, soprano; L. V. Davidson, Paul P. Martin, tenors; L. V. Davidson, saxophonist; Mary Bell Garrett, soprano; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; **6:00 P. M.,** Dinner dance music; **7:00-7:30 P. M.,** Bedtime stories, Uncle Wip.

WMAQ (Central, Daylight Saving, 448), 7:00 P. M., Virginia Tidd, soprano; Talk, Hearing America First," Mrs. Marx E. Oberndorfer; **9:00 P. M.,** Concert, LaSalle Roof Garden Orchestra.

WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilent; **5:45 P. M.,** Chimes concert; **6:30 P. M.,** Sandman.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; **12:00-12:55 P. M.,** Luncheon music, Wanamaker Tea Room Orchestra; **4:45-5:00 P. M.,** Organ recital, Mary E. Vogt; **7:45 P. M.,** Dinner music, Hotel Adelphia Roof Garden Orchestra; **8:30 P. M.,** Song and piano recital; **8:45-10:55 P. M.,** Dance music, Hotel Adelphia Roof Garden Orchestra; **11:00 P. M.,** Dance music, Hotel Adelphia Roof Garden Orchestra.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; **8:30 P. M.,** Concert, News Orchestra; Schmeman's Band.

Saturday, August 4

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Cavalleria Rusticana," Star Orchestra; Kathleen Cameron, soprano; "The Swan," Jaques Sterin, 'cellist; "Air de Ballet," Orchestra; Kathleen Cameron, soprano; "Ritornell," Jaques Sterin; "Moment Musical," Orchestra; Kathleen Cameron, soprano; "Three Dances from Nell Gwynn," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, Westinghouse Band, T. J. Vastine, director; Bert Mustin, fun maker.

KGW (Pacific, 492), 3:30-4:00 P. M., Children's program, Aunt Nell; **10:00-11:00 P. M.,** Dance program, George Olsen's Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; **2:30-3:30 P. M.,** Musical matinee; **6:45-7:30 P. M.,** Children's Hour, "Uncle John;" **8:00-10:00 P. M.,** De Luxe program.

KYW (Central, Daylight Saving, 345), 7:00 P. M., Musical program, National School of Music; "Invictus," The Kappa Alpha Psi Four; "Love's Old Sweet Song," The Ladies' Singing Four; "Thora," Aubrey B. Hawkins, tenor; "Mister Mocking Bird," The Fulton Four; "Habanera," from "Carmen," Mme. Camille Cohen-Jones, soprano; "Song of the Toreador," from "Carmen," Emmitt G. Berger, baritone; Cope Harvey's Orchestra; Cornella Lampton, pianist; "Jesus Is Coming Soon," W. C. Mason, baritone; "Negro Spiritual," Foulton Four; "La Donna Mobile," from "Rigoletto," Lawrence Lomax, tenor; "Battle Hymn," Kappa Alpha Psi Four; **8:00 P. M.,** "Under the Evening Lamp," Youth's Companion.

WBAP (Central, 476), 7:00-7:30 P. M., Sunday School Lesson, Mrs. W. F. Barnum.

WBZ (Eastern, 337), 7:00 P. M., Concert, Raymond Le Doux, violinist; Frances E. White, reader; M. Frank Regnier, baritone; Mrs. A. W. Mosher, pianist; **8:20 P. M.,** Bedtime story for Grown-ups, Orison S. Marden.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical program, Fletcher Henderson, pianist; Edna Hicks, singer; Emma Gover, singer.

WFAA (Central, 476), 12:30-1:00 P. M., Address, Prof. Clyde Eagleton, Southern Methodist University; **8:30-9:30 P. M.,** Concert, Ennis, Texas, Band; **11:00-12:00 P. M.,** Musical program, J. W. Hubbell, tenor; David Guion, pianist.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk, "New England Business Problems," Arthur R. Curnick; Radio drama, Amrad Players; Music.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater; **7:30-9:00 P. M.,** Concert; Sylvian Trio; Mrs. J. Gex William, soprano; Elwynne Griffith, pianist; Henrietta Everett, soprano; Reading, "An Interesting Historical Episode."

WMAQ (Central, Daylight Saving, 448), 8:00 P. M., Concert, LaSalle Orchestra; Mrs. Franklin Knight, contralto; Robt. MacDonald, pianist; Chicago Theater talent.

WOC (Central, 484), 3:30 P. M., Educational talk, C. C. Hall; **5:45 P. M.,** Chimes concert; **6:30 P. M.,** Sandman; **9:30-10:30 P. M.,** Dance program, P. S. C. Orchestra.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; **7:30 P. M.,** Concert, Schmeman's Band.

Sunday, August 5

KYW (Central, Daylight Saving, 345), 5:00-8:00 P. M., Concert, Sisson Trio.

WBZ (Eastern, 337), 7:30 P. M., Church services, Edgar Austin, Agent Massachusetts Society for the Prevention of Cruelty to Children.

WFAA (Central, 476), 2:30-3:30 P. M., Radio Chapel Bible Class, Rev. William F. Galbraith, pastor Colonial Hill Presbyterian Church; **9:30-10:00 P. M.,** Singers from the choir of Haskell Avenue Methodist Church; **10:00-11:00 P. M.,** Concert, Dizzy Four Orchestra.

WFI (Eastern, Daylight Saving, 395), 4:00 P. M., Church services; **7:30 P. M.,** Church services.

WGI (Eastern, Daylight Saving, 360), 4:00 P. M., "Adventure Hour," Youth's Companion; Concert, Edison Laboratory Phonograph; **8:30 P. M., Talk,** "Present Day Russia," Rev. L. O. Hartsman; Musical program.

WGY (Eastern, 380), 9:30 A. M., Church services, Albany Street Methodist Episcopal Church; Sermon, "Why Religion?" Rev. James L. Ellenwood, pastor State Street Methodist Church, Troy; **6:30 P. M.,** Church services, Albany Street Methodist Episcopal Church; Sermon, "The Crowd Outside," Rev. James L. Ellenwood.

WHAS (Central, 400), 9:57 A. M., Organ music; **10:00 A. M.,** Church services, Fourth Avenue Presbyterian Church; Dr. Charles W. Welch, pastor; Warren Memorial Church Choir; **4:00-5:00 P. M.,** Concert, arranged by Myrtle George Stinger.

WWJ (Eastern, 517), 11:00 A. M., Church services, St. Paul's Cathedral; **5:00 P. M.,** News Orchestra; **4:00 P. M.,** Concert, Schmeman's Band.

Monday, August 6

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music; **2:00-3:00 P. M.,** Musical selections, Arcadia Cafe Concert Orchestra; **4:40-5:55 P. M.,** Song recital and short talks.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; **3:00 P. M.,** Concert; **6:30 P. M.,** Dinner music, Meyer Davis Bellevue-Stratford Orchestra.

WGY (Eastern, 380), 7:45 P. M., Vaudeville program; "Medley of Marches," Mr. and Mrs. Robert Beerle, pianists; Novelty act, "Racing at Saratoga," William F. Madden; "Melody," Wilbur Bowman, violinist; Dialogue, Herman Schulman, Fred Clieman; "Drifting Back to "Dreamland," "Side by Side," Robert Beerle, saxophonist; "Moments of Mirth," Maurice G. Randall; "Madrigal," Wilbur Bowman, violinist; "Silver Moon," "Sleep, Baby, Sleep," William F. Madden, yodler; Saw solos, "Aloha Oe," "Carry Me Back to Old Virginny," Herman Schulman; Duet, "It Took a Wild, Wild Woman to Make a Tame Man Out of Me," Tom Morris, Frank Purcell; "Cradle of Liberty," Mr. and Mrs. Robert Beerle, pianists.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; **6:45 P. M.,** Radio baseball dope, Monte Cross, old-time baseball star; **7:00 P. M.,** Bedtime stories, Uncle Wip.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; **12:00-12:55 P. M.,** Luncheon music, Wanamaker Tea Room Orchestra; **4:45-5:00 P. M.,** Organ recital, Mary E. Vogt; **7:45 P. M.,** Dinner music, Hotel Adelphia Roof Garden Orchestra; **8:30 P. M.,** Orchestra and vocal selections, music by WOO Orchestra, Robert E. Golden, director; **9:30 P. M.,** Organ recital, Mary E. Vogt.

Radio Digest Illustrated

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Study the Science on Warm Days

Keep a Record of Your Receiving for Reference

ON warm days you will notice that some of the stations you have been hearing at a distance will come more weakly; perhaps you will cease to hear some of them for a time.

Like some of us poor mortals, the Radio waves do not travel so far on hot, sunny days as they do on crisp, cool ones, and they prefer to travel by night rather than by day.

You can make an interesting study and at the same time contribute something to the knowledge of Radio telepathy if you will keep a record of the weather on days when you have difficulties. Such a study, con- for a considerable length of time, may aid the f some of your difficulties. It should be

enefited by the Lull

in Distance and Hook-ups

eems to have settled down and hook-ups. There is ent apparatus so that

evelopment does not ntists are resting after their n the contrary, more research is done than ever before.

But this is the quiet, plodding kind of work which retains its secret until it has accomplished something big in the development of the science. When the scientists are ready to announce their next developments, it will be like another wave in the advancement of Radio. Meanwhile Radiophans are getting their fill of hook-ups and changes for their receiving and transmitting sets, in order to gain what seems to be the greatest desire—distance.

Fading Signals

Daylight Range Taken as a Reliable Working Distance

A PERSON does not have to operate a Radio receiving system over a very long period of time before the discovery is made that under certain conditions, distant stations may be heard very loudly and that other stations, at times entirely inaudible, are heard with ease. It is usually the case that the receiving range is greatly increased at night, especially when both stations are included in the period devoid of sunlight. It will be further noted that on certain nights signals from one direction vary in strength over a short interval of time, that is, the signal may come inaudible within five seconds and five seconds later it will swing back stronger than before. On the same night signals from another direction may be inaudible beyond the usual range of the receiver. The succeeding night may see the conditions reversed with the fading signals heard from a different direction and apparently affecting signals only from that direction.

Many observations have been made of conditions and localities where the so-called fading is experienced; many data have been compiled as a result of numerous tests to ascertain the exact causes of this phenomenon but so far little has been accomplished. Various theories have been advanced in the attempt to explain why such variations in signal strength should exist; while most persons agree that atmospheric conditions probably have much to do with the action, no generally exceptable explanation has yet been advanced. Thus far the most practicable solution to the problem has been to employ sufficient amplification at the receiving station to render the signal audible even when it has faded away to its minimum value.

Ionization due to the action of the sun's violet rays has been advanced as the cause of the reduced range of Radio stations during periods of daylight. It is interesting to note that the effect of this condition is somewhat more pronounced when employing very short wave lengths than when using waves several thousand meters long.

Due to the fact that the range attained at night is a variable factor, the daylight range is taken as the reliable working distance over which the set can be depended on to maintain communication under any condition.

RADIO INDI-GEST

JSKWSKVXZGWV PGYXXZKSQPT WINS INDI-GEST NAME PRIZE WITH BLAH

WALLA WALLA.—Breaking a genuine, completely full, bottled in bail, untouched quart bottle of pre-1919 three star vanilla extract on the Indi-Gest super bum broadcasting station's counterpoise, the plant was christened "BLAH" amid the heart-felt, equator-heated, dark drown cheers of the dusky inhabitants of this South Sea isle. Thus ended the great, world-wide search for call letters by which to designate the works of Bambdin Bray, unofficial announcer, and Wattle knees, musical director. The handsome, round, beveled edge, pure brass switch point prize for the naming, was awarded to Jskwskvxzgwv Pgyxxzksqpt, who submitted the name selected. J. P., as we will call him hereafter for the sake of the printers, has always had a great gift for names, having named himself all alone. He is also called by many other names by larger persons than himself. These are rumored to be more pronounceable and emphatic in nature.

The counterpoise, while not mentioned in this column's excellent exclusive description of the oscillatory system of the triode tube transmitter, is nevertheless there. (We know it is, because they broke the bottle thereon.) But to go on with this miserable story, the counterpoise was added to give Station BLAH poise, microphonically speaking.

To avoid unnecessary correspondence on "where didja get the vanilla?" let it suffice to say that the latter is still condensed by Dielectric. Send him all the orders and Indi-Gest, the cash remittance.

One of the Many Losers

Dear Indi: I have had the pleasure of hearing your super bum broadcasting station two times. I have also had the pleasure of getting the earache twice and paying two doctor bills. I hasten to give your station the call letters "BSS" (bring smelling salts). LUKE WHATIV DUNN.

A-B-C Lessons for Indigest Beginners

Chapter VII—Oh! We Thot They Cooked on It

BY GOSH

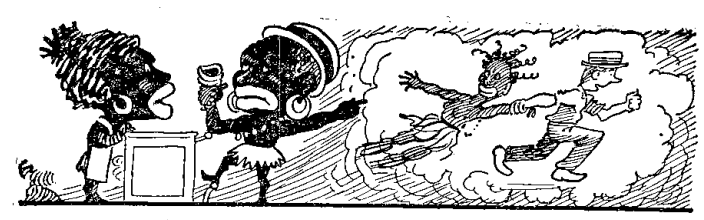
G IS for grid,
(It's really a traffic cop)
That bosses electrons
And makes 'em go and stop.

Walla Walla

or

A Cannibal Chief's Story

Lemme sit down a minute, so I can tie my shoe,
Stop throwing fifty-watt tubes at me, I ain't done nothin' to you,
Once I was a masher, and always wore silk hose,
But that was long before Radio came, and a washline was used for clothes,
Don't stare at me with that empty look, and fill my heart with hate.
Just listen to what I'm going to tell, a story I would relate.
Way down in Walla Walla, where you'd sink in sand to your knees,
I had a cross-eyed daughter, but she looked straight if you please.
Fellows? Why she had them by the jug full, thy came to her fast and thick,
But she didn't like those Cannibals, and claimed they made her sick.
When along came a crew from America, sent by Indi-Gest.
To build a broadcasting station, they claimed they were from the West.
Well, it's the same old gag boys on which many a Moo's* got tripped.
One Turk from the crew fell hard for my Moo, and away from the isle they skipped.



But this isn't all of the story, I was chief of the isle,
And when I heard my Moo vamoosed, it was hard for me to smile.
I swore if I caught this Romeo, this bird who stole my Moo.
That I'd pickle him first in seaweed, then slice him up for stew.
My aching heart was breaking, and my hands itched for this Turk.
For since my Moo has left me, I've had to go to work.
Each night as the skies get rosy, I sit by the beach and dream,
Till the stars come out of their hiding and the moon begins to beam.
I will yearn and yearn for her return, and perhaps she'll come some day,
But she'll come alone, he'll leave her cold, so the natives say.
Oh, Moo, if you knew I was blue for stew, you would bring him back to me,
And come yourself to this quaint lil' isle, back to your Chief Teehee.
So just give me another shellful, a big one if you please,
And I'll look for her and lay for him 'till Hell begins to freeze.

—*ROZEE.*

*Moo means "Maiden" in Walla Wallan.

IN THE BEST OF FAMILIES

Planted here is the mother-in-law of
Isadore James Henry McPine,
She went to move his Radio set—
Shattered a U. V. One Ninety-Nine.

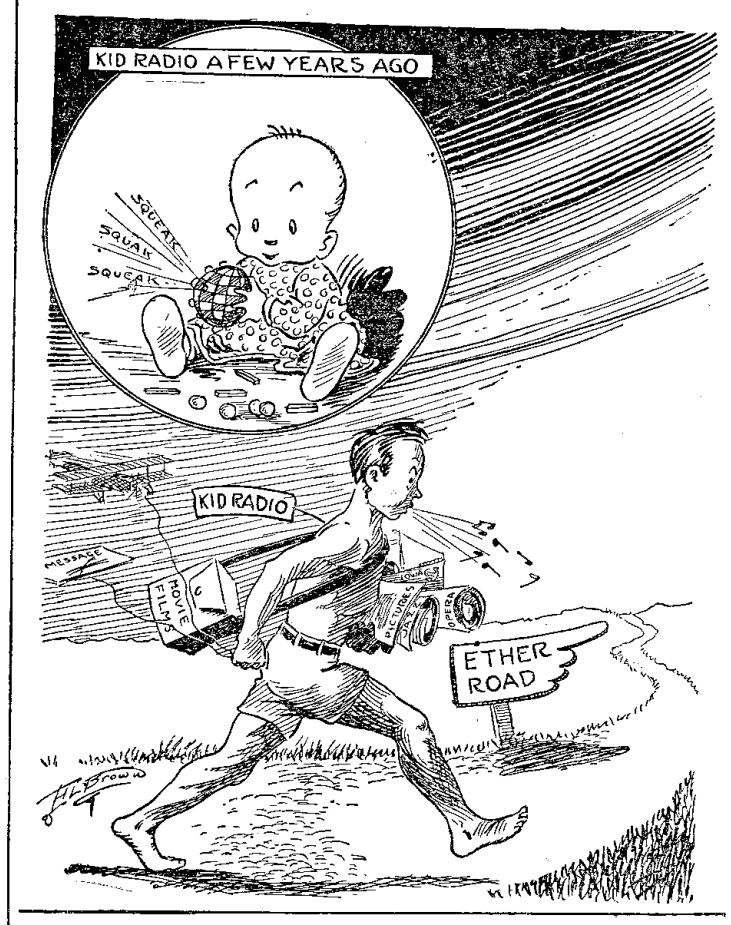
ROTOR E. GAPP

But Did You Count Ten?

Dear Indi: Listening in to the Firpo-Willard bout broadcast, I thot it would improve matters to have the right atmosphere, so I did my tuning with a pair of boxing gloves on. The result was a knockout! SPIDER WEBB.

To offset any mistaken rumors, let it be said here that no material used in Indi-Gest is purchased. The idea is to try to see how good you are and whether or not it is possible for you to achieve that achievement greatest of all, to have your contrib appear herein. Indi says it's bad enough to read the contribs, let alone print them!

Traveling Right Along



Condensed

By DIELECTRIC

The suggestion has been made frequently that in time all broadcasting would have to be supported by the public directly. Whether that time has arrived or not, the Philadelphia Chamber of Commerce purposes urging the establishment of a broadcasting station in the Quaker City to be operated by the public. They have hopes of building the first such station in the country to be powerful enough to reach at least half the receiving sets in the United States. The idea originated with the National Radio Chamber of Commerce.

It is thought that at least two million persons listened to the detailed description of the discussion beween Firpo and Willard. If you were listening to the ringside announcements you had no difficulty in accepting the estimate that one hundred thousand folks were present—when they yelled! After WEAF ceased broadcasting did you find other stations in the midst of telling their listeners just what took place in each round? Slow? Just recall the days before Radiophony.

In most cities there are public parks; at least one of these usually boasts a band. At present the one band is made to serve musical refreshment to patrons of all the other parks (in a great many instances) simply by relying on the aid of Radio. Detroit, so much alive to the advantages it offers, has made Radio serve in various capacities. Twelve city parks are to be supplied with music from Schemen's band broadcast through station WWJ. In New York city WJZ is broadcasting the Goldman band concerts given in Central Park.

The seeming possibilities of Radio are so unlimited as to give rise to fanciful stories at times. One such was spread not long ago to the effect that Station POZ in Germany had developed a means of stopping autos by electromagnetic waves. They can't even stop the mark; that has had quite a little magnetism. It is rather likely that the Germans would, if they could, produce some startling discoveries in Radio in the hope of marked advantage over those countries with which they were at war. However, any discovery would not long remain the secret of one nation.

It would seem to me highly desirable to equip every legislative hall with receiving sets. (The Assembly at Albany, N. Y., possesses one, which may be due partly to the extensive use of Radio broadcasting by Governor Smith.) Our chosen representatives would then have ample means of knowing the stations which refrain from spreading propaganda relative to the shortage of a very popular fruit—bananas! All broadcasting stations coming within that group could be subsidized and all others legislated out of existence. Jazz needs no such titles to make it barbaric.

Not only does Radio provide a way to keep in touch with the rest of our fellows while camping in the mountains but it brings to us the experiences of sportsmen. WGY, among a number of stations, has broadcast information of value to the prospective fisherman, telling him the proper bait to use in each instance and other facts of prime importance. By Radio we have heard what to take on our auto trips, and where to go. This saves the expense of sport journals.

One more instance of a public spirited move is recorded; this time it happened in Los Angeles. The Times of that city is doing all that it can to have receiving sets placed in the hands of every shut-in in the city. For this plan the name "Uncle John Radio Fund" was chosen; if you want to aid in the good work, send what you have to the newspaper. There can be no question now as to the great good these sets do

First Steps for Beginners in Radio

Chapter XI, Part II—Super Regeneration

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XII—Reflex Circuits.
Chapter XIII—Reflex Circuit Operation.
Chapter XIV—Headsets and Loud Talkers.
Chapter XV—Filament Batteries.
Chapter XVI—Plate Batteries.
Chapter XVII—Using Alternating Current on Tubes.
Chapter XVIII—Testing Radio Instruments.
Chapter XIX—Locating Trouble in the Set.
Chapter XX—Useful Information and Formulas.

THE construction of the one-tube super regenerative set offers no great difficulties; it is much simpler than the plain regenerative in operation. The set to be described is intended particularly for use with a loop aerial and will be found ideal for portable work or for one who does not want to erect an outdoor aerial.

The loop aerial need not be described in detail; an aerial of 12 turns mounted on 3-foot spreaders will serve the purpose

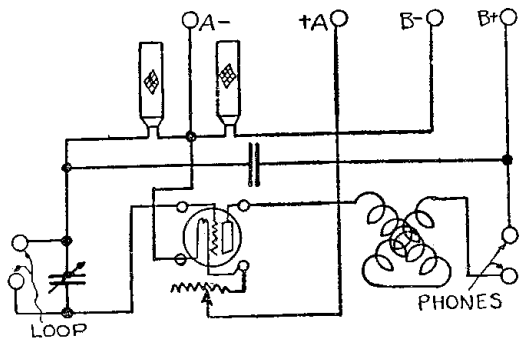


Figure 49—Diagramatic circuit for one tube super

nicely. It may be interesting to note that many are using with excellent results strips of copper ⅛ inch wide for constructing aerials. The metal strip makes a better appearance than wire.

The Assembled Receiver

In Figure 48 is given a top view of the assembled receiver, which shows the relative position of the various instruments, a very important factor in the operation of the outfit. At the left of the panel is mounted a .0005 variable condenser, preferably fitted with vernier control. At the right side of the panel is mounted a variometer which serves to tune the plate circuit to obtain regeneration. The filament rheostat is mounted in the center of the panel.

On the base, attached to the back of the panel, we have a tube socket in the center with the small fixed condenser at the rear.

The two honeycomb coils are mounted on a frame made from strip brass at the rear of the baseboard, so that they can be moved back and forth to control the coupling between them. If desired a two-coil honeycomb mount may be used for the purpose.

The instruments are wired according to the diagram shown in Figure 49, which gives the actual layout of the wiring. Binding posts are provided at the back of the board for connecting with batteries and aerial.

Any hard tube capable of standing 60 volts or more on the plate can be employed in this circuit, but a tube using six volts on the filament will give the best results. The small tubes using 1½ volts on the filament will work, but the larger plate currents possible with the larger tubes give louder signals.

Operation of the Set

As to the operation of the set—after checking the wiring and connecting the batteries, phones and aerial, light the tube filament. Slide the honeycomb coils towards each other on the brass strip; a high-pitched whistle will be heard in the receivers. Should the whistle not be heard, reverse the leads to one of the honeycomb coils; if this fails adjust the voltage of the B battery and filament brilliancy till the whistle is heard. This is the controlling or variation frequency generated by the honeycomb coils; it serves to check the regeneration of the tube and keep it from going into a howling state. The intensity of the whistle is reduced to a convenient amount by sliding the coils apart until the whistle does not annoy.

Now an attempt should be made to pick up a broadcasting station by varying the grid condenser and plate variometer. These two instruments act in the regular manner; resonance points between the two will be noted by a slight roar as in the usual regenerative receiver. After picking up a station and getting it as loud as possible by the adjustment of the plate variometer and the honeycomb coils, the instrument may again be adjusted to obtain the clearest and loudest reception. Proper adjustment of the coils can be obtained only by experiment, but when once found the adjustment can be fixed. A simple method is simply to tape the coils to the brass strip, if this method of mounting is used, or wedge the two-coil mount so that the coils will not jar out of position. The pitch of the whistle can be controlled by varying the capacity of the small fixed condenser until it is not bothersome and maximum signal strength is obtained.

When once properly adjusted this little receiver will be found very efficient, suited to one of moderate means who must get the most out of one tube. Audio frequency amplification may be added, but a filter is necessary to keep the oscillation of the tube from paralyzing the amplifier tube; this makes the set rather complicated.

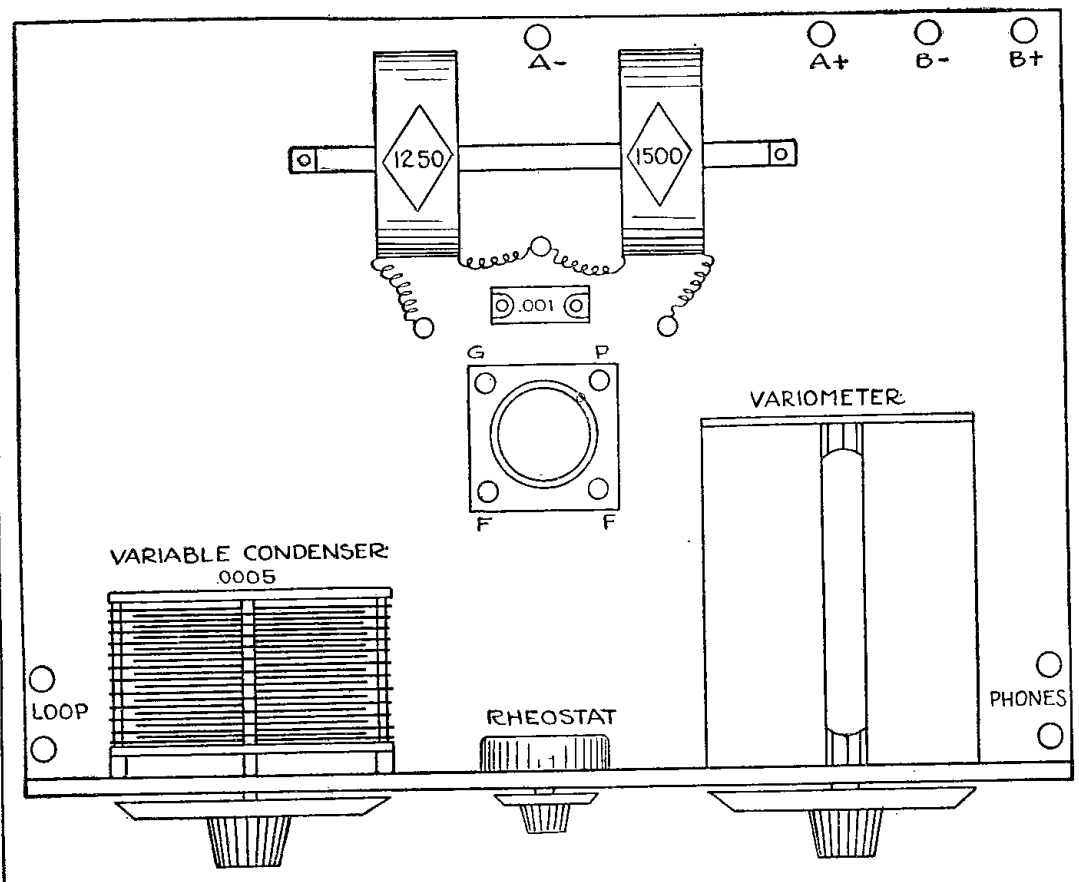


Figure 48—Layout of instruments for one tube super

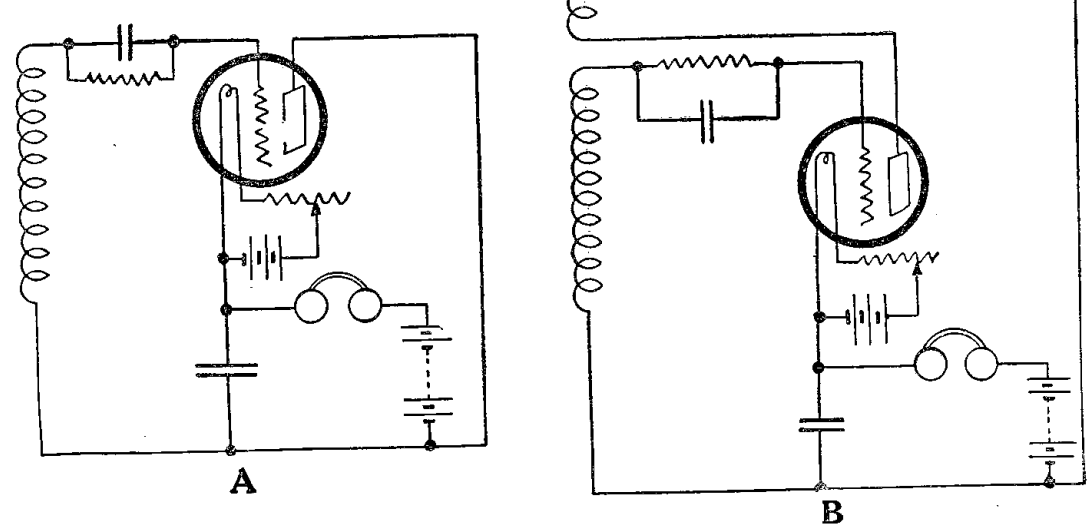


Figure 50—Analysis of Flewelling circuit to show principles of operation

The Flewelling Circuit

We come now to a consideration of the Flewelling circuit, which has received not a little attention during the last few months and has been refined down to a very simple device. Many descriptions have been published as to how to construct the sets, so we will confine ourselves to a discussion of its operation; this may assist those who have difficulty in operating the set.

The Flewelling circuit operates on the same principle as the Armstrong super in that a controlling frequency exists in the circuits for the purpose of checking over regeneration and howling. The method of obtaining this frequency is remarkable in its simplicity.

Considering the circuit without the tickler feedback as shown at A in Figure 50, we find the original De Forest ultra audion circuit using a condenser in the lead to the filament, which is also in the plate circuit. As we learned under regeneration, a condenser so situated will lead to a regenerative effect; thus the tube in such a circuit will be kept in oscillation. The frequency of these oscillations depends on the inductance and capacity in the grid circuit.

Regeneration of Set

It was also found that regeneration built up excessive negative charges on the grid, tending to block the tube, which was eliminated by connecting a grid leak across the condenser. When this leak was too small the tube would block for an instant and, when the charge finally leaked off, would operate again. This

(Continued on page 13)

Extra Coil Tunes High Wave Lengths

Oatmeal Box Provides Tube for Triple Mount

When the new wave lengths became effective I found that my three circuit set would not tune in above 485 meters; I also found that by loading the aerial circuit alone I did not raise the wave length sufficiently to catch the higher waves. I wound three coils of Number 22 dcc wire on an oatmeal box, two of the coils with 40 turns and the other with 30 turns. The center coil was connected in the aerial circuit; the other 40-turn was placed in the secondary circuit and the 30 turn coil in the plate circuit, as shown in the diagram. About ½ inch space was left between the coils.

I placed a .001 mfd variable condenser in the aerial circuit.

It aids in tuning and does not decrease the wave length. My aerial and lead in are 150 feet long. This coil does not add an extra adjustment and it may be constructed very cheaply as it requires only ¼ pound of wire. If the set is in a cabinet and the coil is mounted outside the primary coil may be connected between the ground post and the ground wire and the plate coil between one output post and the phones. Two extra binding posts must be provided for the secondary load. The addition of audio frequency amplification does not change the hook-up. With this loading coil connected I can easily tune in KSD on 546 meters.—Edwin Burnham, Ironton, Mo.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 W. Madison St., Chicago

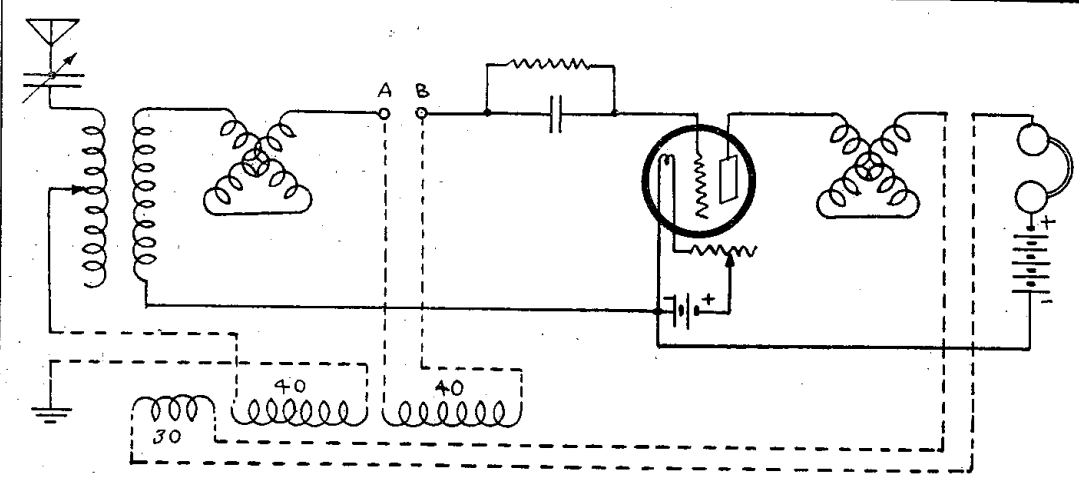
Locating the Aerial

When planning to erect an aerial be sure to estimate the distance to the nearest electric light or power wire and estimate as closely as possible whether any break in the aerial during a storm might make it possible for a wire to blow across the light or power wire and carry the high tension current into the house.

Soda Straws Make Spaghetti

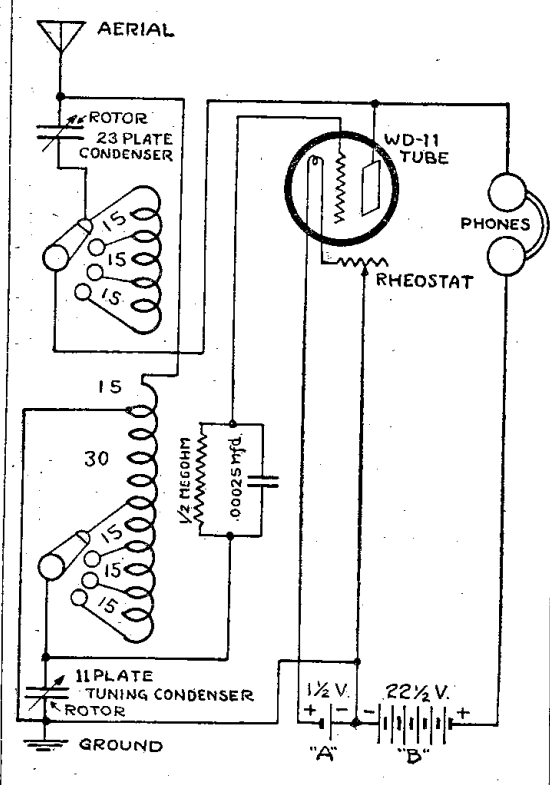
The price of spaghetti tubing is very high. I have found a very good substitute in soda-water straws. These straws are pliable; they may be easily obtained for a few cents a hundred straws. They are well waxed, which give them a very fine insulating quality.—H. Silverman, Brooklyn, N. Y.

LOAD DEVICE USED IN CIRCUIT



Improvised Reinartz Coil

Securing some data on the Reinartz tuner I constructed one of these some time ago and obtained very good results. As it was rather bothersome to make a form on which to wind the Reinartz coil I tried out a 3-inch tube and obtained results, I think, just as good as I did with the regular Reinartz coil.



The accompanying diagram is entirely self explanatory. The number of turns on the tube is just a little different from the Reinartz coil on account of the turns all being the same length with the tube.

This set using WD-11 tube picked up Schenectady, N. Y., Atlanta, Georgia, Ft. Worth, Texas and Davenport, Iowa, regularly. It may be possible some other amateur will welcome the data on winding the coil on a tube. Another point that may help some person is that a 22½-volt B battery will not always give sufficient voltage for the plate. I am using a UV 200 detector tube and have to use 27 volts on the plate to secure proper results. I am unable to pick up out of town stations at all on 22½ volts.—H. L. Shiner, Kansas City, Mo.

Renewing Knobs and Dials

Give the old knob a good polish, using a thin oil on a rag. Wipe the surface dry with a clean cloth. Go over the surface with a white-lead paint; allow it to remain for two or three minutes, then wipe the surface clean with a cloth. The white paint will remain in the depressions cut for the figures and scale. When this has set for an hour it is ready for use.—Robert L. Calbert, Jr., Nashville, Tenn.

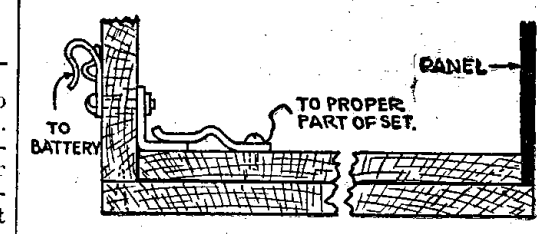
Crystal Detection

Carborundum crystals usually require a firm contact for good detecting, while galena crystals detect better the more delicate the adjustment.

Sliding Contacts for Connections on Back

In most sets there are at most four or five connections which would ordinarily be placed best at the back of the cabinet. I accomplish this in the manner indicated in the illustration. In an ordinary single-tube set, for instance, three connections to the battery are required, viz., A positive, A negative and B positive, the B negative going direct to the positive side of the A battery.

Three ordinary clips are bolted, each with a number 8 machine bolt, through the back of the cabinet, a piece of angle brass forming the inside; it is placed so that when the inside bottom of the cabinet is slid in it passes under the projection of the spring brass. Another strip of



spring brass is placed on the second bottom to make contact with these angle brass strips when the set is in place.

The set wiring is run to these second plates; therefore, when it becomes necessary to get into the set the front screws are removed and the whole inside part slides out. When it is put back the brass contacts close the three battery leads without any trouble.—L. R. Godden, Mitchell Field, N. Y.

Difficult Tube Characteristics Explained

How to Analyze, Test and Estimate Them

By H. J. Marx

THE series of articles on "Characteristics of Vacuum Tubes" in the June 2, 9 and 16 issues of Radio Digest was a forerunner of a more technical discussion and description of vacuum tube factors that are generally unknown and rarely understood or appreciated. Their importance will be appreciated when the statement is made that these factors are the best criteria of the relative efficiency and method of operation of the tubes.

The subject as handled in the few textbooks available is always accompanied by intricate and well-advanced mathematical analysis. In addition, the most important points are surrounded by lengthy details and descriptions, making it difficult for the ordinary layman to comprehend. In this series, the characteristics, such as plate resistance and impedance, amplification constants and mutual inductance, will first be described and analyzed, then the method of testing them will be detailed. The values of the highly standardized tubes on the market will be given and sufficient instructions will be furnished so that the amateur may test or calculate the characteristics of his own tubes.

Making Your Own Tests

It is rare, however, that the amateur has available the necessary instruments to make these tests. If he has not, the knowledge of the method of testing and calculation of the values and their effect in operation will help to improve the operation of his Radio set and at the same time put him in a better position to discriminate in the selection of his vacuum tubes.

The characteristics are to be described separately. This will be followed by an analysis of the methods used in calculating and testing them.

Plate Resistance and Impedance

In all electrical circuits there is an action or condition that tends to resist the passage of current. Put in other words, it limits the amount of current that can pass through. It would correspond with the size of a water pipe. Naturally, the greater the pressure the greater the volume of water that passes through; likewise, the greater the voltage the greater the current which passes through. This factor is known as resistance.

Considering the vacuum tube—there is a plate circuit inside the tube. It consists of the movement of electrons from the filament to the plate. There is a direct current resistance to this flow, known as the dc or plate resistance. When dealing with an alternating current, the direct current resistance no longer holds true; so another value is introduced, known as alternating current resistance or plate impedance. This impedance varies with the changes in frequency. For amateur purposes an approximation is possible; this is satisfactory for frequencies up to the order of several hundred thousand cycles per second. The value of this knowledge of impedance is in the fact that best operation for amplification is obtained when the transformer impedance is balanced against the plate resistance. This explains why some tubes will not operate satisfactorily with most transformers. It is only a question of time before all apparatus will be accompanied by accurate statements of characteristic values in order that circuits may be more carefully balanced for maximum results.

Amplification Constant

The amplification constant (represented by the Greek letter Mu, μ) is one of the most important constants of the audion or three-electrode vacuum tube. This constant represents the maximum voltage amplification obtainable from the tube and is also instrumental in determining the current and power amplification. It is a function of the construction of the tube, depending on the mesh of the grid, diameter of the grid wire and the distance between grid and plate. Its value varies slightly with changes in the plate voltage, increasing as the plate voltage is raised. Therefore, when operating as a detector, the amplification constant of a tube is not as high as when used as an amplifier. If the amplification constant is 5, it must not be assumed that the volume will be 5 times as great; there are a number of factors which must be considered; but it furnishes an index of the possibilities of the tube.

Mutual Conductance

Inasmuch as every circuit has a resistance, it is easily understood that the resistance and the voltage pressure determine the amount of current that the circuit will conduct or permit to flow. Therefore the conductance of a circuit may be considered as an expression of its efficiency. This is the derivation of another tube characteristic known as mutual conductance, and it is a function of the amplification constant and plate resistance.

This is a very important characteristic and furnishes the degree of merit of the tube when functioning as amplifier, detector or oscillator. It is always desirable to have the mutual conductance as large as possible.

The mutual conductance is a measurement of the effect of the grid potential on the plate current.

(TO BE CONTINUED.)

FIRST STEPS IN RADIO

(Continued from page 11)

action gave rise to clicks in the telephone receiver. And therein lies the secret of the variation frequency of the Flewelling circuit. By properly adjusting the grid leak the tube blocks and frees itself at a high rate, giving rise to the well-known "super" whistle. It is this blocking or checking effect that permits high regeneration in the Flewelling circuit without the howling and screaming of the tube.

The connection from the positive of the B battery to the grid circuit is required to bias the grid; that is to obtain the proper grid potential for best operation. This positive potential acts so as to drain the negative charges from the grid and prevents the tube blocking at too high a frequency.

Having a variation frequency in the circuit, we have but to add a tickler feedback to obtain signal regeneration as in the regular Flewelling circuit shown at B, Figure 50. The operation of the set depends then on obtaining a proper variation frequency by a careful adjustment of the grid leak.

Varying Condition of Grid Leaks

As a rule the grid leaks on the market have the bad habit of changing their resistance with changes in humidity and temperature; we have a set that works beautifully except when visitors drop in. A method to overcome this defect to a great extent is to make use of a homemade leak consisting of lead pencil lines or celluloid or thin formica; when the proper adjustment is found, paint the leak with collodion to keep out moisture. Final adjustment of the set can be made by tapping the B battery for the lead to the grid. A set that functions very poorly can often be tuned perfectly by adjusting the positive biasing potential obtained from the B battery.

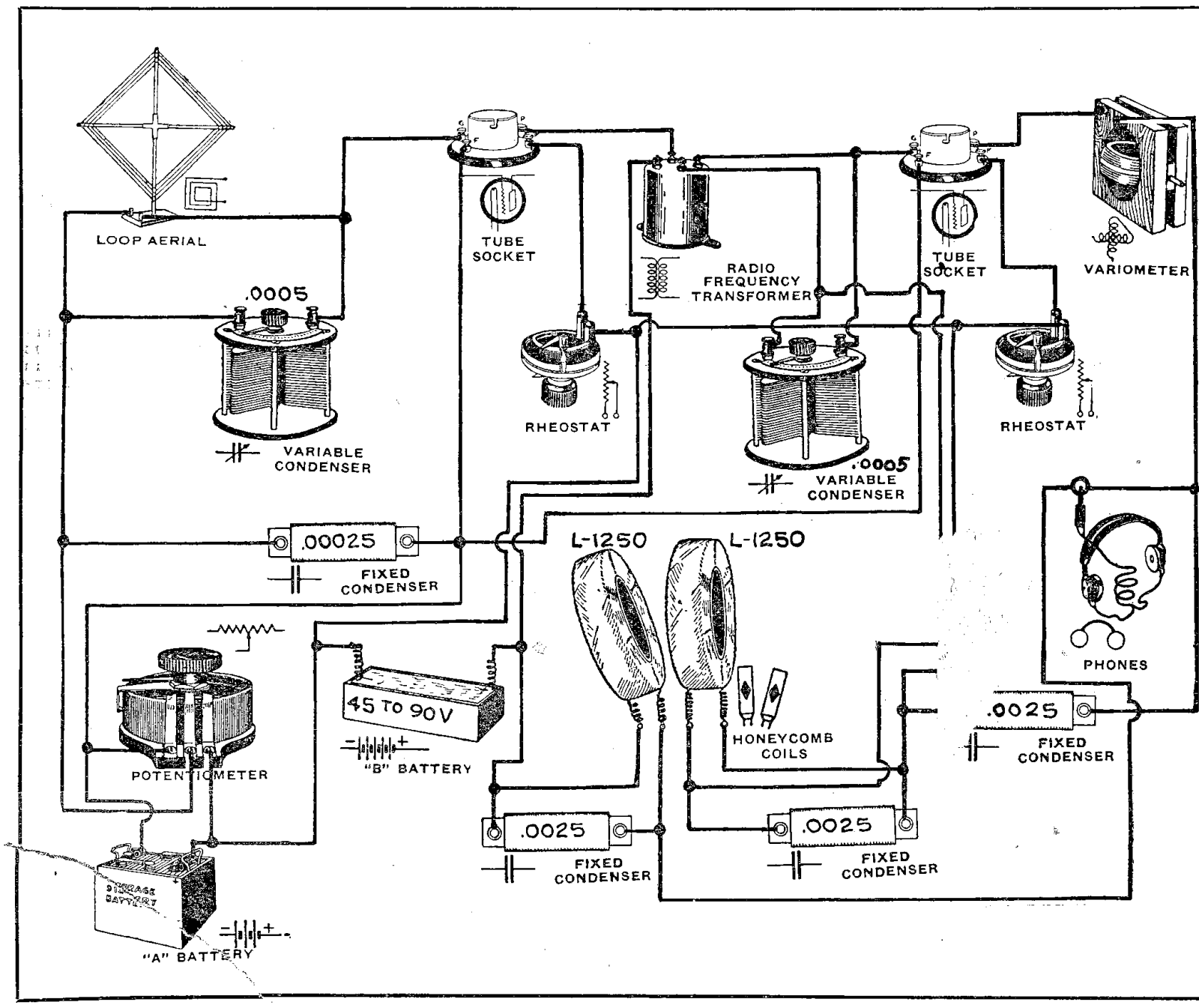
Thus we see that all a regenerative set needs to make it "soup" is a variation frequency that will check the regeneration before it gets too strong. Two methods are now in use, the Armstrong using a tuned frequency and the Flewelling using the blocking effect in the tube. There surely ought to be another method that is better and simpler; the announcement of that method will be the one great event of the coming year in Radio.

(TO BE CONTINUED.)

Erecting Antennae

It is often advisable to erect two antennae when both local and long distance reception is desired. One of these antennae designed for obtaining a high degree of selectivity, in differentiating between local signals, may be a single wire outdoor antenna approximately 30 feet in length and about 20 feet in height, or an indoor antenna using about the same length of lamp cord placed behind picture molding. For long distance reception a longer antenna is necessary; for this purpose a single wire about 150 feet in length stretched as high as possible will give satisfactory results. The use of two antennae provides a flexible arrangement for avoiding interference between local stations operating on nearly the same wave length, particularly when a regenerative receiver is used with the small antenna and, in addition, provides a larger antenna for use in long distance reception after the local stations have ceased operation.

ONE STAGE OF RADIO FREQUENCY WITH SUPER



THERE is a constantly growing tendency on the part of fans to ask for Radio frequency stages added to the various popular circuits. Sometimes it works—more often it doesn't. Often it can work, but the fan isn't successful and becomes discouraged. Radio frequency is tricky; when you add it to a trick circuit the results are trickiness to the "n"th degree.

Here's one that's been tried; it works fine. The original is simply a single tube super; one stage of Radio frequency has been added.

It is advisable to use two amplifier tubes and a plate battery voltage of at least 67½. Two .0005 microfarad variable condensers used with a loop aerial control the wave length adjustment. A 400-ohm potentiometer takes care of the grid potential of the Radio frequency amplifier tube.

A good variometer takes care of the plate circuit control. Two 1,250-turn honeycomb coils inductively coupled by means of a two-coil mounting control the super action. Condensers are shunted across both of these coils.

The circuit is not very difficult to tune and is adaptable in relation to portability.

The Reader's View

Dr. Pickard's Theory Wrong?

I am writing you in regard to an article in your paper some time ago giving Dr. Greenleaf W. Pickard's view about the radiation from regenerative receiving sets. I know nothing of Radio from a scientific viewpoint; but will say from experience in tuning I very much disagree with the professor. I would like to ask a question or two to prove my assertion.

If re-radiation is impossible, why can I at any time cause my neighbor about 100 feet away, who has a crystal set, to receive stations one after another in same rotation as I receive them? Have tried it several times with good results. Also, another boy about 400 feet away has reported same on a prearranged test. Neither have heard distant stations when I was not tuning. Also have tried it when signals were coming strong. They only hear when I cause my detector tube to squeal from too much current on the filament. My theory is that the signals are not strengthened, but are re-radiated or received by my set and re-broadcast by the same set. I have even heard others, when listening in, turn up rheostats, also hear other tubes squeal when there were none closer than six or seven blocks. I only wish that I could explain this in a scientific way, but cannot, so you may publish this theory in your words or mine. —B. W. Banyar, Independence, Mo.

Reinartz Set Good

I have built the Reinartz tuner as described in a previous issue of Radio Digest. I find it a very efficient set. Without amplification and before I purchased a phone condenser, I picked up KHJ, KVQ, CJCA, and others very clearly. My aerial is 75 feet long, 35 feet high, and has three strands of No. 14 copper wire. On the night I picked up CFCN so clearly and loudly that I could hear plainly with the phones at least a foot from my ears.—Leonard D. Johnson, Colville, Wn.

Reviews of Books

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.

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, 75 cents.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

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.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. 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 payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

Radio Illustrated

Colleta Ryan, musical comedy star and prima donna, keeps herself in trim by doing her "daily dozen" to music broadcast by stations in Chicago, where she is now playing at the Apollo Theater. She always has her portable set present when she's on the beach. The unit shown picks up local broadcasters sufficiently loud to operate the loud speaker
© Radio Digest

Alyce Mills of the "movies" is another beach Radiophan who won't desert her set to swim. Except for seeing herself at picture shows, Radio gives her most fun of all
See photo below
© U. & U.

Kewpie doll, razor case, cartridge fuse and cocoanut shell sets, prize winners in "freak" contest. The red cheeked kewpie is tuned by twisting her switch contact "arms" and wears a crystal detector-lavaliere about her neck

Questions and Answers

Gravity Batteries

(4076) GSF, Brookfield, Ill.

A 1:55 on the morning of June 1, I sat at my Radio to see if I could pick up some distant station. The following conversation was the result but due to heavy static I could not receive it in full, at least I don't think I did: "9XN calling WM" repeated twice—"Your signals coming through, but due to heavy static cannot read you. Signed 9XN repeated twice. "We will repeat this experiment tomorrow night; stand by for us." Repeated twice.

From here on static was so heavy on my set I could not catch any more.

This is what I would like to know, if it is possible for you to tell me—what did I get mixed into and what two stations were working? I do not find either one in the list of stations that I have or in any of the Digests on hand.

While I am writing I wonder if it would be permissible for me to ask for some information about batteries. I am using a Reinartz circuit with a WD-12 Tube and have had wonderful results but the battery consumption is very heavy; I use dry cells of 1½ volts, 30 amperes on the B side and 90 volts for the A batteries or on the plates. Can you tell me if I can use Gravity batteries made as follows: blue vitriol, copper, zinc and water? The cells I had in mind are the ones commonly used in Morse Telegraphy or were used some years ago. Can you also tell me the voltage, ampereage and flow of the current produced, whether D. C. or A. C?

Any enlightenment you can offer on either subject will, I assure you, be greatly appreciated.

A.—Answering your inquiry we are of the opinion that the conversation quoted as having been received by Radio was from the University of Wisconsin, 9XM, as station 9XN is in Chicago. It has not been in operation recently. We are unable to inform you as to the other station because the call given is not correct; it was perhaps misunderstood by you.

In the matter of gravity batteries,—three or four connected in parallel may be used for the filament of the peanut tube. All batteries deliver direct current. The cells will test one volt each with a very low current due to high internal resistance which necessitates several cells connected in parallel for use with the tube.

Popping and Fading

(3589) FR, Eldorado, Kan.

I have a two-stage receiving set. The hook-up is of my own plan— 1 grid variometer, 1 varicoupler, 1 plate variometer, 1 fixed condenser, 1 phone condenser, Rheostats, jack and transformer. I have a 100-foot antenna, insulated lead-in wire from the antenna. The ground is a ¾-inch pipe driven 3 feet in the ground and a wire is soldered to it.

I would like for you to advise me as to why the signals come inland by and clearly from almost any station in the United States and disappear at intervals of one to two minutes. You can always hear a pop or crack which disappears. My antenna is 40 feet high.

A.—Noting your specifications and limitations experienced in reception, we believe there is a discrepancy as to a grid condenser and leak which units are not mentioned. Were it not for the action of popping in the phones we would be certain that the fading signals are occasioned by the phenomenon of "fading," which is caused by wave length variation (from little understood cause) at the transitting station. You will simply have to await the return of fading signals, knowing that "fading," as suggested, is the cause for which there is no remedy at this stage of development.

Grid Leak and Condenser

(3656) JH, Liberty, N. Y.

Can you inform me as to the right values of the grid leak and grid condenser when used with a WD-11 tube? Where can I get a 20-volt B battery?

A.—Answering your inquiry, we are advising that the grid condenser should be of .00025 mfd. value, and the grid leak of two megohms in a circuit using a WD-11 tube.

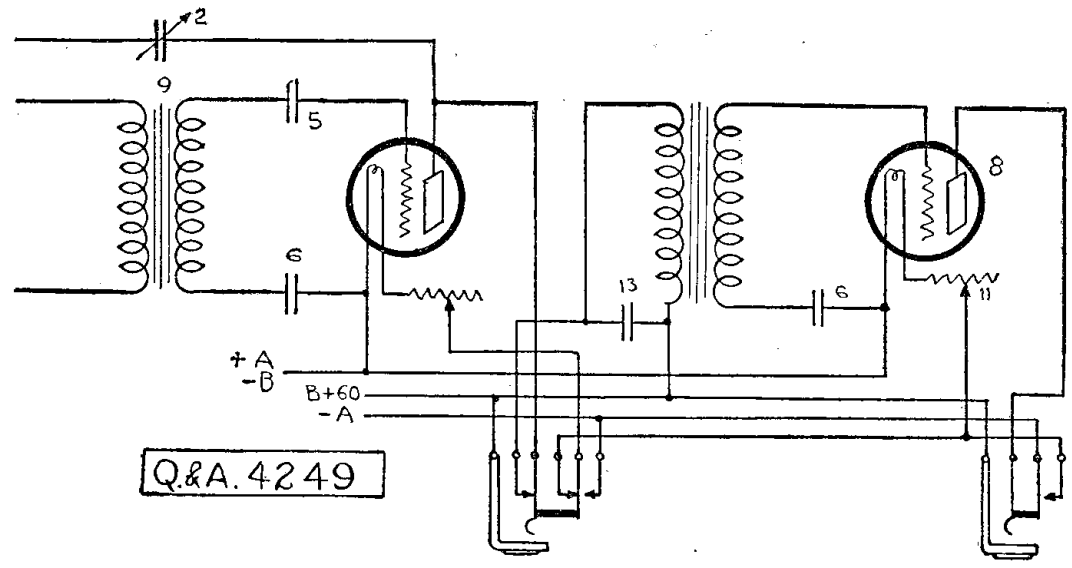
B batteries are not made in 20-volt units. A 22½-volt battery may be bought from any dealer.

Filament Control Jacks

(4249) CEC, Roseville, Ill.

Please show diagram for method of wiring two filament control jacks with the Ultra Reinartz Circuit.

A.—Complying with your request we herewith give diagram showing method of using filament control jacks with Reinartz circuit.



Rules for Radiophone

(3265) BB, Brooklyn, N. Y.

Why must a vacuum tube be evacuated?

Using a single circuit, with two stages audio frequency, what is considered a good distance (DX) to receive?

What are some good rules for a Radiophone owner to observe?

A.—We are pleased to answer your inquiries by advising that perhaps the thing of first importance to a "Radiophan" as to rules to be observed is conformity with all regulations legal and ethical, governing the art. From a personal standpoint, he should exercise care in the selection of electrically perfect apparatus, looking to the maximum satisfaction to be derived. Having proceeded to this point the next in order is a careful understanding of the characteristics of the set he is using, protection of tubes and batteries by means of a knowledge of their operation both theoretically and practically and, above all, intelligent purpose to discover his limitations through an application of the knowledge gained.

In the matter of the vacuum tube, you are advised that if it were not evacuated when the filament was lighted, the oxygen within would unite with the metal in the filament, oxidizing it and burning out the tube.

The range of circuit specified should be approximately fifteen hundred miles.

Rectifier

(3694) JDeC, Niagara Falls, N. Y.

In your Radio Digest, April 21 issue, Question and Answer 2956, you publish a diagram for a transformer, but you do not tell how much laminated iron is necessary or what size to use. Will you please let me know the size and dimensions in relation to building the rectifier for charging batteries?

A.—Answering your inquiry in the matter of a transformer, we inform you that ten pounds of silicon steel .018 thick are required. This is cut into 170 pieces 5¾ inches long and 170 pieces 2¾ inches long, in each instance 1¼ inches wide. These are stacked in according to the standard core assembly method, 85 pieces being used, making the core 1¼ by 1¼ and inside dimensions 1¾ by 4½ inches.

We are directing your attention to the fact that the polarity of the battery, as shown in the diagram in question, is incorrect and should be reversed. Negative A should be connected with the plate of tube.

Grid Potential

(3856) DBL, Baltimore, Md.

Referring to the Flewelling hook-up, please explain why the grid return with B- is from the A-terminal in the detector unit, whereas in the amplifier unit the grid return with the B- is from the A-negative terminal.

A.—Answering your inquiry with reference to the battery connections in the Flewelling circuit, we advise that negative B is connected with positive A in the detector unit to give the added six volts of the A batery to the B battery potential. In the amplifier the opposite method is used to obtain a negative charge on the grid which is essential for amplification.

Frying Noises

(3654) JO, Pennock, Minn.

Could you give me some information in regard to the cause of the frying noise in the receiver? When I turn the volume strong it comes in unsatisfactory.

In the daytime it works quietly and well most of the time, but in the evening it is bad. The signals come in strong and well, but this noise spoils it all. I have used regenerative, one and two steps of Radio amplification and, lately, the reflex, one and two tubes and a detector. Their work is fine. But they all have that noise in the evening. I have tried different A and B batteries; I know the connections are tight.

If it were not for that noise the reflex is the real thing. The noise came in on the Radio amplification also.

A.—We have noted carefully your difficulties as to reception, and are of the opinion that the source is extraneous to your set. Disconnect the antenna. Cessation of the noise proves that it is from some cause outside of the set, such as an electrical appliance in operation, telephone ringer, violet-ray machine or arc light in your vicinity. If this does not eliminate the disturbance, barring the possibility of static, you may look for some discrepancy in the set itself. We hardly believe that the condition cited is due to atmospheric conditions, particularly in your location, although these may exist.

Ultra-Audion

(4139) DKP, Ceres, Calif.

Kindly advise me through your Question and Answer column whether the ultra-audion hook-up described in the May 5 issue is regenerative or non-regenerative?

A.—The ultra-audion circuit appearing in the May 5 issue of the Radio Digest employs the feedback principle which makes it regenerative.

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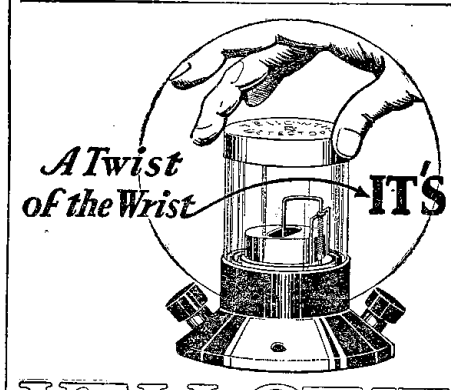

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