How to Make a Flewelling "Super" Set—Page 13

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

TRADE-MARK

Vol. III | Copyright, 1922, R. D. P. Co. Inc. | CHICAGO, ILL., SATURDAY, DECEMBER 2, 1922 | No. 8

RADIO TO SAVE MINERS

BUG BITES GOLFERS —NEW CLUB STARTS

BROADCASTS TO AID GAME ON NEW LINKS

Fairway and Airphone Enthusiasts Join in Novel Canadian Organization —Greens in Wilderness

By Albert H. Munday

TORONTO, CAN.—A new Golf-Radio Club, the first of its kind in the world, is shortly to be opened in Ontario, if the present plans of a number of leading sporting men materialize. The idea has been prompted by the action of the Province of Quebec Society for the Protection of Birds in approaching directors of the leading golf clubs in Quebec to have bird sanctuaries located on the golf courses.

But while the new Golf-Radio Club, to be located approximately fifty miles north of Toronto, will adopt the new idea of a bird sanctuary, it will also be thoroughly equipped with all the latest Radio equipment in order to give the members the latest information and market quotations and to supply the entertainment part of the establishment. The club will not be equipped with a single wire telephone instrument chiefly because its position, which is five miles beyond, and surrounded by a swamp district, would involve too much expense. It has been said that if it

(Continued on page 4)

REGULATES REPAIR PERIODS FOR ARMY

Official Order Follows Fans' Complaints of Interruptions During Programs

SAN ANTONIO, TEX.—Complaints from Radiophans to the effect that a generator was interrupting reception of music from distant broadcasting stations after local broadcasters cease operating in the evenings caused the issuance of a special order by Major Roy S. Coles, Chief Signal Officer of the 8th Corps Area at Fort Sam Houston. The order is that no person shall repair, test or operate any army Radio sending apparatus after 4 p. m. daily, except to send official messages. A "spark" sending set at AG5, Brigade Headquarters, Camp Travis, was dismantled, in line with the movement to "clear the air" for broadcasting stations. Civilians with transmitters are being watched so that untimely noises may be traced and the perpetrators of the nuisance punished.

AUGUST EXPORTS GO MOSTLY TO CANADA

WASHINGTON.—The Department of Commerce has just made public its import and export figures for August. These figures show that there were 102,763 pounds of Radio and wireless apparatus exported during August valued at $188,670. Most Radio exports went to the Provinces of Quebec and Ontario, Canada. England was next best customer.

This lady was a member of the cast of "Il Trovatore," presented by the Chicago Civic Opera Company and broadcasted by Station KYW on November 22. She is Hazel Eden, an American trained entirely in America, who seven years ago made her debut on the Windy City opera stage. Radiophans will hear her in future operas to be broadcasted by KYW. She is shown here as she appears in the opera "Parsifal" Moffet photo

COAL STRATA FAILS TO HALT TEST SIGNALS

Entombed Victims of Fire Damp Blasts See Hope in New Aid

Waves Penetrate 50 Feet

Bureau of Standards Experiments Indicate Greater Success with Longer Wave Lengths

By L. M. Lamm

WASHINGTON.—Tests conducted at the experimental coal mine of the Bureau of Mines at Bruceton, Pa., hold out the hope that Radio waves may be used in the future as a means of effective communication between rescuers on the surface and miners entombed in mines, following fires and explosions. These preliminary experiments of the Bureau of Mines, made in cooperation with the Westinghouse Electric and Manufacturing Company, while failing to develop any practical method of using Radio waves for underground communication, nevertheless indicate clearly that electromagnetic waves may be made to travel through solid strata of earth.

In the Bruceton experiment, signals were heard distinctly through fifty feet of coal strata, although the audibility fell off rapidly as this distance was increased. The absorption or loss of intensity with distance was very great for the short wave lengths used in these tests. Longer wave lengths may possibly be found more effective.

Wire Phone Often Crippled

The mine telephone has been perfected to such an extent that it is giving great satisfaction in mines where the wiring is well insulated. Very often the telephone cannot be depended upon on account of falls of rock, and grounding due to worn insulation or extreme dampness. In the event of a disaster, it frequently happens that the mine telephone system is put out of commission by the cause of the disaster,

(Continued on page 2)

SILENCE SUPREME IN TEXAS CITY FRIDAYS

SAN ANTONIO, TEX.—Friday night is now "silent night" in San Antonio. The designation of a resting period for broadcasting stations in the vicinity resulted from a meeting of operators held recently. The first silent night, fans reported hearing from Fort Worth, Denver, Kansas City, St. Louis, Memphis, Louisville, Atlanta, East Pittsburgh and many other points.

KYW PLEASES WITH TWO MORE OPERAS

COPYRIGHTS KEEP "LA BOHEME" OFF AIR

Announce Program for Third Week—Sixty Per Cent of Fans Want Opera

CHICAGO.—Due to a copyright interference on Puccini's "La Boheme," this opera was not broadcasted on Wednesday, November 15, as originally planned. The second week of the Chicago Civic Opera Association season found two operas broadcasted by Station KYW. These were "The Snow Maiden," night of November 21, and "Il Trovatore," night of November 22. At the time this story is going to press, KYW officials had not announced what nights of the week beginning November 27 would be devoted to opera.

However, the opera management had set their program of the week. This was:

Monday night, November 27, "Madama Butterfly"; Tuesday night, "Aida"; Wednesday night, "The Snow Maiden"; Thursday night, "Parsifal"; Saturday Matinee, "The Jewels of the Madonna"; Saturday night, "Carmen"; Sunday Matinee, "The Valkyrie."

Sixty Per Cent Want Opera

Wondering whether or not the Radiophans of Chicago really liked the opera broadcasts, one of the large local newspapers recently conducted a straw ballot. The results of the ballot were that sixty per cent of the fans expressed their desire for opera two nights a week, while five per cent wanted more than two nights. The figures are acclaimed as evidence bearing out previous statements appearing in RADIO DIGEST that the Radiophan desires the best kind of broadcast program obtainable.

Since the initial opera broadcast "Aida," thousands of letters have been pouring into the Westinghouse Electric and Manufacturing Company's Chicago office. "Every letter pays tribute to the successful performance of Radio broadcasting as a means of disseminating the works of the master composers," says Manager Weatherbee, of Station KYW.

RADIO TO SAVE MINERS

(Continued from page 1)

at the very time when it is most urgently needed.

On this account, the mining industry is interested in any kind of telephone system that can be depended on in an emergency. Many requests have been received by the Bureau of Mines to devise means of utilizing Radio methods for this purpose.

First Experiments in Reception

The preliminary experiments consisted first in receiving signals from without the mine by means of a receiver located inside the mine, and second, both sending and receiving messages underground through the strata. It was found that with a receiving instrument set at a point 100 feet underground, signals from Station KDKA, East Pittsburgh, Pa., could be heard distinctly. Station KDKA is located about 18 miles from the experimental mine.

About 50 feet from the receiving station used in this test, was a 6-inch bore-hole from the surface, lined with iron pipe and containing electric light wires which extended therefrom throughout the mine. The presence of these wires evidently assisted greatly in the reception, for, when the receiving set was carried to another point in the mine removed from wires and tracks, the signals were barely audible through 50 feet of cover. The fact that signals were detected, however, even though faintly, is considered sufficient evidence of transmission through the ground to encourage further experimenting.

Details of the experiments are given in Serial 2407, "Experiments in Underground Signaling with Radio Sets," copies of which may be obtained from the Bureau of Mines, Washington, or the Washington office of the Service.

Tells of Fake Stocks

WASHINGTON.—Methods used to eliminate bucket shops and fake stock promotion schemes in New York City were explained to the Lions Club recently by Jerome Simmons, former assistant attorney of New York. "Hundreds of millions of dollars are invested in these schemes in New York every year. First we had the fake oil promotions, but that has been cast aside for Radio," he said.

Police Receive Crime News

DEFIANCE, O.—The police department here now is receiving information concerning crime by Radio. The first use was when they received data on an auto stolen in Chicago.

A writer states, that literature will perhaps be more radically influenced by the trend of Radio in the next few years than any other walk of life.

EIGHT BIG STATIONS TRY RELAYING OPERA

Metropolitan Opera May Have Chicago Opera in Ether as Competition

If the Metropolitan Opera Company persists in its present attitude toward broadcasting its productions by Radio, it is evident that some other means for furnishing the Radiophans of the East with opera must be attempted. Although still working seriously and with many influential forces in co-operation, RADIO DIGEST has as yet been unable to make a break in the "sound-proof" wall surrounding the great New York company.

Relay opera broadcasting, as proposed last week by this publication to the largest and best geographically located Radiophone plants in the United States, has not been successful so far. The difficulty is mainly in the good reception of KYW on a loop aerial. Not only must the reception be loud, but all possible receiver distortions must be done away with before re-broadcasting. Otherwise, many foreign sounds are introduced in the final broadcast. Modulation is also a little different problem.

Should the eight large stations now working with RADIO DIGEST in this attempt be successful, the achievement will be one of science as well as of good broadcast programs.

Petitions Pour In

Day by day the petitions continue to arrive at the office of this publication. The letters accompanying the petitions for Metropolitan Opera are always interesting in that they indicate that many more members of the general public are interested in high class music than ordinarily is acknowledged by the musical profession itself.

Excerpts from only a few of the petitions follow:

"Enclosed you will find a list of names of those who wish to have Metropolitan Opera broadcasted. It would be a wonderful pastime for us firemen who are unable to get out and hear a good opera."—H. Rodgers, Central Fire Station, Endicott, N. Y.

Hears WEAF Opera

"We all heard the grand opera broadcasted by WEAF Saturday night, Nov. 11th, and it came in great. I sincerely hope that the Metropolitan Opera Company will decide to broadcast grand opera, as many of us never get a chance to get down to New York to hear it, but could get it over the Radio."—C. V. O'Meara, Naugatuck, Conn.

"We greatly appreciate your efforts to have opera broadcast; and hope you will meet with success. That would be something worth listening to."—Mrs. F. Mason, Winthrop, Mass.

"I do not believe broadcasting would have anything but a beneficial effect, for rather than keeping the listeners away from their doors, it will attract those who otherwise would not be their patrons. It most certainly will tend to educate the people into a desire for a better class of music."—L. J. Markham, Durand, Michigan.

KDYL Educates Westerners

This from the concert manager of the Salt Lake Telegram station, KDYL, shows what grand opera means to the millions of people who have never had the privilege of hearing it.

"You will find my petition for Metropolitan Opera. I am too far away to be able to get this on the air, but I am for it, first, last and all the time. I happen to know that it is a success, from my experience of producing the first grand opera—'La Boheme'—ever to be produced and sung exclusively for the Radiophone. It was on the occasion of the opening of our new station some time ago and, if one was to judge by the hundreds of letters received on it, IT WAS A GO. Even the average layman fell for it, so to speak. They are just getting educated to it (meaning grand opera) out here, and they demand more all the time. You can bet that when a grand opera company visits here this season, they will play to their house that will contain a goodly amount of people who have become interested through the radio. I could write a lot more on this subject, but you know, as well as I do, what it means, both to the company, itself, who is granted the privilege of presenting it on the 'Air' and the public who hears it."—Cedric E. Hart, Salt Lake City, Utah.

CONTENTS

Radio Digest Illustrated, Volume 3, Number 8, published Chicago, Illinois, December 2, 1922. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign, Six Dollars; single copies, Ten Cents. Entered as second-class matter April 27, 1922, at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

Looking Ahead

Radio Frequency "Uniset" Panel Unit construction will be described in the December 9 issue by Thomas W. Benson. Read his article on the audio frequency panel unit this week.

How the First Baptist Church of Columbus, Ohio, Was Given a Broadcasting Station. Broadcasting of Church Services is a popular feature of most every broadcasting station. Read how and why a man belonging to no church donated the equipment in the next issue of Radio Digest.

Even Mayors Use Radiophony Nowadays. How J. Hampton Moore, Mayor of Philadelphia, addressed the crowds from Lulu Temple of that city. See the December 9 issue.

Radio Station KHJ of Los Angeles, California, Has Been Reaching Out 3,000 Miles. The first pictures of the new plant of the Los Angeles Times, the first 500-watt transmitter on the Pacific Coast, will appear in the next issue of Radio Digest.

Receiving Records Contestants and Aspirants will want to see the next issue. All records to date are being carefully checked and will be given then.

Another Practical Article for Fans by H. J. Marx will be found on page 13 of the December 9 issue. Turn to page 13 of the paper you are holding and read what he tells about the Flewelling "one lung" super-regenerative circuit.

The Only Authorative Broadcasting Station Directory. Part two appears next week. Four hundred letters went out last week for information regarding stations. Kept up-to-date all the time.

EIGHTEEN LICENSES ISSUED TO PLANTS

TWO WEEKS' TOTAL HAS TWO "B" STATIONS

Los Angeles Times, KHJ, and Gimbel Brothers, WIP, Get 400-Meter Wave Length

CHICAGO.—During the two weeks ending November 25, eighteen new stations were licensed for public service broadcasting. WIP, Gimbel Bros., Philadelphia, Pa., and KHJ, the Times Mirror Co., Los Angeles, Calif., were given the Class B rating, entitling them to use the 400-meter wave length. The new 360-meter stations licensed are:

KFED, Billings Polytechnic Inst., Polytechnic, Mont.; WNAQ, Charleston Radio Elec. Co., Charleston, S. C.; KFCK, Colorado Springs Radio Co., Colorado Springs, Colo.; WNAX, Dakota Radio Apparatus Co., Yankton, S. D.; WOAJ, Ervin's Electrical Co., Parsons, Kans.; WNAW, Henry Kunzmann, Fortress Monroe, Va.; WBAQ, Lyradion Mfg. Co., Mishawaka, Ind.; WNAV, People's Tel. & Tel. Co., Knoxville, Tenn.; WRAY, Radio Sales Corp., Scranton, Pa.; WPAL, Superior Radio & Tel. Equipt. Co., Columbus, O.; WOAF, Tyler Commercial College, Tyler, Texas; KFAV, Abbot-Kinney Co., Venice, Calif.; WPAM, Awerbach & Guettel, Topeka, Kans.; WHAL, Lansing Capitol News, Lansing Mich.; WLAT, Radio and Specialty Co., Burlington, Ia.; KFFA, Shelton, Dr. R. C., San Diego, Calif.; WNAY, Shipowners Radio Service, Baltimore, Md.; WPAD, Wieboldt & Co., Chicago, Ill.

GUIDED WAVES TRAVEL BETWEEN POWER PLANTS

High Voltage Lines Used to "Carry" Ether Signals

TORONTO, CAN.—After many months of experimental and research, the Ontario Hydro-electric power commission has inaugurated a system of communication by Radio between several of its big stations.

Strictly speaking, the commission uses the "guided wave" system, instead of pure Radio. That is to say, the Radio waves are not shot into space from an aerial that radiates in all directions, but are guided by a short antenna to power transmission lines, along which they are guided to Radio receiving sets in stations connected with these power lines.

Use Small Power

Both the sending and the receiving apparatus in the guided wave system are identical with the apparatus employed in ordinary Radio. But only about one-twentieth the power is required to send a message a given distance by guided wave, because of the fact that the energy is pretty well concentrated after it leaves the aerial.

The Hydro commission's aerial, is a single wire running out from the building to one of the nearby steel towers. The aerial does not connect with the transmission wires. As a matter of fact, it is several feet from these carriers of high voltages. The Radio waves jump from this aerial and are guided swiftly along the ample surfaces of the power wires.

What is probably the largest high-voltage, lead storage battery in the world is located in the United States bureau of standards' Radio laboratory. This battery weighs one ton, will supply a potential of 1,760 volts, and has an eight-hour discharge rate of about 5 amperes. It contains 880 cells.

AMATEURS AVERT TRAIN SMASH-UPS

WIRES DOWN IN BLIZZARD —COACHES LOCATED

Denver Bugs Pick Up SOS—Turn Efforts to Aid in Rail Crisis

DENVER, COLO.—Positions of lost passenger trains on the blizzard-swept plains between Denver and Casper, Wyo., were made known and possible danger of train wrecks was eliminated by the heroic efforts of Radio amateurs in the two cities, who established Radio communication between Denver and Casper after railroad telegraph wires had gone down in the big Wyoming snowstorm one night recently.

When the telegraph wires snapped, an appeal was made by Casper railroad officials to Norman R. Hood, manager of the Rocky Mountain division of the American Radio Relay league, who operates Radio station 7ZO in the Wyoming oil city.

"S. O. S." Is Received by Denver Amateurs

Hood immediately began flashing his "S. O. S." to Denver amateurs, and it was not long before William L. Fick, Denver Radio amateur, who operates station 9DTM, caught the call for aid. Fick, who had to keep an engagement, informed Donald and Lewis Hathaway of 1575 Pennsylvania street, who operate Radio station 9AMB.

By the help of Radio 9DTM, William L. Kick; and Radio 9AMB, Donald Hathaway, communication between the two cities was established. The positions of the lost trains were made known to the Casper dispatcher and the storm conditions on the Casper end of the division were made known to the Denver dispatcher.

Danger of Collisions Eliminated by Radio

In this way danger of collisions was eliminated and much was gained in the name of safety to the passengers.

In the same event, J. F. Carpenter operator of 9ZAF in Denver, the station of the Reynold's Radio company, sent to Casper nearly 500 words of press material for use by a local paper.

In a letter to the Hathaways, Mr. Hood wrote:

"Permit me to extend to you the thanks of the entire C. B. & Q. system officials in Casper for the excellent work done last night. 9DTM gets the honor of being the first station to answer my 'SOS' calls and get the first message thru."

MARCONI WIRELESS OF PROVINCES TO EXPAND

Improvement Plan Embraces Expenditure Around $2,000,000

VANCOUVER, CAN. — The Marconi Wireless Telegraph Co., Ltd., of Canada, in conjunction with its British "parent," is planning further expansion. An initial step in this growth is expected to be one of the largest and most powerful Radio stations in the world. The plant is to be built for direct communication with Australia and the Far East. The cost is placed at upwards of $2,000,000. It is known that the British Empire has been anxious for some time to link up its dominions by a world-embracing chain of Radio stations. In this chain the Vancouver plant will be a leading unit.

For the past year Marconi Wireless of Canada claimed $12,253 profits, contrasted with $69,905 in the preceding annual period. However, after "writing off" various items, including $40,000 bad debts, depreciation, special expenses, etc., totaling $165,615, the "surplus" account was lowered from $410,875 to $257,012. The Dec. 31, 1921 balance sheet carries $399,942 working capital.

It is understood that Marconi Wireless Co. of London is planning to issue 1,000,000 additional shares of capital stock at par. Final details of the flotation are withheld pending formal ratification of stockholders.

JUDGE SAYS R. C. A. MUST PAY SUIT COST

WILMINGTON, DEL.—Judge Morris, in the United States District Court in Wilmington, has ordered the Radio Corporation Company of America to pay the costs of the contempt proceedings brought against it by the Radio Audion Corporation, amounting to $5,750. Injunction proceedings to enjoin the defendant from certain alleged infringements are still pending in the court.

RADIO CHAIN REACHES FAR IN ARCTIC CIRCLE

EDMONTON, CAN.—Plans for a chain of Radio stations, extending into the Arctic circle, are being completed. The stations will be operated by the dominion government for the purpose of keeping officials in touch with one another. The locations for the stations are Fort Smith, Resolution, Simpson, Norman and McPherson on the MacKinzie and the sixth at Dawson City.

THE VERY LATEST IN HEAD SETS

Under the peculiar chapeau is Melvina Passmore, coloratura soprano with the Chicago Opera Company. She is just like this in "Faust," so you'll know how she appears if you should be so fortunate as to hear this opera via Station KYW. She is an American, born in Houston, Texas. This is her first season with the Chicago organization Moffett Photo

$100 for Pair Who Will Wed by Radio at Pageant

COLUMBUS, O.—A prize of $100 was offered by the Electric League of Columbus to some couple who would become the principals in a Radio marriage to take place at the electric show at Memorial hall the week of Nov. 20 to 25. The date for the marriage was set for the evening of Nov. 22. Several electrical dealers announced that they would present valuable gifts to the bride and groom in addition to the cash prize.

Gen. Harbord Quits Army, to Head Radio Corporation

WASHINGTON.—Major General James G. Harbord, deputy chief of staff of the army, upon his retirement will become president of the Radio Corporation of America, Secretary of War Weeks recently announced. When General Harbord was elected head of the Radio Corporation at a meeting in New York, his release from the army was requested. His retirement will be effective on December 29th.

FAN STARTS COURT FIGHT OVER ETHER

TRANSMITTER HOGS AIR, LISTENER CHARGES

Illinois Amateur Asks Writ to Restrain Sender from Operating During Broadcasts

PONTIAC, ILL.—Edward McWilliams, Radiophan of Dwight, Ill., has filed a suit in the circuit court here asking for a definition of the right of one person over another to occupy the ether with Radio messages. The suit is filed against Wiley Bergman, another Radiophan of Dwight, who has a transmitting station. Mr. McWilliams has only a receiving set, and when Bergman transmits, declares that his service, as well as that of the twenty other listeners in in Dwight, is interrupted.

Wants Court Decision

McWilliams wants the court to determine whether one person has a right to send Radio messages to the extent of disabling the pleasure of countless other persons while they are receiving broadcasted programs from all parts of the country, which fact McWilliams declares Bergman is aware of, but refuses to recognize.

McWilliams also asks an injunction restraining Bergman from operating his transmitter when programs are being broadcasted by recognized stations throughout the country.

The suit is attracting the attention of the legal fraternity of this section of the state, as well as Radiophans and amateurs holding transmitting station licenses. It is the first case of the kind ever filed in Illinois.

"Siciliana" Strains Enthuse WOR Fans

Station Gets Steady Stream of Letters Lauding Broadcast of "Cavalleria Rusticana"

NEWARK, N. J.—If any Radiophan tuned in on Station WOR, L. Bamberger Company, Newark, N. J., November 14, at 9:00 p. m., Eastern time, he could hear the seductive strains of an orchestra and a wonderful tenor singing clear and strong and the "Siciliana," the opening aria of Mascagm's opera "Cavalleria Rusticana." Nearly 2,000 letters were received by Station WOR thus far from all parts of this country and Canada. The majority of the letters tell how as many as from four to ten and more people listened in on a single receiving set to the splendid rendition of "Cavalleria Rusticana."

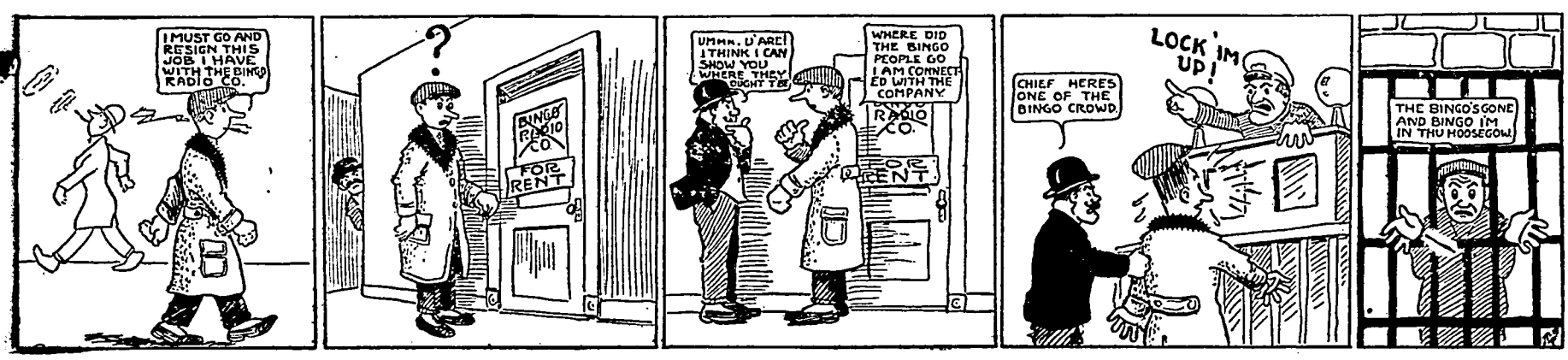
WOR Tabulates Results

Letters and telegrams are coming in every day. Telephone calls to WOR have been so numerous that it has been impossible to keep track of them all. Here are some figures to worry over:

Figuring an average of five people listening in at each receiving station WOR has heard from, this would total 10,000 people. Judging that not over possibly 2 per cent of the public who actually heard the performance wrote in and told of the reception, and basing a total on these figures, the result would be approximately 500,000 people in all parts of the United States and Canada who heard a performance which originated in a room on the 6th floor of the L. Bamberger & Company store. The largest amphitheater known to mankind would not hold this vast audience and it would take many of the largest so-called "bowls" of which some of the largest universities boast.

The S. S. United States has carried on Radiophone conversations with the shore for more than 500 miles.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Political Radio—Part I



GIRL STARTS "RADIO PANIC" IN CHURCH

MISTAKES SPEECH AMPLIFIER FOR BOMB

Pastor Halts Wild Rush for Doors As "Everybody Out!" Interrupts Closing Hymn

DETROIT.—On a recent Sunday morning a very excited young woman rushed into the auditorium of the Central M. E. Church while the audience was singing the closing hymn and exclaimed, "Everybody get out. Someone has placed an electric apparatus in the church offices and the whole place soon will be blown up!"

Immediately the place was thrown into excitement, and the audience of about 2,000 persons, which was largely made up of hotel guests, roominghouse occupants and transients in general, crowded into the aisles. In fact the place was on the verge of a panic.

Pastor Quells Fears

Just then, an assistant pastor, with presence of mind, warned the people not to get excited as the so-called electric apparatus was nothing more than the amplifying instruments of Station WCX, the Detroit Free Press broadcasting station, which at the time was broadcasting the church services.

It seems the young lady, who is said to have had a highly nervous temperament, chanced to come into the church from a rear door and, having no knowledge of Radio broadcasting methods, allowed her fears to get the better of her. The broadcasting instruments were operating at the time, and just how much of this excitement was sent through the ether no one seems to know.

BUG BITES GOLFERS

(Continued from page 1)

was not for Radio the club would never have been considered.

To Have Large Transmitting Station

While definite plans have not been outlined, it is understood that a high power station for receiving and transmitting will be installed and receiving sets will be placed at the third, seventh, twelfth and fifteenth holes. At every sub-station a small rest-room will be built where players will be able to tune in and listen to the latest offerings and a loud speaker placed high above each shelter will entertain the members while they are making their way from green to green.

The direct entertainment side of the club will be supplied by the Radio, as no large musical instruments can be shipped to the new club without great expense and considerable work. All the dance programs will be made up of Radio music. There will also be a series of supper talks, and players who desire to listen in to Sunday sermonts will have an opportunity to do so.

Negotiations are to be made with a large broadcasting station in Toronto for the transmitting of telephone messages to homes in Toronto for the convenience of the members and all orders for supplies at the club will be made through the same channel.

Broadcast Scores to Improve Golf

An innovation in Radio will also be made in the broadcasting of the various scores during the day and this, it is declared by the chairman of the promotion committee, will be a great incentive for players to score high. Very few members would endorse the idea of their name being broadcasted with the lowest score of the day.

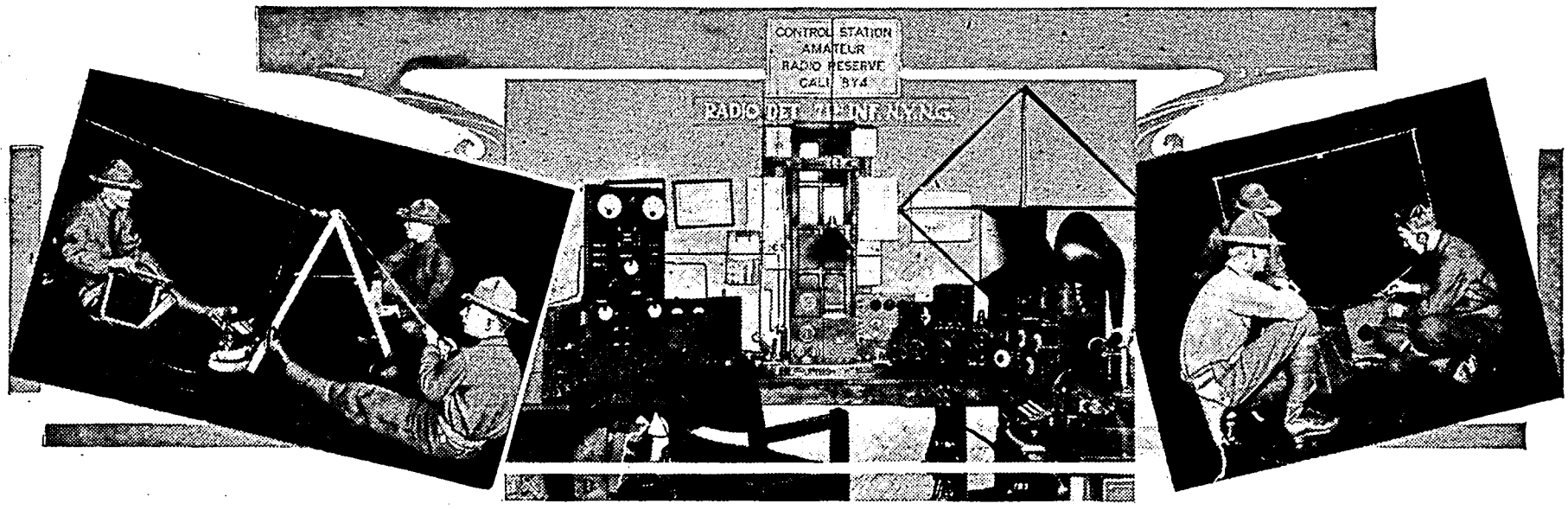
Railway and Government authorities have been approached already and have promised to offer every facility to make the new venture a success. The railways have offered reasonable rates for season tickets. The railway officials have even vouched to equip trains operating between Toronto and the Golf-Radio club with the latest Radio equipment for the convenience of the players. In this way members of the new club will be able to arrange their games ahead of time and reserve their tables long before they reach their destination. And again on their journey home from the links they will be able to listen in to their own scores and compare them with those of other players.

Player Likes Idea

One ardent follower of the Royal and Ancient game, in commenting on the new club with a representative of the RADIO DIGEST, declared that the use of Radio on the links would help considerably towards improving his own game. "For many years I have been obliged to listen to language that would make a heathen dock worker turn green with envy!" remarked this player, " But compare conditions on the new links with conditions on the majority of links throughout the world. When a man is about to drive off his ears are practically always assailed by the sound of a string of firey words emanating from a few irate players out in the rough. This language is not calculated to soothe a player, like myself, who is adverse to even the mildest form of profanity. But how much more uplifting it will be to time one's stroke to the rendition of the love song from La Boheme or endeavour to get out of the rough to the accompanyment of the anvil chorus from Il Trovatore. Then again there will be the twitterings of the robins and the sharp, flute-like song of the meadow-lark to help one.".

Dealers look for a heavy business in Radio sets for Christmas presents.

STATE TROOPS TRAIN IN RADIO



Here is the control station of the Amateur Radio Reserve net of the Second Corps Area, U. S. Army. BY4 is its most familiar name and it is located at the Regimental Armory at Park Avenue and 34th Street, New York City. At BY4 a systemized course in Radio training is provided for the members of the Headquarters Company of the 71st Infantry, New York National Guard. This plant is equipped with several transmitting and over a half dozen receiving sets. The station works with members of the army net, who are amateurs located in all the important military centers in the eastern states. Some of the training given members of the company is illustrated by the two outside photographs. The one at the left shows a three foot antenna being used on a Signal Corps set. The low antenna is especially adapted to work in the front trenches and positions where its low visibility is an asset. Only a minute and a half is required to erect the antenna and put the set in operation. The photo at the right shows members operating a transmitting and receiving set on the exremely low wave length of 70 meters! This is accomplished on the portable loop seen in the background. A break-in system is used. (This enables reception during the intervals between transmission without the necessity of throwing switches.) The center photograph is of the transmitting (left) and receiving (right) equipment of BY4. The feature of the station is that it is run by storage battery power throughout independent of the city mains. It can operate for ten hours intermittently, both transmitting and receiving, in the event of the city power being interrupted as a result of breakdown from storm, fire or other disaster.
Left and Right Photos © INT.

1,000 ARMY TUBES UP AT $5.50 EACH

Unused Signal Corps Equipment Declared Surplus, Offered to General Public

CHICAGO.—One thousand Signal Corps Vacuum Tubes, Type VT-11, manufactured by the General Electric Company, have been declared surplus and are offered for sale to the public at a price of $5.50 each, not more than three to any one person, as is and where is, licensed only for amateur, experimental or entertainment use, at the Chicago Intermediate Depot, U. S. Army, 1819 W. Pershing Road. The tubes have never been used, are part of the current stock of the Signal Corps, and have been released to fill an urgent demand of the amateurs of the United States for such tubes.

The principal characteristics of the tubes are as follows:

a—Hard, require no adjustment of plate potential; b—Filament current 11/10 amperes at 3½ to 4 volts, two cell lead storage battery connected directly across the filament with no series resistance, no adjustment required; c—Plate impedance, average 20,000 ohms; d—Plate voltage, 20 volts for detector, 40 volts for amplifier, adjustable plate voltage not needed for either use; e—Detector grid condenser, 100-200 micro-microfarad with two megohm leak connected to positive side of filament; f—When used as amplifier, grid circuit connects to negative side of filament; g—Is effective Radio and audio amplifier, detector, and will also oscillate freely in low output oscillator circuit; h—Available for use in most existing commercial sets, care being taken to prevent using filament voltage greater than 4 volts; i—Substantially similar to Radiotron and fits Radiotron receiving socket.

The sale is now being conducted by this office, and all correspondence regarding this sale should be forwarded to this office.

Payment for tubes must be either in cash, certified check, or postal money order, made payable to the order of the Finance Officer, U. S. Army, and may be either mailed, addressed to the Officer in Charge, Signal Section, Chicago, General Intermediate Depot, 1819 West Pershing Road, Chicago, Ill., First Floor, Bldg. C. or delivered in person at the depot.

CLAIMS ETHER NEWS SERVICE BEATS CABLE

Publisher Declares Radio Speeds Up Transoceanic Dispatches

LOS ANGELES, CALIF.—At the recent Commercial Congress of the Pan-Pacific Union, at Los Angeles, V. S. McClatchy, publisher of the Sacremento Bee, declared that Radio, rather than the cable, must be looked to for increased facilities for transmission of news across the Pacific.

There are but two cables across the Pacific—one from San Francisco to Shanghai via Hawaii, Guam and Manila (Cavite); the other from Vancouver to Hong Kong via Australia, both controlled by British interests. One carries news from Canada to Australia for five cents per word; the other, from San Francisco to Manila for 27 cents per word.

The United States is using its naval Radio stations for transmitting news between San Francisco and Manila, for 6 cents per word; between San Francisco and Honolulu for 3 cents.

Airphones Oust Wire Lines in Yukon Land

Much Romance of Far Northwest Passes

NOME, ALASKA.—Radio is slowly supplanting wire lines in the great reaches of the Yukon. Much of the romance of the far Northwest is passing with the reeling up of miles of wire which had been kept in operation, despite severe winter storms and intense cold, since long before the days of the Gold Rush.

Radio operators are now working direct from Fairbanks to Nome, a distance of about 540 miles. The resultant improvement in communications has made possible the abandonment of about 200 miles of land wires which had been a tremendous effort and expense to keep in condition. In the winter time these land wires often required the services of a small army of men in order to maintain service.

HUB'S SHOW MANAGER TAKES GOTHAM BERTH

S. H. Fairbanks Is Advisory Director of American Exposition

NEW YORK, N. Y.—S. H. Fairbanks, who managed the recent successful Radio show in Boston, Mass., has been retained as advisory director by the management of the American Radio Exposition to be held in Grand Central Palace, New York, December 21st to 30th. Mr. Fairbanks will take charge of exhibits, the appointment of space and other details of staging the huge show. L. S. Byers, executive secretary of the committee in charge of the show, will continue with the program of organization. A series of novel features are being worked out at present to make the exposition interesting to the general public. The exposition will be New York's principal contribution to "National Radio Week", which will be celebrated throughout the country during Christmas week.

Series of Government Pamphlets Explain Measurements in Radio

Booklets Describe Methods of Standardizing Wavemeters, Figuring Inductance of Fixed or Variable Inductor and Comparing Capacity and Effective Resistance

WASHINGTON.—The Bureau of Standards has prepared a series of pahphlets which deal with Radio measurments. The first pamphlet describes the method of standardizing wavemeters of both the transmitting and receiving type. In the receiving type of wavemeters, the standardization consists in measuring by means of a standard wavemeter the frequencies emitted by a generator of continuous waves which is tuned to resonance with the wavemeter under test at various settings of the scale of the latter. In the transmitting type of wavemeters, which consists of a condenser, an inductor, and an exciting device (usually a battery and a buzzer coupled to the circuit), the standardizing process utilizes the make and break of the buzzer which excites the wavemeter by impact and emits waves the frequency of which is regulated by the wavemeter setting; the frequency of the waves emitted at each setting being known for each setting of the wavemeter.

Apparent Inductance Measurement

The second pamphlet describes the method of measuring the apparent inductance at any Radio frequency of a fixed or variable inductor. The apparatus consists of a variable condenser, a wavemeter standardized in terms of frequency or wave length, a themoelement and galvanometer, current square meter, several non-inductive resistors of known resistance and a source of undamped unmodulated waves. The observations consist of the readings necessary for standardization in terms of frequency or wave length of the circuit composed of the standardized condenser, the inductor to be measured, and connecting leads spaced well apart and as short as is possible without bringing the coil to within about 10 centimeters of the condenser. With this circuit is combined the device used to indicate resonance.

Comparison of Condensers

The third pamphlet describes the method of comparison of the capacity and effective resistance or phase difference of two condensers one of which has already been standardized. The method here described is that of comparison by substitution, that is, tested and untested condensers are compared by inserting them in turn in a circuit which is brought to resonance with a source of undamped waves.

Spirits (Spooks, That Is) Give 'Ghost Night' Thrill

SAN ANTONIO, TEX.—Ghost night at WOAI was really filled with "spirits" for the artists. After the special hour of music between 11 and 12 o'clock sent out through the air from the big 750-watt Radio station, the entertainers adjourned from the Southern Equipment Company building to the Evening News building where they found punch, but it wasn't "spiked." Even though the entertainers failed to get a "kick" they heard strange sounds in the building.

WGM ADVANCES TO RANKS OF LEADERS

Proficiency of Atlanta Station Wins Much Desired Class B Rating

ATLANTA, GA.—The latest word in Radio broadcasting is represented in the new 500-watt set of Station WGM (Atlanta Constitution) which makes this station second to none in the United States. As a result of its proficiency, the plant was recently accorded the distinction of a Class B rating, giving it a 400-meter wave.

Letters and telegrams received from distant part of the United States, from Canada and from ships at sea attest to the efficiency of the new outfit. A telegram from Toronto, Canada, on the first night the new set was used said: "You came in on detector and one step as loud as I can get WJZ. Station WGM's new transmitter consists of three units—the main transmitter, the input or microphone amplifier and the motor generators and controls.

Flexible Microphone System

A very flexible arrangement of microphones is in use. The microphones are wired so that a number of different arrangements are instantly available either in the studio or in the operating room. The microphones feed into the input amplifier, which is located in the studio. This amplifier uses two Westinghouse Electric five-watt tubes, the filaments of which are supplied from a six-volt storage battery and the plates with 120 volts, also from storage battery. Storage B batteries have been found to give a steadier and more quiet discharge from this amplifier than the ordinary dry cell B batteries.

The input of the amplifier may be connected to the microphones in the studio or operating room, or by means of plugs and jacks may be switched to incoming pairs of cables so that concerts being staged at distant points can be broadcast.

Voice Amplifier and Modulators

The voice amplifier is mounted on the main transmitter panel and consists of one 50-watt tube, the plate and filament of which are fed from the main motor generators. The plate voltage is 800 volts, while the filament is burned at 10 volts. The input of the voice amplifier may be connected to the output of the input amplifier, or in case of emergency may be connected directly to the microphones by means of an ordinary modulation transformer.

The output of the voice amplifier is fed directly to the two 250-watt modulator tubes connected in parallel. These tubes are fed by the main motor generators, the plates at 2,000 volts and the filaments at 11 volts. The Heising "constant current" system of modulation is used.

Use Stanley Circuit

Two more 250-watt tubes are used as oscillators. The circuit used is a modified form of the Stanley British air craft circuit and has proven to be very effective. All the wiring of the oscillatory circuit is of copper tubing.

The motor generators are located in a separate small room known as the generator room. There are two separate motor generator units, one generator being used to supply the filaments of the oscillator, modulator and the voice amplifier tubes, and the other plates.

The aerial is 84 feet in length and is suspended 75 feet above the roof of the six-story Atlanta Constitution building. A huge counterpoise is strung between the two aerial poles near the roof. The studio is lined with felt three inches thick, and is as near echo-proof as it is possible to make it.

ULTRA NINE TUBE OUTFIT EXPLAINED

INDUSTRIAL RADIO SERVICE SET "REACHES OUT"

Multi-Valve Circuit Easily Controlled—Uses Myers Audions—Range 150-750 Meters

(See Photo Diagram, Facing Page)

The standard receiving set illustrated on page 7 is the Industrial Radio Service type 401 Ultra Radio frequency receiver-amplifier, and type 403, three-stage audio frequency amplifier. It operates with high efficiency over a tuning range of 150 to 750 meters. This range can be increased by the substitution of another set of coils in place of the three that are furnished with each set.

This receiver was designed for long distance reception and has the advantage of Radio frequency amplification for increasing the "reach." It employs a tuner having three windings, primary, secondary and oscillation feed, coupled together. The primary and O. F. coils swing to and from the secondary coils. Small switches are mounted on the base of the coils to vary the inductance when receiving amateur, telephone or commercial stations.

The first tube is used in the circuit to control and transform the incoming frequency, so that the same frequency is always induced into the amplifier circuit, thus eliminating any tuning of the Radio frequency amplifier. The amplifier circuit is inductively coupled, employing air-core transformers.

Tuning Unit Description

The Radio frequency receiver-amplifier unit employs the use of six Myers high-muaudion tubes. The front view of the unit is shown to the left. The two binding posts in the lower left hand corner are for the aerial and ground connections. Three binding posts in the lower right hand corner are the battery connections. The one in the center (of these three) is for the positive terminal of the 6-volt A battery and the negative terminal of the plate battery. The binding post to the left of the one just mentioned, is for the negative terminal of the filament storage battery. The binding post on the right hand side is for the positive terminal of the plate or B battery. This should have a voltage range from 65 to 100.

Wave Length Controls

The knob or pointer in the upper left hand corner controls the finer adjustment of the primary wave length. The one below it controls the similar adjustment of the secondary wave length, whereas the one to the right of the first one, has the function of controlling the tuning adjustment after the second stage of Radio frequency amplification.

The three knobs with pointers just below the tubes are the rheostat controls. The one on the left controls the filament of the first tube. When the phone plug is inserted in the first jack, the set employs one tube as a detector. The second rheostat from the left controls the second, third and fourth tubes, and when plug is inserted in jack No. 2 (center), the set is employing one tube detector-oscillator and in reality 2 stages of amplification instead of three as would be ordinarily expected. the third rheostat controls the fifth and sixth tubes and when the plug is inserted in jack No. 3, full amplification is secured.

The plug mentioned in the above paragraph is the connection for a pair of receivers, or if the audio frequency amplifier unit is used, is connected to another plug which is inserted in the first jack from the left hand side of the audio amplifier unit. This serves as the means of connecting the output of the one unit to the input side of the last unit.

Description of Coils

In the diagram, the coils have been designed and termed as honeycomb, due to the resemblance to that type. It must be stated, however, that the usual form of honeycomb coil is not used. The winding is inserted in a composition frame and sealed. In the center of one face of each coil there is the tap switch with three contact points.

When these tap switches are moved to the outer points, away from the hinge side, the approximate wave length adjustment is 150 to 275 meters. When the center tap is used, the range is 275 to 500 meters. The last tap or the one next to the hinge side covers the balance of the range up to 750 meters.

Five sets of hinge holes are provided on the support on which the coils are pivoted. The center hole is the fixed position for the primary coil, while the one immediately to the right of it is for the "L. O. F." or oscillation feed coil. The two outermost holes are used where high wave lengths are to be received and a larger set of coils are employed.

Audio Frequency Amplifier Unit

The three binding posts on the lower section of the panel of the audio frequency amplifier correspond to the similar set of three on the receiver unit. These are connected to the same respective battery sources.

Two rheostat knobs are shown. The one on the left controls the first two tubes. When the receiver or loud speaker plug is inserted in the center jack, two stages of audio amplification are obtained. The knob on the right controls the filament current of the last tube. When the plug is inserted in the last jack, full audio amplification is obtained.

As explained before, the first jack is an input jack and is used only for connection to the output jack of the receiver unit.

Tuning Instructions

The reception desired by the Radiophone fan lies between 350 and 400 meters. For this purpose the center switch tap is used on all three coils. The coupling is set so that an angle of 30 degrees exists between the primary and secondary and about 15 degrees between the secondary and "L. O. F." coil. The secondary condenser knob is set to about the 35th graduation, the amplifier knob to about 60.

When battery is fully charged, the rheostats should be turned approximately half-way, or with the pointers down. The second rheostat, since it controls three tubes, will require a little further advance than the last one, which controls only two.

The first rheostat, however, cannot be judged on this basis as its tube requires a little more current than the others. For that reason, if all rheostats are set as stated, the adjustment will be approximately correct and can be more accurately adjusted afterward.

Coupler Between Coils

The adjustment of the coupling between coils is rather critical and resonance will be registered by a click in the phones. The best adjustment is secured just before the click is heard. If any howling begins, it is because the adjustments are out of resonance, or the first tube has too much filament current. Too close coupling between the secondary and "L. O. F." coil will also create howling.

After the coupling has been adjusted approximately, the secondary condenser is varied. This variation is apt to be extremely critical and should consist therefore of a very slow movement of the knob. A slight capacity effect is sometimes noticeable and the use of a rubber tipped pencil in totating the knob will be of considerable assistance.

After the secondary tuning adjustment, the primary and amplifier condensers are readjusted for maximum clearest reception. At this point, the coupling between coils can be readjusted for improvement. Such readjustments may necessitate a slight change in the setting of the amplifier condenser. At this point, it would be advisable to readjust the rheostats.

Operating Amplifier Unit

The A. F. amplifier unit can be plugged in next. The adjustments consist entirely of rheostat control. It may be necessary to twist the tubes slightly in their receptacle while burning to make sure that tube contact sides make good connection. Nine tubes require considerable current and careful attention should be paid to the condition of the storage batteries. A variation of the plate voltage should be tried to obtain the best results. Every increase in plate voltage will necessitate a slight increase in the filament current.

Head phones should not be used with the last stage of A. F. amplification as the receivers are not built to withstand such an amplified plate current flow..

Book Reviews

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.

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" 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, 75c.

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

The A B C of Vacuum Tubes. By E. H. Lewis. Is a book for beginners who have no knowledge of either Radio or electricity and sets forth the elementary principles of theory and operation of the vacuum tube. No attempt has been made in this book to describe all the possible circuit arrangements, but those shown may serve as suggestions to experimenters who desire to evolve their own circuits. Price, $1.00.

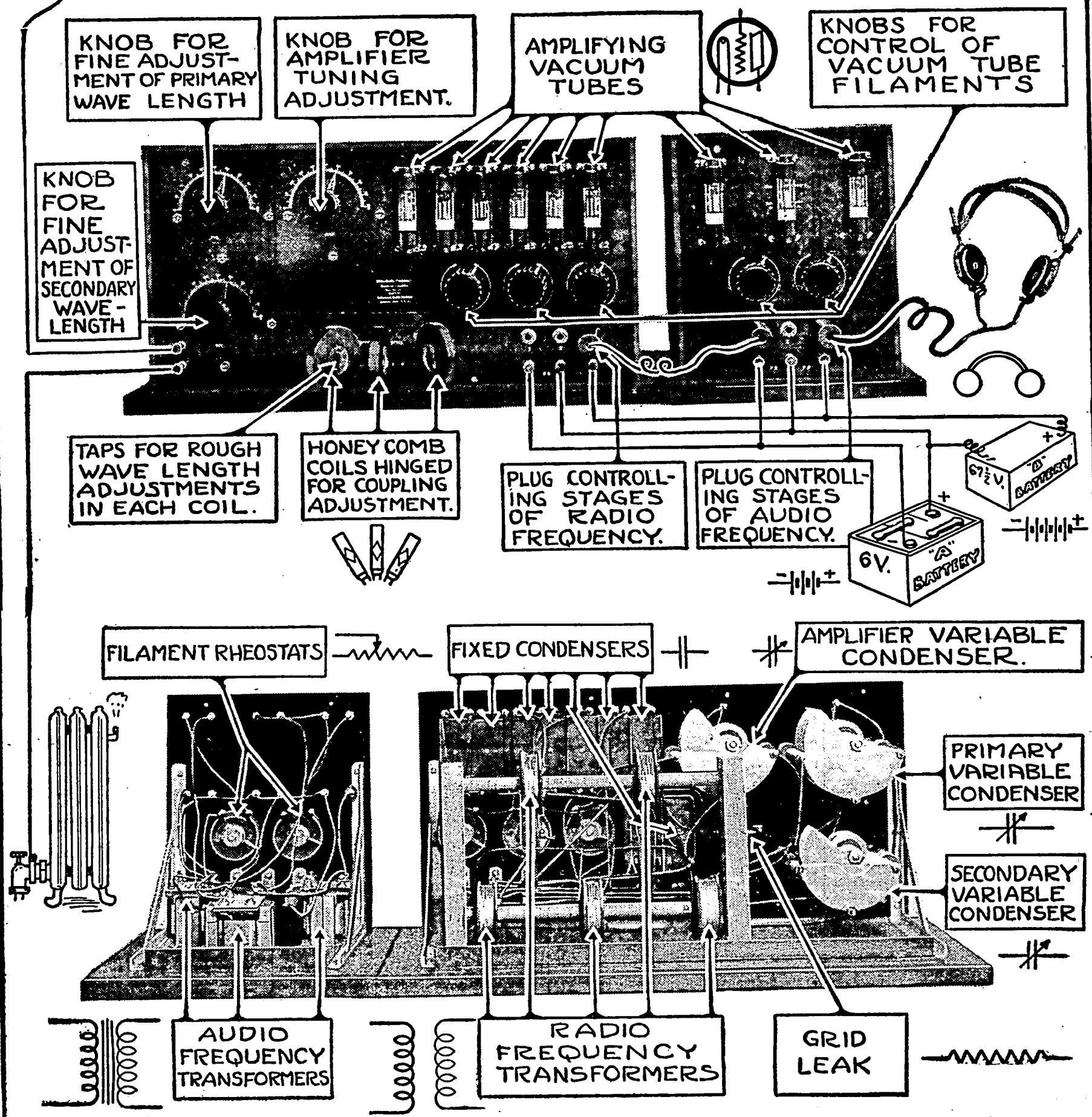
Experimental Wireless Stations. By S. E. Edelman. This book assumes that the reader has some knowledge of fundamental electricity and mathematics and is a readily understandable text for beginners in the art of Radio communication who desire to start with the elements. Earlier editions of this book were published during the war. The 1922 edition has been revised and enlarged so as to cover the progress made in the last few years. Price, $3.00.

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

Radio Receiving Sets

Ultra Radio Frequency Receiver-Amplifier

As the fifteenth of the series of standard receiving sets, Radio Digest presents herewith the Ultra type 401, six tube Radio frequency receiver and the Ultra type B403 audio frequency amplifier, manufactured by the Industrial Radio Service of Saginaw, Michigan. This complete receiving set employs the use of nine Myers High Mu audion tubes. Full installation and operation instructions will be found on page 6. Although the amateur may not possess this particular make of apparatus, it will be well for him to study the diagram and instructions carefully. The numerous points of similarity in standard types of Radio receiving sets enables the amateur to materially benefit from reading the instructions for each of the various types of circuits. Particular attention should be paid to this set because of its generous use of the now very popular Radio frequency amplification.



Radiophone Broadcasting Stations

Corrected Every Week.

(NOTE.—The first half of the schedule list and the state, city index appear below. The second half appeared last week.)

AGI, Presidio of San Francisco, Cal. 50 mi. Signal Corps, U. S. A. Sun, 7-9 pm, instruction. Pacific.
AS6, San Antonio, Tex. 480 only. U. S. Army, Camp Travis. Mon, 7:30-8:30 pm, Thurs, 9:30-10:30 pm, music. Central.
CFAC, Calgary, Alta., Can. 430 only. 400 mi. Western Radio Co., Ltd. Daily ex Sun, 3:30-4:30 pm. Daily, 7:45-8:45 pm. Mountain.
CFCA, Toronto, Ont., Can. 400 only. 500 mi. Toronto Star. Daily ex Sun, 12 m, reports; 2 pm, music, reports; 4:15, music, news; 6:55, bedtime story; 7-8, concert. Eastern.
CFCB, Vancouver, B. C., Can. 440 only. 1,000 mi. Marconi Co. Daily ex Sun, 8:30-9:30 pm, news, weather, concert. Pacific.
CFCE, Halifax, N. S., Can. 440 only. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.
CFCF, Montreal, P. Q., Can. 440 only. 500 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.
CFCH, Iroquois Falls, Ont., Can. Abitibi Power & Paper Co., Ltd.
CFCI, Walkerville, Ont., Can. Motor Products Corp.
CFCN, Calgary, Alta., Can. 440 only. 1,500 mi. W. W. Grant Radio, Ltd. Wed, Sat, 10:30-11:30 pm, concert. Mountain.
CFCX, London, Ont., Can. The Lohdon Advertiser.
CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.
CFTC, Toronto, Ont., Can. The Bell Telephone Co.
CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.
CFZC, Montreal, Que., Can. Can. Westinghouse Co., Ltd.
CHBC, Calgary, Canada. 410 only. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily, 8:45-10 pm, news, stock quotations, music. Mountain.
CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.
CHCB, Toronto, Canada. 440 only. 500 mi. Marconi Co. Tues, 8-10 pm, concert. Eastern.
CHCC, Edmonton, Alta., Can. Can. Westinghouse Co., Ltd.
CHCF Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.
CHCQ, Calgary, Alta., Can. 400 only. 150 mi. Western Radio Co., Ltd. Daily ex Sun, 3:30-4:30 pm. Daily, 7:45-8:45 pm. Mountain.
CHCS, London, Ont., Can. London Radio Shoppe.
CHCX, Montreal, Que., Can. B. L. Silver.
CHCZ, Toronto, Ont., Can. Globe Printing Co.
CHOC, Vancouver, B. C., Can. Can. Westinghouse Co., Ltd.
CHVC, Toronto, Canada. 410 only. 200 mi. Metropolitan Motors Co. Daily ex Sat and Sun, 5-5:30 pm, news, concert. Eastern.
CHXC, Ottawa, Ont., Can. 400 only. 50 mi. J. R. Booth, Jr. Mon, Wed, Sat, 8:30-10 pm, music, entertainment. Eastern.
CHYC, Montreal, Que., Can. Northern Elec. Co.
CJBC, Montreal, P. Q., Can. 290 and 420. 40 mi. Dupuis Freres. Wed, Fri, 9-10 pm or 8-9, music etc. Eastern.
CJCA, Edmonton, Alta., Can. 450 only. 1,000 mi. Edmonton Journal, Ltd. Daily ex Sun, 12 m, reports, concert; 8:30-10 pm, concert. Western.
CJGB, Nelson, B. C., Can. 400 only. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.
CJCD, Toronto, Canada. 410 only. 200 mi. T. Eaton Co. Daily ex Sat and Sun, 4-4:30 pm, concert. Sat 12-12:30 pm, concert. Eastern.
CJCE, Vancouver, B. C., Can. 420 only. 150 mi. Vancouver Sun. Daily ex Sun, 12:30-1:30 pm, 3:30-5, 8-10, music, news. Pacific.
CJCF, Kitchener, Ont., Can. 420 only. 100 mi. News Record Limited. Mon, Tues, Fri, Sat, 9-9:30 pm. Thurs, 8 pm on, concert. Eastern.
CJCG, Winnipeg, Canada. 410 only. 1,000 mi. Manitoba Free Press. Daily ex Sun, 10-10:30 am, news; 12-1 pm, reports. Mon, Thurs, 8-10 pm, concert. Tues, 7-8 pm, music. Fri, 5:30-6:45 pm, music. Sun, 8 pm, every other week starting August 20. Central.
CJCH, Toronto, Ont., Can. United Farmers of Ontario.
CJCI, St. John, N. B., Can. 400 only. 75 mi. McLean, Holt & Co., Ltd. Daily, 8-9 pm, music, news, weather. Eastern.
CJCN, Toronto, Ont., Can. Simons, Agnew & Co.
CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.
CJCY, Calgary, Alta., Can. Edmund Taylor.
CJGC, London, Ont., Can. 430 only. 75 mi. London Free Press. Daily ex Sun, 9:30-10 am; 12-1 pm, news; 3:30-6 pm, weather, news; 8-9, music, entertainment. Eastern.
CJNC, Winnipeg, Man., Can. 400 only. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 9:30-10 am, 1-2 pm. Mon, 5:30-6:45 pm. Tues, 8-10 pm. Fri, 7-8 pm. Sun, 3-4 pm. Central.
CJSC, Toronto, Ont., Can. Evening Telegram.
CKAC, Montreal, Can. 430 only. 1,000 mi. La Presse. Daily 2 pm, reports, 3:30, markets, 4:45, musical teas, news, 5:30 specials. Tues, Thur, Sat, 7 pm, kiddies' stories, 7:30-9:30, music, entertainment. Sun, 4 pm, sacred concert. Eastern.
CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.
CKCD, Vancouver, B. C., Can. 410 only. 150 mi. Vancouver Daily Province. Daily ex Sun, 8:30-9:30 pm, music, entertainment, news. Pacific.
CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co.
CKCK, Regina, Sask., Can. 420 only. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news; 1:15-2 pm, markets, news, music. Mon, Wed, Thurs, 7:30-8:15 pm, sports, music. Tues, Fri, 7:30-9 pm, concert. Mountain.
CKCR, St. John, N. B., Can. 400 only. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Atlantic.
CKCS, Montreal, Que., Can. The Bell Telephone Co.
CKCZ, Toronto, Ont., Can. Westinghouse Co., Ltd.
CKKC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd.
CKOC, Hamilton, Ont., Can. 410 only. 100 mi. Wertworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8.30-9:30 pm, concert. Sun, church services. Eastern.
CKQC, London, Ont., Can. 410 only. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.
CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.
DD5, Denver, Colo. 340 only. 200 mi. Fitzsimmons General Hospital. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.
DM4, San Antonio, Tex. 1,500 mi. U. S. Army, Kelly Field. No regular schedule.
DM7, San Antonio, Tex. 200 mi. U. S. Army, Brooks Field. No regular schedule.
DN4, Denver, Colo. 340 only. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.
KDKA, E. Pittsburgh, Pa. 400 and 485 only. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 3:00, sports; 7:00-9, news, features, markets, entertainments; 9-9:55, concert; 9:55-10 pm, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, 7:30, church service. Eastern.
KDN, San Francisco, Calif. 485, 510 also. 500 mi. Leo J. Meyberg Co. Daily, 1-2 pm, 8:30-9, 4:30-5:30, 7-7:15, music, reports, concert. Pacific.
KDOW, New York, N. Y. S.S. America. Home port is New York.
KDPM, Cleveland, O. Westinghouse Elec. & Mfg. Co.
KDPT, San Diego, Calif. 250 mi. Southern Elec. Co. Daily 7:30-9 pm, news, weather, concerts, lecture. Pacific.
KDYL, Salt Lake City, Utah. 485 also. 500 mi. Telegram Pub. Co.
KDYM, San Diego, Calif. Savoy Theater.
KDYN, Red Wood City, Calif. Great Western Radio Corp.
KDYO, San Diego, Calif. Carlson & Simpson.
KDYQ, Portland, Ore. Oregon Inst. of Technology.
KDYR, Pasadena, Calif. Pasadena Star-News Pub. Co.
KDYS, Great Falls, Mont. 485 also. 1,000 mi. Great Falls Tribune. Daily 12 m, weather, time. Daily ex Tues, 8-10 pm, concert etc. Sun, 4 pm, church services. Mountain.
KDYU, Klamath Falls, Ore. Herald Pub. Co.
KDYV, Salt Lake City, Utah. Cope & Cornwell Co.
KDYW, Phoenix Ariz. Smith, Hughes & Co.
KDYX, Honolulu, T. H., Hawaii. 500 mi. Honolulu Star-Bulletin Co. Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Sun, 11 am-12:15 pm, 5-6, church services. 120th Meridian.
KDZA, Tucson, Ariz. Arizona Daily Star.
KDZB, Bakersfield, Calif. Frank E. Siefert.
KDZD, Los Angeles, Calif. W. R. Mitchell.
KDZE, Seattle, Wash. 300 mi. Rhodes Co. Daily ex Sun, 10:30-11 am, news, 3:30-4:30 pm, style talks, music. Mon, Wed, Fri, 7:15-8:15 pm, concert. Pacific.
KDZF, Los Angeles, Calif. Automobile Club of Southern California.
KDZG, San Francisco, Calif. Cyrus Pierce & Co.
KDZH, Fresno, Calif. 485 also. 50 mi. The Herald-Buford Co. Daily ex Sun, 8:15 am, 4-6 pm, news, reports. Daily ex Tues, Fri, 7-8 pm, reports, music. Tues, Fri, 8-9 pm. Pacific.
KDZI, Seattle, Wash. Seattle Radio Assn.
KDZJ, Eugene, Ore. Excelsior Radio Mfg. Co.
KDZK, Reno, Nev. 50 mi. Nev. Mchy. & Elec. Co. Wed, Fri, Sat, Sun, 8-9 pm, music, entertainment. Pacific.
KDZL, Ogden, Utah. Rocky Mountain Radio Corp.
KDZM, Centralia, Wash. 50 mi. Hollingworth Hdwe. & Radio Supply Store. Daily ex Sat & Sun, 8-9 pm, music. Pacific.
KDZP, Los Angeles, Calif. Newberry Elec. Corp.
KDZQ, Denver, Colo. 500 mi. Wm. D. Pyle. Daily ex Sun, 6:45-7:15 pm, news, 9-10 pm, concert. Mountain.
KDZR, Bellingham, Wash. 200 mi. Bellingham Pub. Co. Daily ex Sun, 7-8 pm, 8:30-9 pm, music, news, sports, reports. Sun, 7-8 pm, church service. Pacific.
KDZT, Seattle, Wash. Seattle Radio Assn.
KDZW, San Francisco, Calif. Claude W. Gerdes.
KDZX, San Francisco, Calif. Glad Tidings Tabernacle.
KDZZ, Everett, Wash. 50 mi. Kinney Bros. & Seppell. Daily ex Sun, 2:30-3:30 pm, 4:30-5:30, 8:15-9:15. Pacific.
KFAB, Portland, Ore. Pacific Radiofone Co.
KFAC, Glendale, Calif. 355 and 485. 250 mi. Daily Press. Daily ex Sun, 4:15-5:15 pm, news etc. Mon, Wed, Fri, 7-8 pm, concert. Pacific.
KFAD, Phoenix, Ariz. 485 also. 100 mi. Mon, Wed, Fri, 8-9:15 pm, concert, weather, stocks, markets. Sun, morning, church service. Mountain.
KFAE, Pullman, Wash. 200 mi. State College of Wash. Program irregular.
KFAF, Denver, Colo. 1,000 mi. Western Radio Corp. Daily ex Thurs & Sun, 8-9 pm, music, reports, news. Mountain.
KFAJ, Boulder, Colo. 250 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.
KFAN, Moscow, Idaho. The Elec. Shop.
KFAP, Butte, Mont. Standard Pub. Co.
KFAQ, San Jose, Calif. City of San Jose.
KFAR, Hollywood, Calif. Studio Lighting Service Co.
KFAS, Reno, Nev. 300 mi. Reno Motor Supply Co. Mon, Tues, Thurs, 8-9 pm, music. Pacific.
KFAT, Eugene, Ore. 100 mi. Pac. Radio Co. Tues, Thurs, Sat, 7-8 pm, music. Sun, 8:45-9:15 pm, church service. Pacific.
KFAU, Boise, Ida. 485 also. 200 mi. Boise H. S. Mon, Wed, Fri, 9:30-10 am, 2:30-3:00 pm, reports, news, 8:15-9 pm, concert. Tues, Thurs, Sat, 9:30-10 am, 2:30-3:00 pm, reports, news, 7:45-8:15 concert. Mountain.
KFAV, Venice, Calif. Abbot-Kinney Co.
KFAW Santa Ana, Calif. 485 also. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 8-9 pm, concert. Pacific.
KFAY, Medford, Ore. 500 mi. Virgin Radio Service. Mon, Fri, 9-10 pm. Wed, 9-12 pm. Special programs other days. Pacific.
KFBA, Lewiston, Idaho. Ramey & Bryant Radio Co.
KFBB, Havre, Mont. F. A. Buttrey & Co.
KFBC, San Diego, Calif. 100 mi. W. K. Azbill. Thurs, Biblo lesson for foll. Sun. Sat. lectures.
KFBD, Hanford, Calif. 100 mi. Calif. Radio Lab. Daily ex Sun, 3-4 pm, 8-9. Sun, 5-6 pm. Pacific.
KFBE, San Luis Obispo, Calif. 50 mi. R. H. Horn. Daily ex Sun, 4-5 pm, 7-8. Pacific.
KFBG, Tacoma, Wash. First Presbyterian Church.
KFBH, Marshfield, Ore. Thomas Musical Co.
KFBJ, Boise, Idaho. 170 mi. Boise Radio Supply Co. Daily ex Sun, 5-5:30 pm, police reports, music. Mon, Wed, Fri, 7:45-8:15 pm, concert. Tues, Thurs, Sat, 8:15-9 pm, concert. Mountain.
KFBK, Sacramento, Calif. 300 mi. Kimball-Upson Co. Daily ex Sun, 3-4 pm, 6-6:30, concert, news. Sun, 8-9 pm, church service. Pacific.
KFBL, Everett, Wash. Leese Bros.
KFBM, Astoria, Ore. Cook & Foster.
KFBN, Oakland, Calif. Borch Radio Corp.
KFBQ, Prescott, Ariz. Savage Elec. Co.
KFBS, Trinidad, Colo. Chronicle News & Gas & Elec. Supply Co.
KFBU, Laramie, Wyo. Bishop N. S. Thomas.
KFBV, Colorado Springs, Colo. Clarence O. Ford.
KFC, Seattle, Wash. 700 mi. Northern Radio & Electric Co. Daily, eight hours, miscellaneous. Pacific.
KFCB, Phoenix, Ariz. 500 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.
KFCC, Wallace, Ida. 380 only. 100 mi. Auto Supply Co. Daily, 7:30-8:30. Pacific.
KFCD, Salem, Ore. 100 mi. F. S. Barton. Daily ex Sun, 12-1 pm, 8-9, music, news. Sun, 3-4 pm, church service. Pacific.
KFCF, Walla Walla, Wash. Frank A. Moore.
KFCH, Billings, Mont. 100 mi. Electric Service Station, Inc. Daily, 7:30-9 pm, music. Mountain.
KFCK, Colorado Springs, Colo. Colorado Springs Radio Co.
KFDA, Baker, Ore. Adler's Music Store.
KFDB, San Francisco, Calif. Mercantile Trust Co.
KFDD, Boise, Ida. St. Michaels Cathedral.
KFDS, San Francisco, Calif. John D. McKee.
KFEB, Taft, Calif. City of Taft.
KFEC, Portland, Ore. Meier & Frank Co.
KFED, Billings, Mont. Billings Polytechnic Inst.
KFFA, San Diego, Calif. Dr. R. C. Shelton.
KFFE, Pendleton, Ore. 100 mi. Eastern Oregon Radio Co. Daily, 7:30-8 pm, music. Pacific.
KFI, Los Angeles, Calif. 500 mi. Earle C. Anthony, Inc. Daily ex Sun, 1-1:30 pm. Daily ex Mon & Fri, 7:40-8:20 pm. Tues, Sat, 2-3 pm. Sun, 10:45-11 am, 4-5 pm, 7:40-8:20. Pacific.
KFV, Yakima, Wash. 250 mi. Foster-Bradbury Radio Store. Daily ex Sun, 3-4 pm. Mon, Wed, Fri, 8-9 pm. Pacific.
KFZ, Spokane, Wash. 300 mi. Doerr Mitchell Elec. Co. Tues, Wed, Fri, Sat, 7-8:30 pm, music etc. Pacific.
KGB, Tacoma, Wash. 200 mi. Tacoma Daily Ledger-William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm. Entertainment, news, weather, tides, police reports. Pacific.
KGF, Pomona, Cal. 150 mi. Pomona Fixture & Wiring Co. Thurs, 7:30-8:15 pm, news, markets, concert. Mountain.
KGG, Portland, Ore. 500 mi. Hallock & Watson Radio Service. Daily ex Sun, 5-6 pm, music, entertainment, 7:30-8 pm, reports. Sun, 9-10, music. Pacific.
KGN, Portland, Ore. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.
KGO, Altadena, Calif. 350 only. 300 mi. Altadena Radio Lab. Mon, Wed, Fri, 5:15-6 pm, reports, code lessons, agriograms. Tues, Thurs, 7:40-8:20 pm, concerts. Sat, 7:40-9 pm, concert. Sun, 2-3 pm, church service. Pacific.

In Two Parts—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which RADIO DIGEST has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one-half appearing this week, and the other half to appear next week. It is believed the improvement will be greeted as welcome by many readers.

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

The state, city and call list appears with the first half of the station schedules every other week and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Two successive issues of RADIO DIGEST will give one the most complete and accurate list of broadcasting stations obtainable.

KGU, Honolulu, Hawaii. 485 also. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat special program. 150th meridian. (Three hours later than Pacific.)
KGW, Portland, Ore. 200 mi. Ship Owners Radio Service Inc. (Daily Oregonian.) Daily, 3:30-4:30 pm, news etc. Mon, 7:30-8:30 pm, concert. Wed, 8-10 pm, concert. Fri, 8-9 pm, concert. Sun, 7-8 pm, church service. Pacific.
KGY, Lacey, Wash. 50 mi. St. Martins College. Tues, Fri, Sun, 8:30-9:30 pm, news, concert, bedtime story. Pacific.
KHD, Colorado Springs, Colo. 485 also. 50 mi. Daily ex Sun, 8:15 am, weather. Daily ex Sun, Mon, 7-7:30 pm, music. Mountain.
KHJ, Los Angeles, Calif. 400 and 485 only. 2,000 mi. Los Angeles Times.
KHQ, Seattle, Wash. Louis Wasmer.
KJC, Los Angeles Calif. 100 mi. Standard Radio Co. Barker Bros. Daily ex Sun, 11:30-12 noon. Mon, 10-11 am. Wed, 9-10 am. Sun, 1-2 pm, 5-6. Pacific.
KJJ, Sunnyvale, Calif. 500 mi. Radio Shop. Tues, 8:15-9 pm, Fri, 7:30-8:15 pm. Pacific.
KJQ, Stockton, Calif. C. O. Gould.
KJR, Seattle, Wash. 200 mi. Northwest Radio Service Co. Daily ex Sun, 8-9 pm, miscellaneous. Pacific.
KJS, Los Angeles, Calif. 100 mi. Bible Inst. of Los Angeles. Tues, Wed, 12-12:30 pm, sacred music, lecture. Sun, 11:30-12:30 pm, sacred music, sermon. Pacific.
KLB, Pasadena, Cal. 300 mi. J. J. Dunn Co. Mon and Fri, 7:30-8:15 pm, concert. Sun, 3-4 pm and 8-9, concert. Pacific.
KLN, Del Monte, Calif. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert. Pacific.
KLP, San Francisco, Calif. 500 mi. Colin B. Kennedy Corp. Mon, 7:30-8:30 pm. Thurs, 8:30-9 pm. Sun, 4-5 pm. Pacific.
KLS, San Francisco, Calif. 300 mi. Warner Bros. Radio Supply Co. Daily, 12-1 pm. Sat, 7:30-8:15 pm. Pacific.
KLX, Oakland, Calif. 500 mi. Oakland Tribune. Daily ex Sun, 7:15-7:30 pm, news, entertainment. Tues, 7:30-8:15 pm, Fri, 8:15-9 pm, and Sun, 3-4 pm, concert. Pacific.
KLZ, Denver, Colo. 485 also. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30 pm on, news, markets, bedtime story, concert. Sun, 8-9 pm, church service. Mountain.
KMC, Reedley, Calif. 100 mi. Lindsay-Weatherill & Co. Mon, Wed, Fri, 8:30-9 pm, concert. Pacific.
KMJ, Fresno, Calif. 200 mi. San Joaquin Lt. & Pr. Corp. Tues, Fri, 7-8 pm, music. Sun, 5-6 pm, music. Pacific.
KMO, Tacoma, Wash. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 11-1 pm, 6-7, 9:15-10, concert, news, lecture. Pacific.
KNI, Eureka, Calif. T. W. Smith.
KNJ, Roswell, New Mex. 485 also. 750 mi. Roswell Public Service Co. Daily, 8 pm, news, reports, concerts. Mountain.
KNN, Los Angeles, Calif. 100 mi. Bullock's. Mon, 2:30-3:30 pm. Wed, 2:15-3 pm. Thurs, 4-5 pm. Pacific.
KNT, Aberdeen, Wash. 400 mi. Grays Harbor Radio Co. Daily, 5-5:30 pm, 7:30-8:15, news, concert. Pacific.
KNV, Los Angeles, Calif. Radio Supply Co.
KNX, Los Angeles, Calif. Elec. Lighting Supply Co.
KOB, State College, N. M. 485 also. 500 mi. N. M. College Agri. & Mech. Arts. Daily ex Sun, 11:55-12 m, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert, Mountain.
KOG, Los Angeles, Calif. 300 mi. Western Radio Elec. Co. Daily ex Sun, Wed, 5-5:30 pm, code, news. Mon, Fri, 7:40-8:20 pm, music. Wed, 4:30-5 pm, code, 8:20-9 pm, music. Pacific.
KON, Los Angeles, Calif. 200 mi. Holzwasser Inc. Daily ex Sun, 4-5 pm and 8:15-9, concert, news. Sun, 10-11 am, 4-5 pm and 8:15-9, church service. Pacific.
KOP, Detroit, Mich. Detroit Police Dept.
KPO, San Francisco, Calif. 300, 600 also. 500 mi. Hale Bros., Inc. Daily ex Sun, 11-12 m, 3:30-4:30 pm, concert. Wed, 7:30-8:15 pm, concert. Sun, 11-12:15 pm, church service. Pacific.
KQI, Berkeley, Calif. Univ. of Calif.
KQP, Hood River, Ore. 350 only. 50 mi. Hood River News. Daily ex Sat, Sun, 7 pm, news. Tues, Fri, Sun, 8:30-9:30 entertainment. Pacific.
KQV, Pittsburgh, Pa. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm, 2:30-3, music, lectures. Mon, Wed, Fri, 10-11 pm, music, entertainment. Eastern.
KQW, San Jose, Calif. 345 also. 500 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed, 8:15-9 pm, concert. Pacific.
KQY, Portland, Ore. 200 mi. Stubbs Elec. Co. Daily, 1-2 pm, 6-7. Pacific.
KRE, Berkeley, Calif. 200 mi. Maxwell Elec. Co. Every other Sat, 8:15-9 pm. Sun, 1-2 pm, 6-7. Pacific.
KSD, St. Louis, Mo. 400 & 485 only. 1,500 mi. St. Louis Post-Dispatch. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Sun, 8:15 pm. Central.
KSL, San Francisco, Cal. 50 mi. The Emporium. Daily ex Sun, 10-11 am, concert, news; 2-3 pm, concert, educational talk. Sun, 2-3 pm, concert and educational talk. Pacific.
KSS, Long Beach, Calif. 25 mi. Prest & Dean Radio Research Lab. Daily ex Sun, 3:30-4:30 pm, news, concert. Pacific.
KTW, Seattle, Wash. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.
KUO, San Francisco, Calif. 485, 525 also. 1,500 mi. San Fran. Examiner. Daily ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 3-3:30 pm, lecture, news; 5:30-6:45 pm, concert; 9 am, 12 m, 6:45 pm, weather report. Wed, 3:30 pm, health bulletins. Sun, 9-10 am, concert; 5-6 pm, concert, news. Pacific.
KUS, Los Angeles, Calif. City Dye Works & Laundry Co.
KUY, El Monte, Calif. 500 mi. Coast Radio Co. Daily ex Sun, Sat, 4-4:45 pm. Mon, Thu, 8:20-9 pm. Sat, 3-4 pm. Pacific.
KVQ, Sacramento, Calif. 300 mi. Sacramento Bee. Daily ex Sun, 6:30-7:30 pm, news, reports, music. Sun, 6-7 pm, reports, music. Pacific.
KWG, Stockton, Cal. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.
KWH, Los Angeles, Calif. 485 also. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.
KXD, Modesto, Calif. Herald Pub. Co.
KXS, Los Angeles, Calif. Braun Corp.
KYF, San Diego, Calif. Thearle Music Co.
KYG, Portland, Ore. 700 mi. Radio Service Bureau, Inc. Tues, Thu, Sat, 9-10 pm, concert. Pacific.
KYI, Bakersfield, Calif. Bakersfield Californian.
KYJ, Los Angeles, Cal. 485 also. 1,000 mi. Leo J. Meyberg Co. (Hamburgers). Daily ex Sun, 4-5 pm, concert, markets, weather, news. Mon, Thurs, Sat, 8-9 pm, same program. Pacific.
KYW, Chicago, Ill. 400, 485 only. 1,500 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:35 am-1:20 pm, market quotations every half hr; 2:15, news, markets; 3, baseball; 4:15 and 6:30, news, final markets and stocks; 7:30, baseball, bedtime story; 7:45, feature; 8-9, concert; 9, news. Sun, 3:30 pm, church service. Central.
KYY, San Francisco, Calif. The Radio Telephone Shop.
KZC, Seattle, Wash. 100 mi. Public Market & Department Store Co. Daily ex Sun, 6:45-7:15 pm, music, news, agriograms. Pacific.
KZM, Oakland, Calif. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.
KZN, Salt Lake City, Utah. 485 also. 1,000 mi. Deseret News. Daily ex Sun, 3-4 pm, reports, music, 8-9:30 pm, music, news, bedtime stories etc. Mountain.
KZV, Wenatchee, Wash. Wenatchee Battery & Motor Co.
KZY, San Francisco, Calif. Atlantic-Pacific Radio Supplies Co.
NOF, Anacostia, D. C. 412 only. 600 mi. U. S. Navy Dept. Mon, Tues, Thur, 7:15-7:30 pm, lecture. Mon, Thur, 6:45-7 pm, lecture. Tues, Thur, 7:45-8 pm, health lecture. Wed, Fri, 8:30-9:45 pm, band concert. Eastern.
PWX, Havana, Cuba. Cuban Telephone Co.
VIAI, Dayton, O. McCook Field, U. S. Army.
WAAB, New Orleans, La. Valdemar Jensen.
WAAC, New Orleans, La. Tulane Univ.
WAAD, Cincinnati, O. 200 mi. Ohio Mechanics Inst. Fri 2:30-4:30 pm, and Sat, 8:15-10:15 pm, Cincinnati Symph. Orchestra concert. Central.
WAAF, Chicago, Ill. 485 only. 300 mi. Chi. Daily Drovers Journal. Daily ex Sat & Sun, 8:30 am, 10:30, 10:45, 12:30 pm, 3, 4:30, stock reports. Central.
WAAG, Shreveport, La. 50 mi. Bordreaux Co. Daily ex Sun, 7:30-9 pm, sports, concert. Central.
WAAH, St. Paul, Minn. 200 mi. Commonwealth Elec. Co. Mon, Fri, 12-12:45 pm, concert. Mon, Tues, 8-9:30, music. Wed, 1-1:45 pm, lecture. Sun, 3:30-4:30 pm, concert. Central.
WAAI, Boston, Mass. 50 mi. Eastern Radio Inst. Mon, Wed, Fri, 9-10 pm, music. Eastern.
WAAK, Milwaukee, Wis. 485 also. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, markets, weather; 11, markets; 12:10 pm, markets; 1:25, closing markets; 2, and every hr. after, concert, test; 7, weather; 7:15, baseball; 7:30, concert. Central.
WAAM, Newark, N. J. 300 mi. I. R. Nelson Co. Daily ex Sun, 11-11:55 am, 3-4 pm, music. Wed, 8-9 pm, special program. Eastern.
WAAN, Columbia, Mo. Univ. of Mo.
WAAO, Charleston, W. Va. 40 mi. Radio Service Co. Daily ex Sun, 6:45-7:45 pm, music, news, weather, baseball. Eastern.
WAAP, Wichita, Kan. 200 mi. United Elec. Co. Daily, 12-1:30 pm, music, news; 5, weather; 7:15-7:30, sports, markets; 9:45-12, talks, music, and code on C. W.; 10:30, weather. Tues, Fri, 8 pm on, concert, etc. Central.
WAAQ, Greenwich, Conn. 600 mi. New England Motor Sales Co. Daily ex Sun, 9:30 am-5:30 pm, every half hr. Eastern.
WAAR, Huntington, W. Va. Groves-Thornton Hdw. Co.
WAAS, Decatur, Ga. Georgia Radio Co.
WAAT, Jersey City, N. J. 70 mi. Jersey Review. Wed, 7-8 pm, concert, lecture. Sun, 7-8, church service, concert. Eastern.
WAAV, Athens, O. 500 mi. Athens Radio Co. Daily, 7-9 pm, miscellaneous. Central.
WAAW, Omaha, Neb. 485 also. 500 Omaha Grain Exchange. Daily ex Sun, 9:45, 10:45, 11:45, 12:45, 1:20, 8 pm, market reports. 8:15-9 pm, music. Central.
WAAX, Crafton, Pa. Radio Service Corp.
WAAY Youngstown, O. 500 mi. Yohrling Rayner Music Co. Daily ex Sun, 5:30 pm, reports; 8:15-9 pm, music. Eastern.
WAAZ, Emporia, Kans. 250 mi. Hollister-Miller Motor Co. Daily ex Sun, 7-8 pm, weather, entertainment. Central.
WAH, El Dorada, Kans. Midland Refining Co.
WAJT, Marshall, Mo. Kelly-Yawter Jewelry Co.
WAJU, Yankton, S. D. Yankton College.
WBAA, W. Lafayette, Ind. 50 mi. Purdue University. Fri, 7:15-7:30 pm, educational lecture. Central.

(Continued on page 9)

State, City, Call

Alabama:
Auburn, WMAV
Birmingham, WIAG, WSY
Mobile, WEAP
Montgomery, WKAN

Arizona:
Phoenix, KDYW, KFAD, KFCB
Prescott, KFBQ
Tucson, KDZA

Arkansas:
Fort Smith, WCAC, WGAR
Little Rock, WCAV, WEAX, WSV
Pine Bluff, WOK

California:
Altadena, KGO
Bakersfield, KDZB, KYI
Berkeley, KQI, KRE
Del Monte, KLN
El Monte, KUY
Eureka, KNI
Fresno, KDZH, KMJ
Glendale, KFAC
Hanford, KFBD
Hollywood, KFAR
Long Beach, KSS
Los Angeles, KDZD, KDZF, KDZP, KFI, KHJ, KJC, KJS, KNN, KNV, KNX, KOG, KON, KUS, KWH, KXS, KYJ
Modesto, KXD
Oakland, KFBN, KLX, KZM
Pasadena, KDYR, KLB
Pomona, KGF
Reedley, KMC
Sacramento, KFBK, KVQ
San Diego, KDPT, KDYM, KDYO, KFBC, KFFA, KYF
San Francisco, AG1, KDN, KDZG, KDZW, KDZX, KFDB, KLP, KLS, KPO, KSL, KUO, KZY
San Jose, KFAQ, KQW,
San Luis Obispo, KFBE
Santa Ana, KFAW
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

Colorado:
Boulder, KFAJ
Colorado Springs, KFBV, KFCK, KHD
Denver, DD5, DN4 KDZQ, KFAF, KLZ
Trinidad, KFBS

Connecticut:
Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
New Haven, WCJ, WGAH

Delaware:
Wilmington, WHAV

District of Columbia:
Anacostia, NOF
Washington, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WPM, WWX, 3YN

Florida:
Jacksonville, WDAL
Miami, WFAW, WIAZ
Pensacola, WGAN, WLAV
Tampa, WDAE, WEAT, WHAW
West Palm Beach, WKAH

State, City, Call

Georgia:
Atlanta, WDAW, WGM, WSB
College Park, WDAJ
Decatur, WAAS
Gainesville, WKAY
Macon, WGAK, WMAZ
Savannah, WHAO

Idaho:
Boise, KFAU, KFBJ, KFDD
Lewiston, KFBA
Moscow, KFAN
Wallace, KFCC

Illinois:
Belvidere, WOAG
Chicago, KYW, WAAF, WBU, WDAP, WGAS, WJAZ, WMAQ, WNAJ, WPAD, WQX
Decatur, WBAO, WCAP, WHAP
Peoria, WBAE, WFAP, WJAN
Quincy, WCAW, WCAZ
Rockford, WIAB, WJAH
Springfield, WDAC
Tuscola, WDZ
Urbana, WRM

Indiana:
Anderson, WEAW
Evansville, WNAM
Fort Wayne, WFAS
Frankfort, WKAT
Greencastle, WLAX
Huntington, WHAY
Indianapolis, WLK, WOH
Marion, WIAQ
Mishawaka, WBAQ
Muncie, WJAF
Richmond, WOZ
South Bend, WGAZ
Terre Haute, WEAC
West Lafayette, WBAA

Iowa:
Ames, WOI
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Cresco, WNAG
Davenport, WHAI, WOC
Des Moines, WGF, WHX
Fort Dodge, WEAB
Iowa City, WHAA
Le Mars, WIAU
Marshalltown, WLAR
Newton, WIAH
Shenandoah, WGAJ
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WEAZ, WHAC, WMAR

Kansas:
Anthony, WBL
Atwood, WEAD
Eldorado, WAH
Emporia, WAAZ
Hutchinson, WLAS
Independence, WFAY
Liberal, WMAG
Manhattan, WNAK, WTG
Parsons, WOAJ
Salina, WFAD
Topeka, WJAQ, WPAM
Wichita, WAAP, WEAH, WEY, WHAN

Kentucky:
Bowling Green, WNAB
Louisville, WHAS, WKAG, WLAP, 9ARU
Paducah, WIAR
Waco, WPAA

State, City, Call

Louisiana:
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, WAAG, WDAN, WGAQ, WMAU

Maine:
Auburn, WMB
Houlton, WLAN
Portland, WJAL
Sanford, WFAR

Maryland:
Baltimore, WCAO, WEAR, WKC, WNAY

Massachusetts:
Boston, WAAJ, WFAU, WNAC
Dartmouth, WMAF
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WCN, WDAS

Michigan:
Ann Arbor, WMAX
Bay City, WTP
Dearborn, WWI
Detroit, KOP, WCX, WWJ
East Lansing, WHW, WKAR
Flint, WEAA
Kalamazoo, WLAQ
Lansing, WHAL
Saginaw, WIAW

Minnesota:
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, WBAH, WCAS, WLAG, WLB
Northfield, WCAL
St. Cloud, WFAM
St. Paul, WAAH

Missouri:
Butler, WNAR
Cameron, WFAQ
Columbia, WAAN
Jefferson City, WOS
Joplin, WHAH, WJAC
Kansas City, WDAF, WHB, WMAJ, WOQ, WPE
Marshall, WJAT
Rockport, WMAD
St. Joseph, WEAK
St. Louis, KSD, WCK, WEB, WEW, WMAY
Springfield, WIAI, WKAS
Tarkio, WIAT

Montana:
Billings, KFCH, KFED
Butte, KFAP
Great Falls, KDYS
Havre, KFBB

Nebraska:
David City, WRAR
Fremont, WOAE
Hastings, WKAM, WLAD
Lincoln, WFAV, WGAT, WIAX, WJAB, WKAC, WLAF, WMAH, WQAP, WSAS
Norfolk, WJAG
Omaha, WAAW, WDV, WIAK, WNAL, WOU, WOV
Rushville, WEAV
University Place, WCAJ
Waco, WPAA

State, City, Call

Nevada:
Reno, KDZK, KFAS,

New Hampshire:
Laconia, WKAV

New Jersey:
Atlantic City, WHAR
Camden, WRP
Deal Beach, 2XJ
Jersey City, WAAT, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WJZ, WOR, 2XAI
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Roselle Park, WDY
Trenton, WMAL

New Mexico:
Roswell, KNJ
State College, KOB

New York:
Albany, WNJ
Binghamton, WFAX, WIAV
Buffalo, WGR
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WDT, WEAF, WJX, WLAW, WVP, WWZ, 2XI
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Syracuse, WBAB, WDAI, WFAB, WLAH, WNAN
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Raleigh, WLAC

North Dakota:
Fargo, WDAY, WKAJ
Grand Forks, WOAB
Wahpeton, WMAW

Ohio:
Akron, WOE
Athens, WAAV
Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH
Cleveland, KDPM, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN, WPAL
Dayton, WA1, WFO, WJAJ
Defiance, WCAQ
Fairfield, WL-2
Granville, WJD
Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Springfield, WLAM, WNAP
Stockdale, WJAK
Toledo, WBAJ, WHU, WJK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY, WMC

State, City, Call

Oklahoma:
Ardmore, WOAA
Enid, WNAF
Muskogee, WDAV
Norman, WNAD
Okemah, WKAK
Oklahoma City, WKY, WMAB
Tulsa, WEH, WGAF, WLAL
Yale, WHAT

Oregon:
Astoria, KFBM
Eugene, KDZJ, KFAT
Hood River, KQP
Klamath Falls, KDYU
Marshfield, KFBH
Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFAB, KFEC, KGG, KGN, KGW, KQY, KYG
Salem, KFCD

Pennsylvania:
Allentown, WIAN
Altoona, WGAW
Bridgeport, WBAG
Brownsville, WDAQ
Clearfield, WPI
Crafton, WAAX
Easton, WMAP
Erie, WOAV, WSX
Lancaster, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO, WPJ
Pittsburgh, KDKA, KQV, WCAE, WHAF, WJAS
Scranton, WLAO, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WKAZ, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
East Providence, WKAD
Pawtucket, 1XAD
Providence, WEAN, WJAR

South Carolina:
Charleston, WFAZ, WNAQ
Orangeburg, WGAM

South Dakota:
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ
Yankton, WAJU, WNAX

Tennessee:
Knoxville, WNAV
Memphis, WKN, WPO
Nashville, WDAA

Texas:
Abelene, WQAQ
Amarillo, WDAG, WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, WDAO, WFAA, WRR
El Paso, WDAH
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WFAL, WGAB, WPAN, WSAV
Laredo, WWAX
Orange, WKAL
Paris, WTK
Port Arthur, WFAH
San Antonio, AS6, DM7, WCAR, WJAE, WOAI
Tyler, WOAF
Waco, WJAD, WLAJ, WWAC

State, City, Call

Wichita Falls, WKAF

Utah:
Ogden, KDZL
Salt Lake City, KDYL, KDYV, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX

Virginia:
Blacksburg, WEAE
Fortress Monroe, WNAW

Washington:
Aberdeen, KNT
Bellingham, KDZR
Centralia, KDZM
Everett, KDZZ, KFBL
Lacey, KGY
Pullman, KFAE
Seattle, KDZE, KDZT, KFC, KHQ, KJR, KTW, KZC
Spokane, KFZ
Tacoma, KFBG, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFV

West Virginia:
Charleston, WAAO
Clarksburg, WHAK
Huntington, WAAR
Morgantown, WHD

Wisconsin:
Beloit, WKAW
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
Superior, WFAC
Waupaca, WIAA

Wyoming:
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU, KYQ

Porto Rico:
Ensenada, WGAD
San Juan, WKAQ

Canada:
Calgary, CHBC, CHCQ, CFAC, CFCN, CJCY
Edmonton, CHCC, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls CFCH
Kitchener, CJCF
London, CFCX, CHCS, CJGC, CKQC
Montreal, CFCF, CHYC,
Montreal, CFCF, CFZC, CHCX, CHYC, CJBC, CKAC, CKCS
Nelson, CJCB
Ottawa, CHXC
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CHCZ, CHVC, CJCD, CJCH, CJCN, CJSC, CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC, CHCA, CHOC, CJCE, CKCD
Walkerville, CFCI
Winnipeg, CHCF, CJCG, CKCB, CKZC, CJNC

Cuba:
Havana, PWX

STATION SCHEDULES

(Continued from page 8)

WBAB, Syracuse, N. Y. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30-9:30 pm; concert, agriogrames etc. Eastern.

WBAE, Peoria, Ill. Bradley Polytechnic Inst.

WBAF, Moorestown, N. J. Fred M. Middleton.

WBAG, Bridgeport, Pa. 485 also. 300 mi. Diamond St. Fibre Co. Daily, 11:45-12 m, markets, weather. Eastern.

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

WBAJ, Toledo, O. 300 mi. Marshall-Gerken Co. Daily ex Sun, 12:05-2 pm, 6-7:30, news, music, reports. Tues, Thur, Sat, 8-9 pm, concert. Eastern.

WBAN, Paterson, N. J. 100 mi. Wireless Phone Corp. Daily ex Sun, 10:30 am, on the hour to 9:30 pm, concert, baseball. Eastern.

WBAO, Decatur, Ill. James Millikin Univ.

WBAQ, Mishawaka, Ind. Lyradion Mfg. Co.

WBAP, Fort Worth, Texas. 400 and 485 only. 1,500 mi. Ft. Worth Star Telegram. Daily ex Sun, 9:45-10 am, 11-11:30, 3-3:30 pm, 3:45-4, 5:15-5:30, 6:30-6:45, 9:30-10:30, news, reports, concert. Central.

WBAU, Hamilton, O. Republican Pub. Co.

WBAV, Columbus, O. 485 also. 300 mi. Erner & Hopkins Co. Daily ex Sun, 12:30 pm, news, weather. Mon, 7 pm, music. Central.

WBAW, Marietta, O. Marietta College.

WBAX, Wilkes-Barre, Pa. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 400 only. 1,500 mi. A. T. & T. Co. Daily, 11-12 am, 4:30-5:30 pm. Thurs, 7:30 pm on Eastern daylight saving.

WBL, Anthony, Kans. 200 mi. T & H Radio Co. Mon, Wed, Fri, 10-11 pm, concert, lecture. Sat, 11-12 pm, concert. Sun, 10 am, 4-5 pm, church service. Central.

WBS, Newark, N. J. 100 mi. D. W. May, Inc. Mon, Wed, Thur, 7:30-8:30 pm, reports, music. Sun, 9-10:30 am, 1-3 pm, church service. Eastern.

WBT, Charlotte, N. C. 485 also. 500 mi. Southern Radio Corp. Daily ex Sun, 11 am, reports, 8 pm, music. Sun, 7:30 pm, church service. Eastern.

WBU, Chicago, Ill. City of Chicago.

WBZ, Springfield, Mass. 400 only. 500 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 3 and 8, church service. Eastern.

WCAB, Newburgh, N. Y. 150 mi. Newburgh Daily News. Daily ex Sun, 1 pm, 2, 3, 7. Mon, Fri, 10:30 pm. Eastern.

WCAC, Fort Smith, Ark. 500 mi. John Fink Jewelry Co. Fri, Sun, 8-10 pm, music, talks, sermon. Central.

WCAD, Canton, N. Y. 200, 480 also. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. Kaufman & Baer Co.

WCAG, New Orleans, La. Daily States Pub. Co.

WCAH, Columbus, O. 150 mi. Entrekin Elec. Co. Tues, Fri, 7-9 pm, music. Wed, Thur, Sat, 7-8 pm, music. Sun, 10-12:30, church service. Central.

WCAI, San Antonio, Tex. Southern Equipment Co.

WCAJ, Univ. Place, Neb. 485 also. 100 mi. Neb. Wesleyan. Univ. Daily ex Sun, 11 am, weather, news. Wed, 9 pm, music, lecture. Central.

WCAK, Houston, Tex. 100 mi. Alfred P. Daniel. Daily ex Sun, 7-7:15 pm, music. Wed, 8-9:15, concert. Sun, 3-4:30 pm, concert. Central.

WCAL, Northfield, Minn. 500 mi. St. Olaf College. Thur, 11 pm, music. Sun, 8:30 pm, music, concert, lecture. Central.

WCAM, Villanova, Pa. Villanova College.

WCAO, Baltimore, Md. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20. Mon, Wed, 7:30-8:30 pm. Eastern.

WCAP, Decatur, Ill. Central Radio Service.

WCAQ, Defiance, O. 200 mi. Tri-State Radio Mfg. Co. Daily, 11:30-12:30 pm, 3, baseball; 6-6:30, baseball, concert; 8, special program. Central.

WCAR, San Antonio, Tex. 200 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Sun, 11 am, church service. Central.

WCAS, Minneapolis, Minn. 200 mi. Wm. H. Dunwoody Industrial Inst. Mon, 8-8:45 pm, music, lectures. Central.

WCAT, Rapid City, S. Dak. 485 also. 300 mi. S. Dak. School of Mines. Daily ex Sun, 9:30-12:30 pm, weather. Mountain.

WCAU, Philadelphia, Pa. Phila. Radiophone Co.

WCAV, Little Rock, Ark. J. C. Dice Elec. Co.

WCAW, Quincy, Ill. 200 mi. Quincy Elec. Sup. Co. (Quincy Herald.) Daily ex Sun, 8:45 am, markets; 11, markets; 1 pm, markets; 5, music, baseball. Tues, Wed, Thurs, Sat, 8:30-9:45 pm, concert. Sun, 6:30-7:30 pm, religious. Central.

WCAX, Burlington, Vt. Univ. of Vt.

WCAY, Milwaukee, Wis. Kesselman O'Driscoll Co.

WCAZ, Quincy, Ill. Whig-General.

WCE, Minneapolis, Minn. Findley Elec. Co.

WCJ, New Haven, Conn. 400 mi. A. C. Gilbert Co. Mon, Wed, Thur, 7:30-8:30 pm, news, music. Eastern.

WCK, St. Louis, Mo. 485 also. 50 mi. Stix Baer & Fuller (Grand Leader). Mon, Wed, Fri, 6:45-8 pm, concert, lecture, bedtime story. Central.

WCM, Austin, Tex. Univ. of Tex.

WCN, Worcester, Mass. 485 also. 100 mi. Clark Univ. Daily, 11:15 am, 5:15 pm, weather. Evening program irregular. Eastern.

WCX, Detroit, Mich. Detroit Free Press.

WDAA, Nashville, Tenn. Ward Belmont School.

WDAC, Springfield, Ill. Ill. Watch Co.

WDAE, Tampa, Fla. 485 also. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 400 and 485 only. 500 mi. Kansas City Star. Daily ex Sun, 3-4 pm, reports, music; 6-7, educational, bedtime story, etc. Mon, Wed, Fri, 8-10 pm, concert. Sun, 3:30-5:30 pm, music. Central.

WDAG, Amarillo, Tex. J. Laurance Martin.

WDAH, El Paso, Texas. 485 also. 300 mi. Mine & Smelter Supply Co. Daily ex Sun, 10 am, news, reports. Tues, Thurs, Sat, 7:30-8:30 pm, music. Mountain.

WDAI, Syracuse, N. Y. 485 also. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Wed, Sat, evening concert.

WDAJ, College Park, Ga. 485 also. 300 mi. A. & W. P. R. R. Co. Daily, 9-10 pm, concert etc. Central.

WDAK, Hartford, Conn. 150 mi. Hartford Courant. Daily ex Sun, 2:30 pm, 3:30, 4:30, 5:30, music; 7:40, bedtime story; 8:15, concert. Eastern.

WDAL, Jacksonville, Fla. 485 also. 250 mi. Florida Times Union. Daily, 11 am, time, weather, 3-3:15, 4-4:15, 5-5:15, 8-9:30 music. 10:05-10:20 pm, reports. Eastern.

WDAN, Shreveport, La. Centenary College and Glenwood Radio Corp.

WDAO, Dallas, Tex. Automotive Elec. Co.

WDAP, Chicago, Ill. 485 also. 1,000 mi. Midwest Radio Central Inc. Daily ex Sat and Sun, 9:45 am, 10:45, 11:45, 1:45 pm, 3:15, foreign exchange; 3:17, closing Chicago stocks. Sat, 9:45 am, 10:45, 11:45, 12:45 pm, foreign exchange; 12:17, closing Chicago stocks. Sun, 8:30-10:30, concert. Central.

WDAQ, Brownsville, Pa. 200 mi. Hartman-Riker Elec. & Mach. Co. Daily ex Sun, 10:30-10:50 am, music; 12:50-1:10 pm, music, news, weather; 5:05-5:30 music. Tues, Thurs, Fri, 9:15-10 pm, concert. Sun, 5 pm, chapel. Eastern.

WDAR, Philadelphia, Pa. Lit Bros.

WDAS, Worcester, Mass. Samuel A. Waite.

WDAU, New Bedford, Mass. 50 mi. Slocum & Killburn. Mon, Wed, 7-9 pm, concert etc. Eastern.

WDAV, Muskogee, Okla. Daily Phoenix.

WDAW, Atlanta, Ga. 485 also. 500 mi. Georgia Ry. & Power Co. Daily ex Sun, 6-7 pm; 9-9:55. Sun, 3:30-4:30 pm. Central.

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

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

The General Electric Company employs 3,000 persons in its Schenectady factory in the manufacture of Radio apparatus. It is expected that the business will ultimately give employment to over 5,000 people in this factory alone.

Radio Digest Illustrated

TRADE-MARK

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

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

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

Western Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

58
PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. III Chicago, Saturday, December 2, 1922 No. 8

Speed of Speech

Radio the Fastest Thing in the World

TRANSMITTERS take up a person's voice and broadcast it so that it can be heard 15 miles away sooner than the voice can be caught by a bystander 10 feet away. In fact, the sound waves can be picked up 200 miles as quick as at 10 feet distant. The time it would take for the voice to travel these comparative distances would be one ninety-third of a second. The tremendous velocity of the Radio wave may be compared with the speed of the voice. Sound travels a little more than 1,000 feet per second.

A Radio message spoken in New York can be caught in Portland, Oregon, in one sixty-second of a second. If sound alone were capable of carrying the message this distance, it would take almost four and one-half hours to reach Portland.

An actual test of the terrific speed of Radio is often made by Radio operators on ships in the Pacific. They will first tune in on the Honolulu station for its midnight signal. Immediately and by a quick adjustment, they will catch the noontime signals from Nauen, Germany.

Letters Are the Artist's Applause

Missives of Praise Much Appreciated

IT HAS not been so very many years ago that players and speakers were enthused by their audience giving applause. The motion pictures have taken the applause away from the scenario playwright and the only means he has of knowing the public's appreciation is in the sale and rental of his film, or to pass an evening at the theater where one of his pictures is shown.

Likewise, the speaker or singer who broadcasts has no way of receiving applause. The only form of applause for him is the mail frequently following a broadcast. Unless the fans voice their likes and dislikes occasionally, the managers of broadcasting stations have no way to gauge the public's preference. Without such letters the programs must be arranged by the managers through their own personal likes and good sense. Letters sent to broadcasting stations are often treasured more than the casual handclap. They are not thrown away, but are carefully read and passed on to the artists who are interested in their contents. Letters are the Radio artist's applause. It will pay you many times over to write these letters, no matter how brief, to show your appreciation of the kind of entertainment you most desire, and to praise those who produce it. Constructive criticism will aid the growth of Radio broadcasting.

Knowledge Being Disseminated

World Rapidly Absorbing Ether Education

NEVER before in the history of the world has knowledge been disseminated so widely and bits of information picked up so quickly as in recent months, thanks to Radio. Universities have adopted the Radiophone as a means of spreading their extension education facilities. Lectures, free to all who care to listen in, are being sent out daily from all parts of the country. Music, both jazz and classic, is being broadcast. Bedtime talks for children, health hints, book reviews, plays and, in fact, all subjects which lend themselves easily to broadcasting, are being delivered without cost to the people with Radio sets.

It is the greatest era of free learning the world has ever experienced. Even beyond the education spread directly through the Radio microphone there are means of helping the Radiophan and his friends to increase their knowledge. There is, for instance, geography. While geography cannot be broadcast by Radiophone, yet where is there a long distance fan who has not made a complete study of geography? The fans know locations, they know distances and they can tell directions of points from their own stations. By constant reference to the map of the United States they can draw an outline of the country from memory. This knowledge is gained through curiosity and the instinct of contest among the fans.

This contest and competition exists in all parts of the United States. And with the long distance reception will come some day more programs in foreign languages. Even foreign tongues will be taught then to listeners in.

Minority Will Succeed

What Will a Hundred Years of Radio Be?

IN THE current issue of Industry Illustrated there appeared an editorial, which, while not written for the Radio field, is befitting in all its words. It is worth while reading. Here is a part of its text:

"Over a hundred years ago, an English inventor succeeded in making a practical horseless carriage. Far from welcoming the thing with open arms, the great majority of people considered the new monster so dangerous that they compelled the passage of a law requiring a man to walk ahead of the machine, not faster than four miles an hour, with a red flag, which effectually disposed of the automobile idea, so far as the majority of people were concerned, but by no means stopped that small minority of engineers and inventors who finally gave us the motor car, today considered indispensable by the majority.

"While the big and ponderous majority has slowly acquired a new viewpoint, it stops there—always it stops, content with things as they are. And always the small but persistent minority goes on: dissatisfied with the reciprocating steam engine, it produces the turbine; dissatisfied with the wastes involved in coal burning, it produces the oil burner and powdered coal burner; dissatisfied with the man-power method of handling materials, it produces the conveyor and the crane and the industrial truck.

"In any field of endeavor, a man must give due consideration to the majority. But the majority merely rules, it does not initiate. For progress, for new and better ways of doing things, we must look to that small group of human beings whose minds refuse to write finis under any achievement, looking always to better that achievement—the numerically small, but potentially overwhelming minority."

Is Radio now following a "red flag" bearer traveling at a speed of four miles an hour, or has it passed that point and is now "hitting on all six"? Radiophans are in the minority, but many wonders are yet to come in Radio.

Condensed

By DIELECTRIC

If you happened to be living in the State of Tennessee, and had your auto stolen, the news of its theft would be broadcast together with the license number and description of the car. Naturally, that service is rendered by the automobile clubs. I wonder if they allow the Radio clubs in the State to aid them. A broadcasting news service supplemented by amateurs' code messages would leave very few indeed with no knowledge of the thefts. There are some fans who really find little time to work with their sets except late in the evenings. At any rate, you stand a better chance to regain your car with the aid of Radio than you had before it came into such popular use.

It has often been said of the people in the United States that they know comparatively little of the things taking place in South American countries. Perhaps that has been true. I say has been, because now that Radiophony is an accomplished fact the truth of that statement will generally be disproven. President Zayas, upon a recent occasion, was heard as far north as New Jersey by listeners in to the broadcasting of his speech. Possibly a very few understood what was being said. The broadcasting of phonograph records, which were picked up by amateurs in this country, needed no translation for the reason of our being used to hearing opera records in a foreign tongue. My point is this, news in several languages will no doubt be transmitted from these countries, so that we fans can learn more of the events transpiring there than has been the case formerly.

How much greater assurance of safety one may feel who now is engaged in ocean travel. For some time past when a ship had on board one taken suddenly ill, and no adequate means of either diagnosing or alleviating his condition, the chances for recovery were dubious. Today, when there is a patient on board, the operator transmits a message for aid to a land station and is immediately supplied with the skilled knowledge of a physician. Then in case of fire, the SOS calls are picked up by a number of vessels and succor is soon at hand. Is Radio a mere plaything? Let those in peril at sea answer!

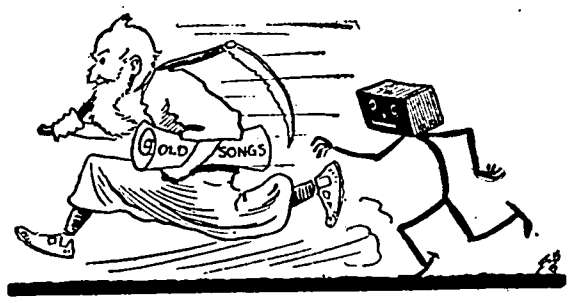
Perhaps as large a body of fans are interested to receive the news of football games, and other sports, as listen in for any other one thing. Heretofore, the sporting extra was depended upon for giving a complete description of the various plays in a game, and now, you simply tune in the station that will broadcast each play as it is made—a few seconds later. It would have cost me a considerable sum of money to have attended each of the games I have followed by means of my Radio receiving set. At the same time it was possible to be in touch with other matters needing attention. Sports and Radio are fast developing new fans for each other.

As a community booster Radiophony has no equal. To prove this assertion I simply refer you to the extensive publicity secured by Station WOAI, when they broadcasted the address of the Mayor of San Antonio, Texas, recently. Evidently the word "vicinity" takes on a broader meaning, for this new station of the Evening News was dedicated to "the citizens of San Antonio and vicinity" and the message was picked up as far away as Glen Cove, N. Y. It would be an easy matter to transmit glowing accounts of any town or State, emphasizing the advantages to be derived from living therein. Stations in Turkey please relay.

RADIO INDI-GEST

Old Broadcasts Rewired

"When You and I Tuned in Maggie."
"Silver Wires Among the Copper."
"By the Glad Ether Waves."



"Aunt Dinah's Radio Party."
"Call Me by Radio To-Night, Love."
"Wireless Back to Old Virginia."

—HARRIETT REYNOLDS MARCHANT.

Radio Fifty-Fifty

(One of a series of Radio lectures—Home meter)
Broadcasted nightly—seven to eleven

I do without a maid or cook, I don't get time to read a book—but hours and hours you spend at Radio! I peel potatoes, open cans, cook dinners, scrub the pots and pans—while you just calmly sit and Radio! You used to put the kids to bed, till you got tube sets in your head—now they must go to sleep by Radio! You once did gratify my wishes, sometimes would help to do the dishes—before you "went a nut" on Radio! You seldom take us for a ride, in nothing do you take such pride—as in your wonderful new set of Radio! Why, if I mention house or gown, you madly shout at me and frown—"Keep quiet! How can I tune the Radio? O hush, there's Station ZXI—Great Scot, you kids do love to cry—I guess I'll have to move my Radio!" Now, husband, I am tired of this, you're going to spoil our wedded bliss—if all your time you spend on Radio! But I know just what I will do, to make you pay a bill or two—for something else besides that Radio! Tomorrow I will go down town and buy a swell fall hat and gown—yes, inexpensive, dear—like Radio!—HELEN TYLER-COPE.

For Our Spiritual Needs

If Radio enables communication with departed spir-

its it's about time they started a Questions and Answers service.

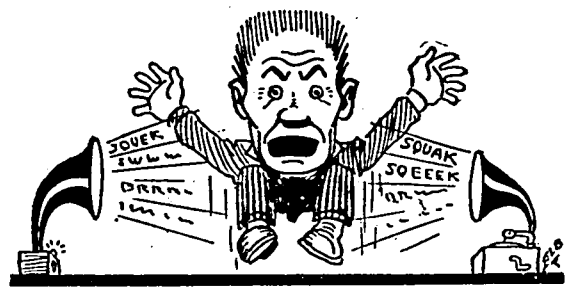
Just Blame It Onto Static

If Radiophans "rooted" their favorites in the way ball fans do, a stronger term than pandemonium would have to be invented.

Ether Travels

I have heard the savage tribes of Zululand
  As they bound their helpless victim to the stake;
I have heard the waves creep o'er a coral strand;
  I have heard the rustling palms on Guam and Wake.

I have heard the thunder of an avalanche;
  The grinding cakes of ice on Arctic seas;
The lowing herds upon a western ranch;
  The droning of a farmer's hive of bees.



I've heard the sledge dogs howl upon the trail;
  The jungle king lift up his sullen roar;
I've heard a fishing boat with flapping sail;
  I've heard the dancer's feet upon the floor.

No, I am no traveler as you may think;
  I never had the means nor time to go.
But I've even heard a Tartar chieftain wink;
  I hear the world by means of Radio.

How to Make Uniset Panel Receiver

By Thomas W. Benson

IN PREVIOUS articles the construction of a single circuit tuner and tube detector were considered. The construction of an audio frequency amplifier unit will be now described in detail and thus

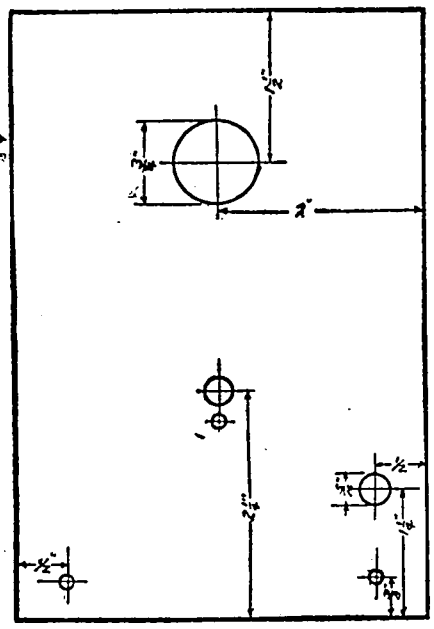


Figure 1

enable the constructor to advance one step nearer the final set. It might be well to state at this point that an audio frequency amplifier does not increase the range of a set but serves to increase the volume of the sound. Signals or music that can just be heard with the detector alone will come in loud with one stage of amplification and when two are used the music will be loud enough to be heard all over a fair sized room.

Amplifier Set

The amplifier of course has a panel that matches up with the tuner and detector, in fact it is identical with the detector panel in every detail. The layout of the panel is given in Figure 1 and mounts the same instruments as the detector panel, namely a rheostat in the center and a jack at the lower right corner.

The base is the standard 4 by 5 inches of ¾-inch pine. The terminal panel mounts seven binding posts as in the case of tuner and detector. Following the detector construction a V.T. socket is mounted on the base as far to the front as possible without interfering with the rheostat. This leaves room to mount the audio frequency amplifying transformer as seen from Figures 2 and 3 which show the side and top views of the unit respectively.

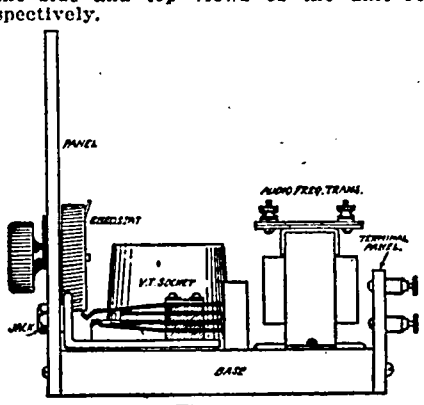


Figure 2

There are several reliable makes of transformers on the market and any transformer built by a reliable concern may be used. Before mounting the transformer the set should be wired in the same manner as advised in connection with the detector panel previously described. That is, cut the connecting wires of the proper length and solder them to the jack terminals and to the binding posts before the panels are attached to the base by means of the wood screws. The socket can then be wired in, finally mounting the transformer and connecting it into the circuit.

The Wiring of the Unit

The wiring diagram of the set is shown in Figure 4. It will be noted that the primary of the amplifying transformer is not connected to binding posts. This is not done because the posts on the transformer will usually be so located as to allow of connections being made direct.

On completing the unit it can be rigidly attached to the tuner and detector units by means of links. From a brass strip ⅛-inch thick cut two pieces and drill or punch holes as shown in Figure 5. Remove the link that holds the tuner and detector together and cut 2 inches off one end, thus making it lap half way across the detector panel, and tighten the screws on the tuner panel. The strips just made will reach from the center of the detector panel across the amplifier. If desired one long strip can be used with holes punched to pass the screws on each panel but the short strips make the arrangement easier to dismantle and rearrange.

Connecting Amplifier in Set

The method of connecting the amplifier to the other units is shown in Figure 6. The resulting circuit is given in the lower part of the illustration. An extra battery is required to furnish the higher voltage used with the amplifier and should preferably be of the 45-volt size to give a total voltage of 62 on the plate of the amplifier tube. Higher voltages up to 90 can be used with an increase in signal strength.

When using the amplifier the phone cords should be fitted with a plug so the detector alone or amplifier and detector can be employed by inserting the plug in the proper jack.

Second Stage of Amplification

Amplification at audio frequencies is usually carried to two stages and seldom beyond that. A second stage of amplification would employ a similar panel to that just described which can be connected into the circuit as shown in Figure 7. No extra batteries are required as the one B battery serves for both tubes. The four units are linked together by strips to form a complete set.

With the addition of a second stage of amplification tube noises as well as

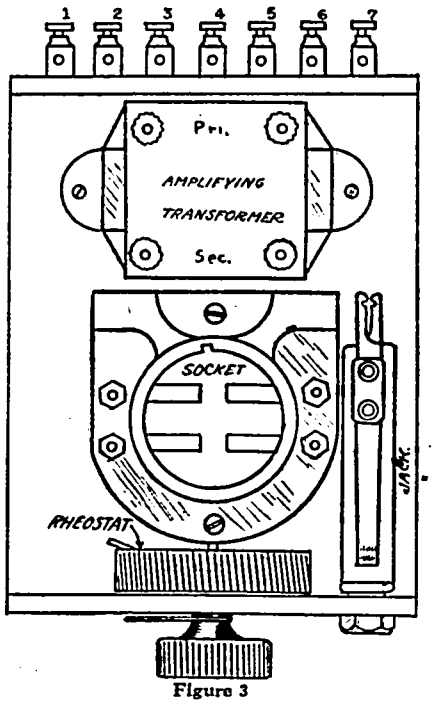


Figure 3

squealing and howling may make themselves quite troublesome. The elimination of these disturbances if serious will require a little experimenting on the part of the constructor. Tube noises may be due to poor battery connections, worn out B battery, poor contact between tube and springs in the sockets. Go over these and make sure every connection is tight. Howling or squealing is due to one tube feeding back into the other and giving a regenerative action.

Eliminating Noise

The noise can often be cut out by reversing the leads to the transformers and this remedy should be tried. If of no avail shielding will usually remedy the trouble. To shield the unisets cut two

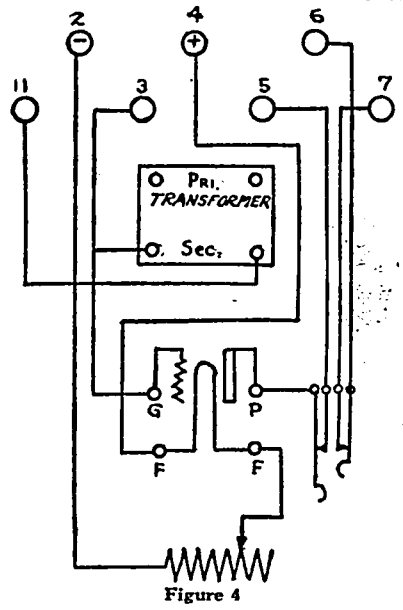


Figure 4

pieces from sheet copper, brass or aluminum measuring 4 by 5 inches. Slip a sheet between the detector and first stage amplifier and one between the first and second stages. These strips should be connected together and to ground terminal on the tuner. These sheets act as shields and effectively prevent interaction between the tubes.

(Continued on page 12)

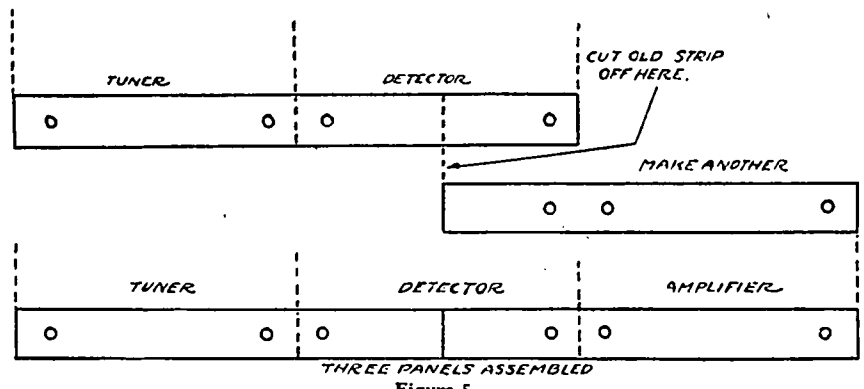


Figure 5

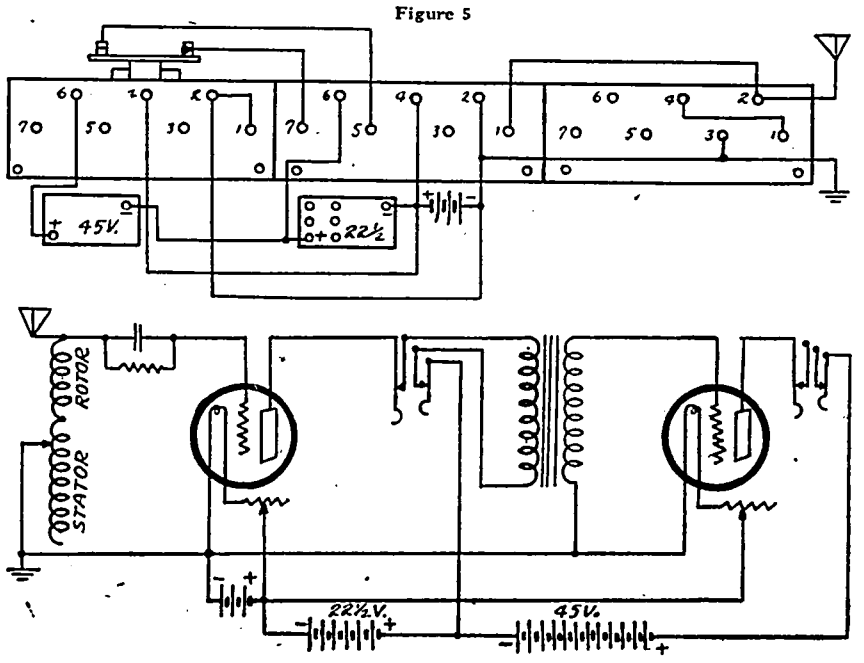


Figure 6

Flewelling Super-Regenerator Adapter

Extras for Set to Make Regenerator a "Super"

Opinions differ as to the value of the Flewelling super-regenerative circuit described in the October 21st and November 4th issues of RADIO DIGEST, but with the regenerative set described by me on page 13, of the October 28th issue, using a UV 200 tube, 65 volts on the plate, and the Flewelling circuit I brought in KFAF, Denver, 2XB, New York and the Fort Worth Star-Telegram louder than I have ever heard them before. With a UV 201 tube and above 100 volts on the plate, they came in considerably louder.

As the extra apparatus costs practically nothing it is well worth while trying out.

Cut a piece of paper 3 inches by 6 inches and fold it twice lengthwise so that when you look at it from the end it looks like the letter N. Cut two pieces of tinfoil 1¼-inch by 5 inches, and lay one in each fold so that ¼-inch of the foil projects at each side. Fold the paper and foil crosswise until it forms a neat flat packet about 1 inch wide. Make three of these and mount them with small brass screws

WORKSHOP KINKS? EARN A DOLLAR—

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

RADIO KINKS DEPARTMENT,
RADIO DIGEST,
123 West Madison St., Chicago, Ill.

CONDENSER BANK AND HOOK-UP

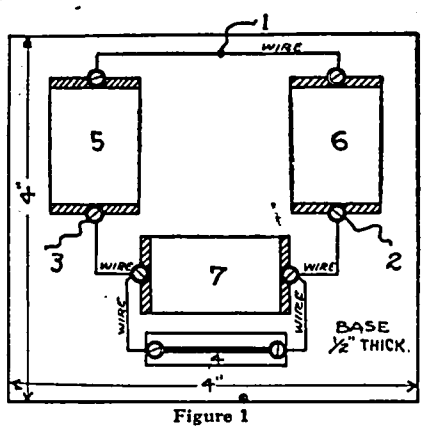


Figure 1

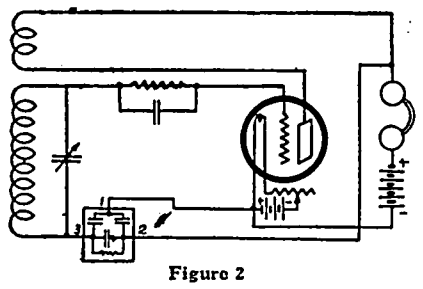


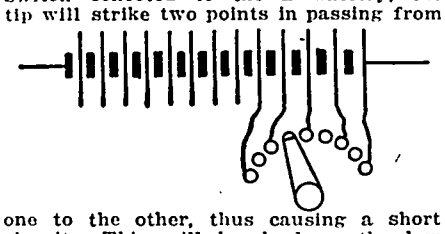
Figure 2

and washers on a piece of wood or fiber ½ inch by 4 inches by 4 inches, as shown in Figure 1. The leak (4) is a piece of cardboard with a very heavy lead pencil line across from end to end. Wire as shown in the diagram and hook up as shown in Figure 2.

This circuit allows the use of plenty of B battery without making tuning too critical and I think it is a great improvement.—Chas. Middleton, Westville, Ind.

Use of Extra Switch Points

When turning the blade of a panel switch conected to the B battery, the tip will strike two points in passing from



one to the other, thus causing a short circuit. This will break down the low amperage of these cells. To over come this difficult place an extra switch point between the regular ones and have no connection to it. Of course you will have a double set of points, but only half of them will be in the circuit, and the switch blade will jump from a dead one to a live point each movement.—Louis Daigle, Franklin, La.

Home-made Panels

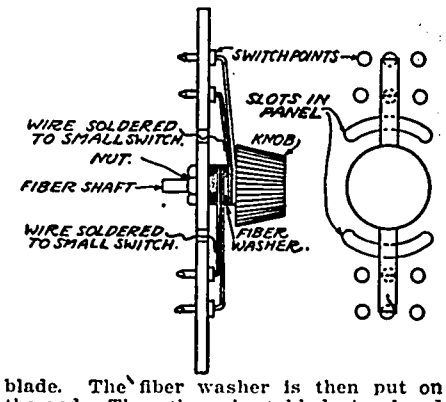
Several sheets of asbestos roofing were procured from a roofing company and these used in building up the panel. The sheets were not very thick and it took six of them stuck together with shellac to make the thickness desired. The pieces were cut 20 inches long and 10 inches wide. After thoroughly coating them with the shellac they were stuck together and placed under a heavy weight. When this became thoroughly dry I coated the outside several times with black shellac. Never use paint as it contains lead.

Make such a panel large enough so that it will need trimming. This can be done by placing the prepared panel between two boards and saw it and the boards as if sawing a single piece.—Selwyn Graves, Denver, Col.

Knob and Blades Make Series Parallel Switch

Needing a series parallel switch I designed one as shown in the illustration. The materials required to make this switch are as follows: Two long switch blades, two short switch blades, 2 feet of bell wire one ⅛-inch fiber rod, tapped to take two 8-32 units and one knob to fit the fiber rod, one 1/16-inch fiber washer.

The parts are assembled as shown in the diagram. A short blade is put on the rod and right on top of that is a long



blade. The fiber washer is then put on the rod. The other short blade is placed on top of the long blade. The knob is then put on to hold the blades in place. It is quite necessary to use a fiber shaft so that the two sets of blades will not come in contact with each other. The short and long blades on one side correspond with one continuous blade of the ordinary series parallel switch. This type of a switch can be used either for a series parallel switch or for changing to different stages in an amplifier.—Eugene Schmidt, Utica, N. Y.

Preventing Interference

Amateurs, who operate Radio sets for receiving, should tune and stop their bulbs from oscillating as quickly as possible, as they may interfere with their neighbor's entertainment.

TO MAKE UNISETS

(Continued from page 11)

As previously mentioned in connection with the tuner and detector, the four units comprising tuner, detector and two stage amplifier can be mounted on one panel and the apparatus mounted on one long base. These four units comprise a rather complete receiver that can be used with a loud speaker and will bring in broadcasts clearly and without distortion. No regeneration is used in these circuits shown but the next panel to be described will allow

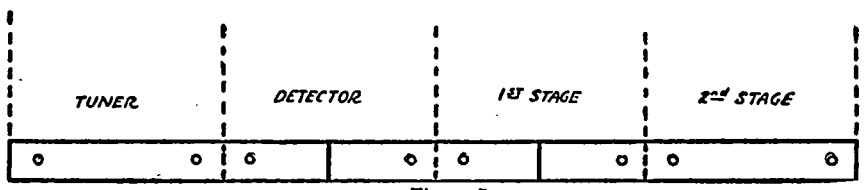


Figure 7

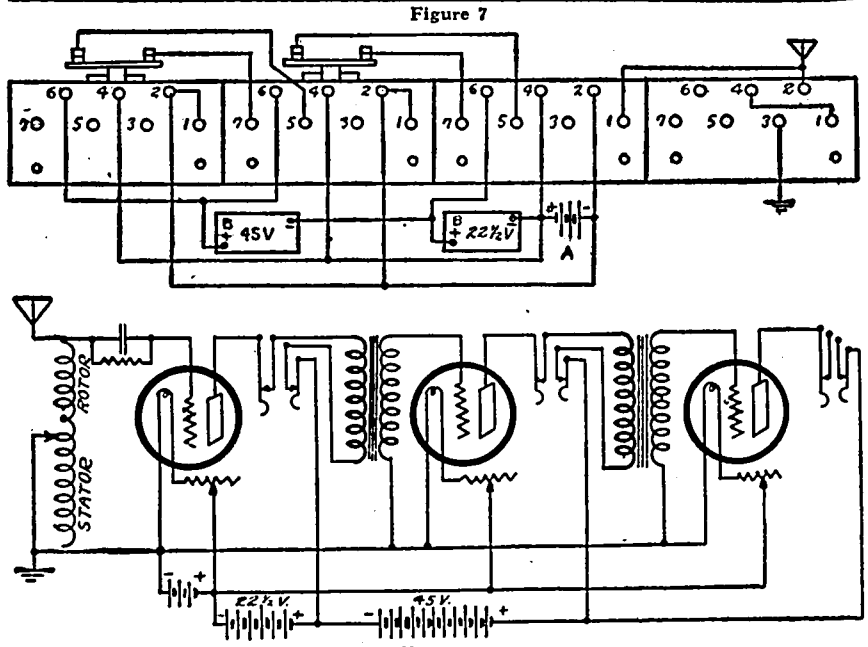


Figure 8

of its use and will also permit of the reception of long wave stations.

Combining Units Into One Instrument

When the units are combined into one instrument the number of binding posts can be reduced materially, in fact they can be cut down to five or six, just sufficient to connect aerial and ground, A and B batteries. The writer does not advise this construction however for every day sees new circuits described and where each instrument is connected to a post it is a simple matter to test new circuits and perhaps evolve a new one. It is often the case that one who starts by listening to broadcasts develops into a regular "bug" anxious to try everything.

Experimenting with the outfit will often increase the intensity of the signals quite appreciably. A leak across the secondary of the amplifying transformers sometimes results in improved operation. A leak is readily made from a strip of fibre with holes punched in it to fit over the transformer terminals. Drawing lines between the posts with a soft lead pencil will form a high resistant leak. Or what is termed a bias or C battery can be employed. This is connected between the secondary of the transformer and the grid and consists of a few flashlight batteries in series, the negative or zinc terminal being connected to the grid. Various voltages are applied till best results are obtained.

The writer will be pleased to answer any questions relative to the construction or operation of these sets.

(R. F. Amplifier Uniset Next Week)

Flewelling Super-Regenerative Panel Receiver

A Cheap, Single Tube Set That Brings in Distant Stations

By H. J. Marx

THE WAVE of popularity that has greeted this new circuit as first announced by the RADIO DIGEST ILLUSTRATED in the October 21st number, is a clear indication of its efficiency of operation. In contrast to the Armstrong Super-Regenerative circuit, it requires no experienced operator, but can be handled by the newest of Radiophans.

With but a single tube in the hook-up, reports are coming in from all over the country of the efficiency of this circuit in long distance reception. Requests are repeatedly coming in for more detailed information and hook-ups for Radio and audio frequency amplification.

The popularity of the panel and cabinet installations of circuits has necessitated some form of layout along similar lines for the Flewelling circuit. In order to make it easier for the amateur to understand, the hook-up is repeated in the panel form. Details of and comments on the various pieces of apparatus that make up the set are given.

Description of Apparatus

The parts in the panel diagram are numbered for identification. Numbers 1 and 2 are honeycomb coils, mounted so a variation in coupling can be had. The first or grid coil should have about fifty turns—although this may be affected by the natural wave length of the particular type of antenna used. The second or plate honeycomb coil can be ordinarily a 75-turn coil although sometimes slightly better results have been obtained with 90 turns. The question is often asked whether a variocoupler cannot be substituted. The difficulty lies in the fact that the winding on the rotor of a variocoupler has an insufficient number of turns. If however, the turns are increased to about 75 or 90, the results will be about the same as with the honeycomb coils and will in addition, simplify the panel mounting construction.

Condensers and Leaks

The variable condenser, No. 3, is of the usual 23-plate type (.0005 mfd.) and is shunted across the grid coil. The condenser No. 4 is likewise variable but the capacity is only .00025 mfd. (11-plate). This is placed in series with the antenna but a snap switch, No. 5, is connected across so that the condenser can be shunted out if desired.

The three fixed condensers, N. 6, have a capacity of .006 mfd. each. These apparently have stumped many of the amateurs because numerous letters have been received, stating that this particular capacity is not obtainable on the market. It can be taken care of, however, by combining in parallel three phone condensers of .002 mfd. each, six of .001 each, or other combinations.

Condenser No. 7 is the usual grid condenser and has a capacity of .00025 mfd. The grid leak No. 8 should be of the variable type as the adjustment is very critical, running from 1 to 1.5 megohms. The pencil mark leak offers the simplest and cheapest method although other types and forms of variable grid leaks are obtainable on the market. No. 9 is also a variable grid leak of very low resistance and is not particularly sensitive. Experiment must determine its value as it will vary with tubes.

Tube to Use

The tube used in this circuit is preferably hard. The usual amplifier tube, UV 201 or C 301 will give satisfactory results. Power tubes will give slightly better results. With the ordinary amplifier tubes the plate voltage should be about 100 volts. With power tubes, however, an increased plate potential is possible. The filament rheostat No. 11 can be of the ordinary type, but a vernier construction is recommended. The usual phone condenser with a capacity of .002 mfd. is used.

Aerial System

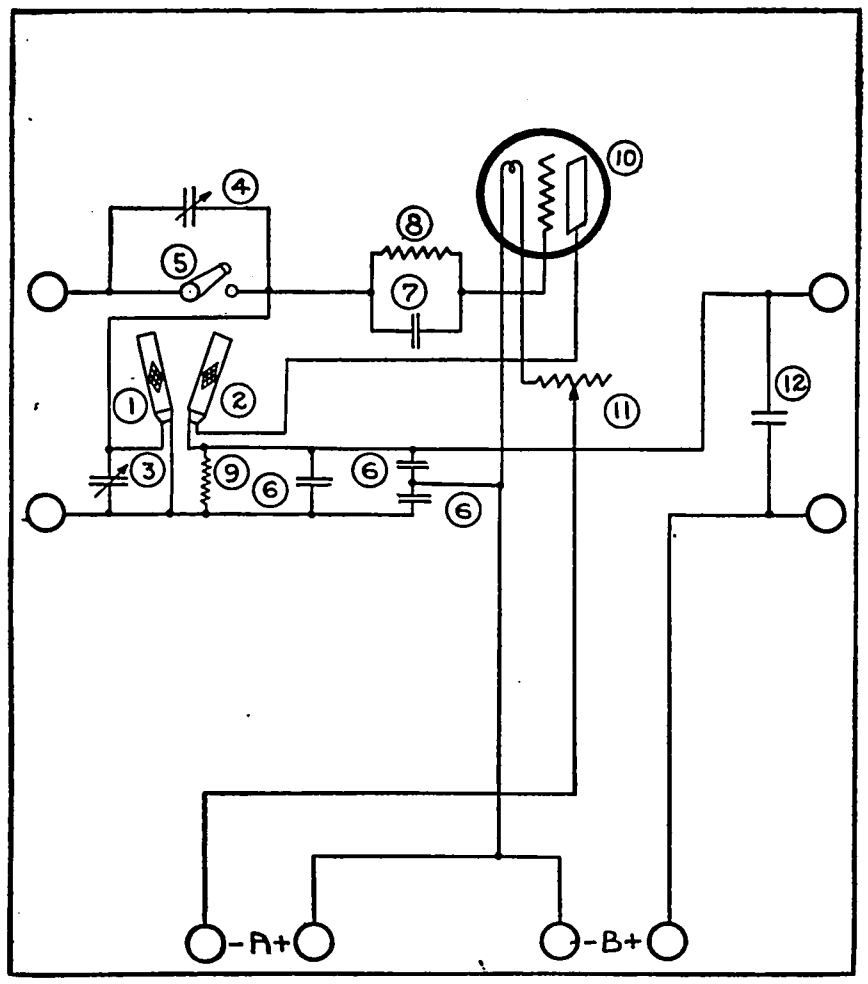
When the loop aerial is used with this circuit the two ends are connected to the binding post on the left side of the panel. Under such conditions, condenser No. 4 would be shorted out by switch No. 5.

When outdoor aerial alone is used without a ground, it should be connected to the upper left binding post. Under these conditions switch No. 5 is left open and the primary circuit is first tuned by means of condenser No. 4.

If the ground connection is used instead of the antenna, it should also be connected to this upper binding post. Very often, for short distance work, good results will be obtained without the use of any aerial or ground connection at all. The amateur should not overlook the fact that the natural wave length of his antenna circuit may necessitate a change in the value of honeycomb coil No. 1.

Tuning

The operator will find that the coupling between coils No. 1 and No. 2 is not half as critical as the adjustment of grid leak No. 8 for best resistance to balance up the circuit. Condenser No. 3 serves the purpose of accurate tuning adjustment of the grid circuit for wave length. The resistance of the grid leak No. 8 will be considerably affected by the position of the rheostat (11) since the potential and connection of the grid is dependent on the heat of the filament. The three condensers (No. 6) should be fairly accurate in value in order to get a properly balanced circuit. In assembling the set it is essential to bear in mind that short leads will be of considerable assistance in eliminating unnecessary howling.



LIST OF PARTS USED
Numbers According to Diagram

1—Honeycomb Coil—50 turns
2—Honeycomb Coil—75 to 90 turns
3—Variable Condenser—.0005 mfd. (23 plate)
4—Variable Condenser—.00025 mfd. (11 plate)
5—Snap Switch
6—3 Fixed Condensers .006 mfd. each
7—Grid Condenser—.00025 mfd.
8—Variable Grid Leak—1. to 1.5 megohms
9—Variable Grid Leak—.25 to .75 megohms
10—Amplifier (hard) Vacuum Tube
11—Filament Rheostat
12—Phone Condenser .002 mfd.

Amplification

In spite of the good results that have been obtained from this circuit, the first thought that develops in the amateur's mind is the addition of amplification stages. In view of the high efficiency of this set it would hardly appear necessary or worth while adding on additional Radio frequency stages. For the amateur, however, who wants to go further, the suggestion is made that a filter circuit be inserted, in order to avoid the usual flow of low frequency oscillations to the amplifier tube.

A TELEGRAM FROM FLEWELLING

Answering your questions, grid leak used has slightly less resistance after audio amplification is added. Leak across condenser bank is same with or without amplification and is about one-half megohm. Grid leak is about one and one-half megohm without, and between one and one and one-half with, amplification. No absolute value can be given because it depends on tubes used and the individual wiring characteristics. Recommend setting leak across condenser banks at one-half megohm resistance permanently, and do all adjusting with variable grid leak.

Phone impedance is not at all critical. As many as nine different types of phones have been used separately and together in series at one time. If audio amplification is added, phone impedance is replaced by impedance of transformer primary. Make note that it is impedance that is used, and not a particular value. Any impedance will serve so far as variation frequency is concerned.

Entire action seems to depend upon successful adjustment of variable grid leak.

Have received inquiries all over the United States and Canada asking if Westinghouse WD-11 and Myers High Mu tubes can be used. Answer is yes, positively. In both cases use one hundred volts on plate. Audio amplification is simple but tuning is terrifically noisy until station is tuned correctly, when all noises except whistle are eliminated. Grid leak should be set to keep whistle at minimum and then is not bothersome.

Wiring for amplifier is as follows:

Remove phones and replace with transformer primary of any good audio transformer. Carry A battery connections to the amplifier filament. Put one side of secondary of transformer to positive filament of amplifier tube and other side to the grid. Use ANOTHER one hundred-volt B battery in series with amplifier plate, phones, and positive filament. Adjust grid leak until maximum quietness is obtained. If two or three stages are desired, proceed in usual manner for cascading, but keep phones away from ears and watch out for burned-out transformers and phones.

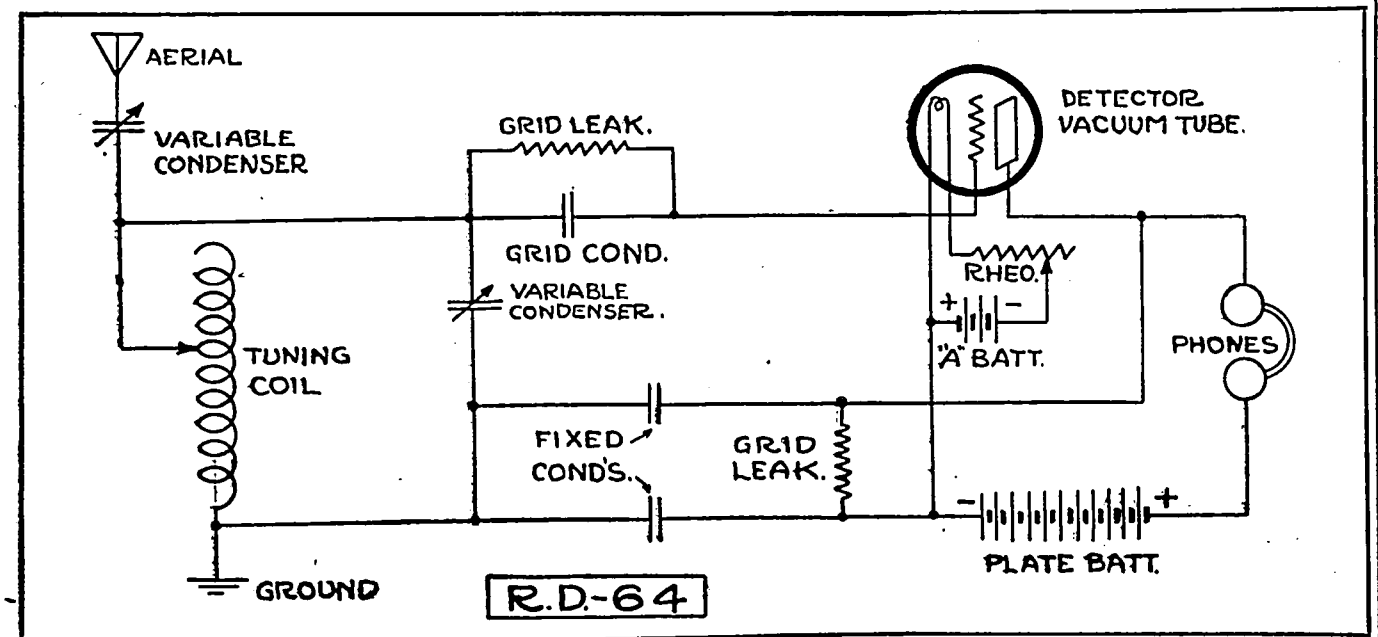
Using this arrangement with one stage, a station ten miles away was heard without antenna or ground almost as loud as ordinary phonograph. Two stages will drown out a phonograph playing a loud band selection. With twenty feet of antenna but no ground, and one stage of audio, I hear Drake Hotel, Chicago, WDAP, almost as good as above.

E. T. FLEWELLING.

Detector Tubes Not Alike

No two detector tubes are alike in any sense and no two require the same grid leak values. When you change tubes, you must become acquainted with your set all over again. You have changed the most important link in the chain.

SINGLE SLIDE TUNING COIL REGENERATOR



This circuit, as a simple single-tube hook-up, presents some interesting possibilities in reception. The tuning unit consists of a single-slide tuning coil and a 43-plate variable condenser in the antenna circuit. Another 23-plate variable is shunted across the coil for more accurate control of wave length. The two fixed condensers each have a capacity of .005 microfarad. The grid lead at the bottom has a resistance of about two megohms.

The regular grid lead and condenser combination in the circuit consists of the resistance of one megohm, and capacity of .00025 microfarads. The vacuum tube is a soft or detector type. A rheostat, preferably with vernier control, is necessary with the usual 6-volt A battery. The plate battery voltage should be about 22½.

In tuning this circuit the antenna condenser is placed in a position of full capacity, while the shunt condenser is set in a midway position. The slide on the tuning coil is adjusted and worked in conjunction with the necessary readjustment of the antenna condenser. The fine adjustment for wave length is accomplished through the variable condenser. After this tuning has been accomplished, the rheostat should be adjusted for maximum flow of filament current without unnecessary distortion and mushing of signals.

Aerial Lead Connector

A good aerial connector which will stand all tests and be of good use is the one described below. It consists of a brass plate, triangular in shape, with a set of screws or binding posts for making the necessary connections. The wire is connected in the proper manner to each binding post and then made fast to the lead-in. This type is easy to make and very rugged in construction.

A small piece of ⅜ or ½-inch brass about two inches square is cut diagonally, so that two triangular pieces result. Along the long edge holes are center-punched and drilled for screws or binding posts. There should be as many binding posts as there are wires in the aerial. All of the fittings should be of brass, which will not rust or oxidize as readily as iron or steel.

Another hole is made at the apex of the triangle and a binding post capable of taking a large size wire is fastened to the plate at this point. Every screw is made as tight as possible, so that the danger of anything becoming loose will be reduced to minimum. If desired the whole connector may be given a heavy coating of shellac or other kind of preserving varnish. This will retard the oxidation of the metal.

The wires of the flat top portion of the aerial are inserted in the base binding posts, which are made very tight. The lead-in wire, which should not be smaller than No. 14 copper wire, is connected to the lower binding post and carried through the lead-in insulator to the apparatus.

Grid Acts as Gate

The part played by the grid of the three-electrode vacuum tube is to form a variable gate through which the electrons pass to the plate, and the amount the gate is opened or closed depends on the variations of the Radio waves coming in, thereby causing the power of the local plate battery to be utilized to give a much louder signal than would be possible with the energy of the signal alone.

In other words, the grid action is like that of a very small man working the handle of an elevator. The man himself cannot exert even a small fraction of the effort to lift the weights that he can easily control from the elevator handle by turning on and off the electric power at the proper times.

Connecting Wire to Carbon

Quite often one wants to connect a wire to a carbon which has no metal cap on the end. On account of the high resistance of carbon it is next to impossible to get a good connection in any ordinary way.

In a teacup or glass half filled with water, place a crystal of blue vitriol (copper sulphate) on a small piece of sheet copper which is attached to a wire from the positive side of an A battery. Tie a wire to the end of the carbon, connecting it to the negative side of the A battery. Dip the other end of the carbon into the solution. This will plate the immersed carbon with pure copper to any thickness desired. A wire may then be soldered on the plated portion just the same as if the carbon were a solid copper rod.—Chas. Middleton, Westville, Ind.

Turning Thin Brass Disks

It is out of the question to attempt to turn a thin sheet of brass when it is only held at the center by an arbor, and cutting and filing are nearly as impossible if a smooth job is required. An easy way to accomplish the work is to fasten the brass at the corners to a wooden disc, mounted on a face plate. A sharp tool will cut out a perfect circle in the brass.

Discs made in this way can be used as condenser shields. The discs should be mounted behind the panel and connected to the ground side of the set. Plenty of space should be allowed between the disc and the condenser parts.—J. M. C.

Questions and Answers

Long Distance Receiving

(1142) HAC, Detroit, Mich.

I wish to build or assemble a receiving set of the regenerative type. I desire a little reliable information before doing so. Of course it is only natural for one to consult the best source possible for this advice, hence my letter to the RADIO DIGEST.

I have a copy of each of your issues from Vol. 1, No. 1 on and which I have read and studied with much pleasure and it is my intention to use one of the hook-ups which you have given but I find myself more or less confused and bewildered as there are so many different hook-ups.

I wish to be able to receive local and long distance broadcasting and it seems as though it would be interesting to receive both long and short wave lengths. What is your advice?

I infer that the variocoupler-variometer set is the best for short wave lengths and the honeycomb coil is the best for long wave lengths. Am I correct, or can either one be used for both long and short waves? Which would be best?

Would I get better results singly or what other hook-up would be advisable? Would a combination of the two such as you have described in one of your recent issues be most satisfactory?

About what range have the sets which you describe as follows:

Issue, Aug. 19, Vol II, No. 6, page 14, honeycomb coil, second illustration of the two hook-ups shown. Issue Aug. 26, Vol. II, No. 7, page 14, variocoupler-variometer, first illustration of the two hook-ups shown.

A.—Your vote of confidence is appreciated.

It is interesting, of course, to listen in on long distance transmitting, but most to be heard on long wave lengths is in code and unless the person receiving understands and is able to receive code it has no value to him. The combination of long and short wave length tuning apparatus may be desirable, although on the whole we believe you will find better all around satisfaction in a variocoupler-variometer set on short wave lengths. However, the life and growth of Radio lies in experimentation and we would never discourage it.

Each of the circuits, No. 6, August 19th and No. 7, August 26th, have a range of approximately three thousand miles.

Troubled with Fading

(1111) JLW, Stuttgart, Ark.

I have a few questions to ask and wish that you would answer them and return answers to me in the stamped and addressed envelope enclosed herewith.

1. I have a variocoupler, two variometer set with detector and two stages of audio frequency amplification. I have been getting very good results with this set up to the last few days when my set started fading very badly. The music or voice comes in very good for a short time and then fades clear out and in a short time comes back in clear again. I have tried to remedy this by changing tubes, B batteries, and looking over my hook-up, but have been unable to find out the cause.

2. I am trying to construct a super-regenerative set but as yet have had no success with it. I am enclosing hook-up I am using. Please tell me what the trouble is.

3. Till just recently I have heard some long distance stations. On the night of August 5th I heard CHBC of Calgary, Canada, and on the same night heard WWJ, WJZ, WOH, WSB, KSD, WKY and several other stations. I have a station diary in which I put down all the stations that I hear with the date I heard them.

I have also done considerable experimenting with my set. I have inserted a transmitting microphone in series with the ground connection of my receiving set shunted with a switch and so have several others in this town and we talk to each other every night and have been wondering if it would be best to get a transmitting license to do this. I also find that if you can get your set to work without any ground connection except through the microphone, that it is possible to get the set to amplify the music but not the voice a great deal by putting the microphone up near the loud speaker. This sends the music back through the set and when it comes out again it is much louder. I also find that by putting a ½-megohm leak across the primary of the transformers that it improves the phone tones.

A.—Would advise, if you are positive that all other wiring is in good condition, to go over ground and antenna connections. There may be breaks or corroded parts which are detrimental.

Your hook-up for super-regenerative set is all right; but frankly speaking, it must be realized that this circuit requires skill in manipulation and its action can be understood only by one familiar with regenerative circuits. It is very apt to lead to a discouragement under other conditions.

Transmitting without a license is a transgression of law and as such should not be indulged in.

Super-Regeneration

(1154), JHR, Cincinnati, O.

My boy has a "Nesco, Jr." set and I know it just gives a smattering or a taste on Radio and I want to interest him further in it, hence me writing you. His antenna is suspended between two iron pipes, which extend above the ground about 33 feet. It is above all housetops and chimneys in the neighborhood. In fact, we are at one of the high points surrounding Cincinnati. What interference, if any, is produced by the following:

His lead-in wire, owing to feed wires leading to our house, passes over these about 5 feet from the pipe to a corner of the house, and is cleated to the sides of the eaves of the house for a length of ten feet. The lead-in is of No. 14 wire, covered. At this point I have it soldered and taped to a slightly heavier, covered wire for about ten feet. The ground wire from the switch to ground connection is of the larger, covered wire also. What bearing, if any, has the difference in sizes of wire?

From your experience or knowledge of Radio what set do you consider as the best to be constructed in sections?

How does the Armstrong super-regenerative set work?

In any of the back numbers of RADIO DIGEST, do you describe how to make different Radio parts, such as amplifiers, transformers, variocouplers, rheostats, condensers, coils or the like? I want my son to learn Radio from the beginning and to make his own parts with my assistance.

A.—Valuable and intelligible instructions on construction for beginners are given in every issue of RADIO DIGEST.

Experimentation with super-regeneration is not advisable at this time, as it is a very delicate creature needing expert manipulation and is very apt under other conditions to lead to disappointment and discouragement. Diagrams for straight regenerative circuits and panel units are contained in RADIO DIGEST and, when properly executed, will give satisfaction.

There is nothing unfavorable visible in the present construction of your antenna.

Loose Coupler Wire

(1181) MLO, San Antonio, Texas

I would like to ask the following questions:

1. What number of wire goes on the primary and secondary of a loose coupler?
2. Can I use enameled wire on the primary?
3. Are 3,000-ohm phones much better than 2,000?
4. How many plates should a variable condenser have for use across the secondary of a loose coupler?
5. How many plates for a condenser in the aerial circuit?

A.—Answering your inquiries briefly:

2. No. Twenty or 22 wire for primary and No. 26 for secondary of loose coupler are O. K.
2. Enameled wire can be used if desired.
3. Three thousand-ohm phones are usually better than two thousand-ohm, although much depends upon the brand used.
4. Not over an 11-plate variable condenser, preferably 5 or 6, should be put in secondary of a loose coupler.
5. In the aerial circuit use a 43-plate variable condenser if in series with antenna, but if across the primary only 23 plates are advisable.

Amplification for Loud Speaker

(1152) JFC, Sonyea, N. Y.

I have had excellent results with a single-tube set, having listened to 47 phone stations, with nothing but variocoupler, 43-plate condenser, and variometer for tuning. I want to build a new set and intend to use three or four stages of amplification and a Magnavox. I want your advice as to whether better results could be expected with one or two stages of Radio frequency and the rest in audio or with all in audio frequency.

I would also like to know if the "Navy Type" loose coupler (200 to 3,000-meter range) would not give as good results on short waves as the variocoupler, and yet have the advantage of tuning the longer waves if desired.

Would you kindly send me a diagram for wiring this set so that the same A battery could be used on all five tubes, and so that the tuning would be possible on the detector tube alone or with any desired number of amplification stages.

Will this set be enough to fill a hall 30 by 30 feet with music or voice?

A.—In constructing your new set, the use of two steps each of Radio and audio frequency amplification is advised.

The "Navy Type" of loose coupler would not afford as sharp tuning as would a short wave set.

For wiring circuit see first diagram, page thirteen, August 19th issue.

This, together with loud speaker, should meet your requirements.

Radio Illustrated

Louise Homer as Azucena in "Il Trovatore," heard by fans listening in to Station KYW
Mishkin Photo

Here is Amelita Galli-Curci, whose voice will sound shrill notes in your head phones early in December, when she returns to the Chicago Opera
Chicago Opera Photo

Lodovico Oliviero in "Falstaff." He sang in "Aida" and "The Snow Maiden"
Photo by Atwell

This picturesque scene is from "The Snow Maiden," broadcast November 21 by KYW. Photo is of the Corps de Ballet
Atwell Photo

This ferocious looking warrior is Riccardo Martin in "The Valkyrie"
Atwell Photo