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New Wave Trap; Trouble Finding; Neutrodyne

Radio Digest

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TO HEAR INSECTS TALK

TUBE PATENT DEAD, BUT NOT TO R. C. A.

COMPANY HOLDS ANOTHER PATENT AS THREAT

Twelve Competitive Triodes as Good as Those of "Trust" Bring Familiar Warning

NEW YORK.—Rumors have been current that the expiration this month of one of the vacuum tube patents under which the Radio Corporation of America has manufactured and sold Radiotrons would legalize the general manufacture and sale of three-element tubes of present-day construction. The corporation has issued the following statement, which indicates it does not consider that the expiration of the patent in any way changes the situation.

"The expiration on January 15, 1924, of vacuum tube patent No. 841,387 will not permit the general manufacture, sale, importation or use of three-element vacuum tubes as generally constructed, in which the grid or its equivalent is interposed or located between the filament and the plate.

Still Covered by Patent?

"This type of vacuum tube is still covered by United States letters patent No. 879,532, under which Radiotrons are manufactured and sold to the public. This latter patent has been sustained by the courts; unlicensed triode tubes have been held by the courts to be infringements of this patent."

Others apparently do not agree with the R. C. A. inasmuch as fully 12 new makes of vacuum tubes have made their appearance. While some of the new tubes are freakish in construction the designs and characteristics of many seem excellent, perhaps better than the Radiotron.

Signe Hagen, famous Danish soprano, who sang the compositions of S. Walter Krebs through Station WEAF recently.

Eve Stuyvesant, well-known scenario writer, recently addressed listeners in of WOR in a talk on opportunity offered by the movie industry.

Rose Stein, age ten, is a talented elocutionist, who often performs at WOAW—always pleasing the fans.

MICROPHONE OPENS FIELD FOR SCIENCE

Unknown Realm to Be Explored by New Radio Glow Discharge Device

First "Ear Microscope"

Dr. Phillips Thomas' Super-Audible "Mike" Hears Notes too High for Human Ear

NEW YORK.—Broadcast programs consisting of butterfly quartets and snail solos may shortly be a regular feature due to the perfection of a new super-audible note microphone just announced by the Westinghouse Electric & Mfg. Company. The invention of Dr. Phillips Thomas of the Research Staff of that company makes accessible to human knowledge an absolutely new realm as unknown as was the field of bacteria before the microscope.

"The best way to gain some conception of the possible importance of 'ultra-audible sounds,'" states S. M. Kintner, director of the Westinghouse research laboratories, "is to realize that the normal person is in the same relation to these sounds as the stone-deaf person is to audible sounds. If every human being were deaf, we would have missed much that is now of vast importance to us.

"Our Voices Would be Useless"

"Our voices would be useless; there would be no speech, writing, literature, or music; and we would know nothing whatever of those innumerable noises that convey to us continuously information of the most varied kind. Above the range of the human ear there is possibly a vastly greater variety of sounds which ought to be just as useful to us as are audible sounds.

"The ultra-audible microphone, in fact, should be to the ear what the microscope is to the eye. Before the invention of the microscope, few realized that there might be in existence things too small for the unaided human vision to see. But as soon as means for extending the range of the eye was provided, an entirely new world was opened to our gaze. At first the microscope was merely a scientific toy, for no one had any conception of the usefulness of its revelations. But today,

(Continued on page 2)

$25,000 MAY PLACE G. O. P. MEET ON AIR

FIRM SEEKS EXCLUSIVE BROADCAST RIGHTS

Committee Indicates Offer to Handle Cleveland Confab Will Be Accepted

CLEVELAND.—Exclusive rights to broadcast proceedings of the Republican national convention here next June are worth $25,000—possibly more.

This was made known by national committee members this week on their second trip to prepare Public Hall for the convention. They said they had received an offer of $25,000 for the Radio rights.

The Radio offer indicates the tremendous interest taken by national Radio companies in broadcasting major political events. No toll could be collected by the company or companies, it was pointed out, but the interests are willing to pay the national committee for the sake of advertising and general good of Radio.

If the offer is accepted, and indications are that it will be, though it may be raised higher than $25,000, trunk telephone wires will be run to several central cities and the proceedings broadcast from these points. This method was followed in sending out President Coolidge's recent message to congress. On that occasion trunk wires carried the address to Chicago, Minneapolis, St. Louis, Ft. Worth and Atlanta.

LISTENING IN FROM WAY UP NORTH

By Vera Brady Shipman

TWILIGHT and snow as far as the eye can see. Pines loaded down with snow festoons; the lake a white blanket without wrinkles. Rabbit, bird, weasel and ground squirrel the color of a snowy afternoon. Darkness early in the winter woods.

I tune in on a quartette from WLAG, Minneapolis; WFAA, Dallas, in piano numbers by Roy David Brown, an old friend from Chicago musical circles, now in a Texas college music faculty. WGY, Schenectady's Blue Bird Orchestra in "Hawaiian Twilight" (evidently different from ours in the north woods). WCAE, Pittsburgh, "Drifting Back to Dreamland," while outside the snow is always drifting. WOS, Jefferson City, and its prison band; WHAZ, Troy, in a university lecture. A prayer in Sunday night service from Omaha, WOAW; an organ voluntary from Skinner organ studio of New York City broadcast by WCAP, Washington; a hymn from WBAP, Fort Worth; WHAS, Louisville, singing "Coming Through the Rye." I tuned in on WEAF, New York City, just in time to hear KYW's own Wendall Hall and his ukulele, who are "doing New York" right now. WOC, Davenport, with an old-time fiddling program (sounds like a violin, then an accordion and then a horn, sometimes all three).

I tuned in on KYW's midnight show the other night and heard Horace Wade, the school boy reporter for the Chicago American in a wordy eulogy of the "Cat," KYW's new mascot in the brand-new studio.

How many times have I heard jazz? Is there never good music? Is all the world dancing? But this week from three stations, I have heard the best in music and drama: From KSD, St. Louis, the symphony and its piano soloist, Ossip Gabrilowitch; from WEAF, New York City, Walter Damrosch's Symphony Orchestra direct from Carnegie Hall, and from WMAQ, Chicago, the balcony scene of "Romeo and Juliet," by E. H. Southern and Julia Marlowe, "Samson and Delilah," Louise Homer's last appearance this year with the Chicago Opera, singing that lovely "My Heart at Thy Sweet Voice." (I heard that song ja zed from WMC, Memphis, lately!) Kansas City Night Hawks initiating a man in the Atlanta Federal prison and another in Saskatchewan—just as bad, you say? WOO, Philadelphia, with Mary Vogt at the Wanamaker organ, and later the Hotel Adelphi orchestra playing "No, No, Nora."

The fire is burning low. Must be getting colder outside, the windows are frosted. As Zion City, WCBD, signs off "Prepare Ye," you turn with a shudder for the future and hear WDAP, Jack Nelson's jovial "May You Laugh in Your Dreams."

Turn out your bulbs. Look for a moment across the fields of snow. This will continue until early spring, for snow comes to stay in the north country. Sleigh bells and flivver snowmobiles, furs and heavy robes "Prepare Ye" for the winter.

Hunters Toting Sets

NEW ORLEANS.—Radio sets are becoming standard equipment for hunters, both amateur and professional, in the wilds of Louisiana and Mississippi.

NEW "MIKE" UNFOLDS SECRETS OF ENTOMOLOGY

Dr. Phillips Thomas, inventor of the super-audible glow discharge microphone (circular object standing on edge) looks over one of the subjects of the kingdom he hopes to explore.

(Continued from page 1)

through the microscope's aid, we are well on our way to the conquest of our most deadly enemies—the disease germs—and we have an immense fund of information concerning the structure of living things and materials, the mechanism of life and growth, and countless other things.

May Revolutionize Ideas

"Just what the ultra-audible microphone will bring us, no one can say. It would be like trying to prophesy concerning the resources of an unknown continent. But every invention that has extended the range of our senses has revolutionized our ideas, and this one is likely to do the same.

"Sound, of course, consists of air vibrations. When the rate of these vibrations is slow, say around 40 times a second, we hear a deep bass note. When the vibrations are at the rate of 256 times a second, we hear the note we call "middle C." At 12,000 vibrations per second we reach the upper limit of musical sound for most ears, and at 20,000 vibrations per second the sound passes beyond the reach of ordinary human hearing. The air can, however, vibrate at rates up to a million or more times a second, and it is highly probable that it is constantly doing so. Hence, there is a range of sounds, from 20,000 vibrations per second upwards to an unknown limit, of which we have hitherto lived in complete ignorance, but which can now be studied by us.

How Ultra-Audible Microphone Looks

"The instrument that makes this possible consists essentially of a ring of insulating material in which two small electrodes are inserted diametrically opposite each other. A high voltage is applied to these electrodes and there forms between them a 'glow discharge,' which is neither a spark nor an arc, but a streak of soft, purplish light.

"This glow discharge was found by Dr. Thomas to have the peculiar property of being affected by sound waves as conveyed by the air. When the sound waves strike it, it vibrates in sympathy with them and in doing so, causes exactly corresponding changes in the flow of current to the electrodes.

Broadcasting Developed "Mike"

"This instrument was developed during the study of a Radio broadcasting problem. Practically all telephone and Radio transmitters now in use depend for their operation on a thin disc of metal (diaphragm) which is vibrated by the sound and makes the electric transmission of speech possible. A diaphragm of this kind can be seen in every telephone transmitter.

"Unfortunately, however, no diaphragm that has so far been designed responds perfectly to sounds having vibrations above 4,000 times a second; and since many musical sounds have vibrations higher than this rate, music broadcast by such transmitters is not absolutely perfect. Dr. Thomas was given the task of remedying this defect and discovered the fact that the glow discharge would vibrate in perfect sympathy with every possible sound.

No Limit to Vibrations Registered

"But its great possibilities soon became evident. As far as can be determined, the glow discharge will respond to any air vibration up to the uttermost limit, whatever that may be. Hence by its use, all sounds in the ultra-audible region can be identified and studied with ease."

An interesting problem to be encountered in connection with the new device is that of transposing the super-audible sounds into a form that will affect one of our senses after this new microphone has picked them up. One method would be that of heterodyning the sounds much as we heterodyne Radio signals in the super-heterodyne receiver. This method would make necessary the creation of a steady, extremely high pitch whistle slightly different in frequency per second from that of the super-audible sounds. These two frequencies would react to create "beat notes" or a third frequency equal to the difference in number of vibrations per second of the whistle and the inaudible sounds. This third frequency would be audible and would vary in pitch and duration exactly as does the otherwise inaudible sound.

The sounds could be made to register visually by causing the amplifiers attached to the microphone to actuate an ink recorder which would give a wavy line that would vary in height with the pitch of the incoming sounds, or with their intensity. Other methods are possible also and no difficulty should be encountered in making us aware of the faint, high pitch notes registering on this new microphone.

CONTENTS

Radio Digest, Illustrated, Volume VIII, Number 3, published Chicago, Illinois, January 26, 1924. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign Postage One Dollar additional; single copies Ten Cents. Entered as second-class matter at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

"All the Live News of Radio"....1 to 8
What Is It We Call "Static"? Part II, by Dr. A. Meissner.... 9
Operating and Trouble Shooting, for new owners of standard receiving sets....11, 12, 13
An Evening at Home with the Listener In.... 14
Advance Programs for the Current Week....15, 16, 17
Radiophone Broadcasting Station Directory—Part III.... 18
Further Details of the Famous Miloplex Hook-Up, by the Mystery Man.... 19
Editorials; Indi-Gest; Condensed, by Dielectric.... 20
How to Make Inexpensive Neutrodyne Receiver, Part I—Hook-Up and Parts Required, by H. J. Marx.... 21
Regenerative Simplex Hook-Up for Long Distance.... 22
Simple Explanation of Radio for Everybody, Chapter IX, Part II—Audio Frequency Amplification, by M. W. Thompson.... 23
How and Why of Super-Heterodyne Receiver, Chapter II—Special Units Required, by H. J. Marx.... 25
The Reader's View.... 26
Selective Three Tube Single Circuit Receiver, Part IV—Changing Other Types of Sets to Grill Hook-Up, by Fred Grill.... 27
Review of Books; Triplex Honeycomb Coil Circuit, R.D.-112.... 28
Details of the Yeiser One Tube Reflex.... 29
Construction of Effective Wave Trap.... 30
Questions and Answers.... 31
Radio Illustrated, a Page of Pictures.... 32

Looking Ahead

Who Disagrees with Dr. A. Meissner? Of course You Think His Views Radical, but such discussions and investigations of "accepted" theories are what make scientific progress. Another authoritative article by Dr. Meissner next week.

End of Two-Part Neutrodyne Set Construction Series will also be given next issue. Five tubes for power and distance—three dials for tuning selectivity. Build one and agree.

Third Super-Heterodyne Article Next Week—H. J. Marx tells how to construct the oscillator unit.

Trouble Finding and Set Operating Is Easy for the Beginner who reads the series of articles on this subject now being given every week in Radio Digest. Two more standard sets will be explained simply next issue.

King Miloplex for Ladies Only—That's what the Mystery Man says his next story will be. And now members of the fairer sex—tune in the King.

Thompson on "Loud Speakers," an R. D. Diagram of a single tube super reflex, F. A. Hill on his Weagant receiver hook-up—all these and more are waiting for you to finish reading this issue so that they can appear next week.

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Asks for Alaskan Plant

WASHINGTON, D. C.—Senator Jones of Washington has introduced a bill in the Senate "providing for the establishment of a Radio station on Unga Island, Alaska." The bill, which has been referred to the Senate Committee on Naval Affairs, would authorize the Secretary of the Navy to prepare a site, erect Radio towers and install apparatus on the island.

PRISON DELIVERIES COST FELONS SETS

RADIO SUSPECTED AS AID TO FLEEING CONVICTS

Warden of Pentitentiary in Philadelphia Finds 200 Receivers Made by Inmates

PHILADELPHIA.—Convicts in the eastern (state) penitentiary here have received orders to surrender their Radio receiving sets to the warden. Prison officials declared that although they had not been able to couple recent breaks for freedom with Radio, they believed it would be well to "take no chances."

Investigation showed, the prison administration reported, that recent attempts to free the prisoners were aided by persons "on the outside." None of the broadcasting stations was suspected, but a number of DX plants using what were called secret codes could easily have helped the prisoners, it was said.

There are many men in the penitentiary who are clever in the construction of sets. Many of them have built devices that would excite the envy of experienced Radio engineers. According to Sergeant R. H. Santee of the prison guard many of the sets have been "built of nothing". Their owners, he said, have heard distant western stations and ships at sea. Electric light sockets in the cells are used as aerials and steam radiators serve as ground connections.

Sets Are Confiscated

The receiving sets of several of the convicts who refused to surrender them were confiscated. They were given to children's hospitals and to little cripples. Then trouble ensued. Prison attaches reported the mysterious disappearance of steel table knives, wire from the workshops and other pieces of metal. They found that bits of the wire had been wrapped around sticks of wood slightly thicker than a man's wrist. "Sliders" had been made from bent steel knives and forks; the rods for the sliders were made from pieces of steel "smuggled" from the shops.

Bits of tin obtained from cans served as cups for the crystals and the "secret channels" of the institution provided the crystals and headsets. Thus did the felons improvise Radio sets despite the orders of the warden.

Felons Balk Search

The guards, instructed to search for receiving sets, were balked on every hand. The prisoners tried almost every trick to retain their Radios. One of the convicts, under a 20-year sentence, suspected of secreting a set, foiled every attempt of the guards to find it. Even the bedding in his bunk was ripped open. The set finally was found in the record compartment of a phonograph despite the owner's contention that the phonograph was "imitatin' a Radio."

At one time, officials said, the prison contained more than 200 sets. Despite the "no Radio" order, the guards suspect there still are more than 50 secret sets.

SEA TRAGEDY BRINGS MORE COAST STATIONS

Locate Sites Following Disaster at Point Honda

SAN FRANCISCO, CALIF.—A considerable increase in the number of Radio compass stations for the Pacific Coast is expected as the indirect outcome of the Point Honda naval disaster several months ago when eleven United States naval destroyers were plunged on the jagged rocks in an evening fog, resulting in the loss of seven ships, valued at $15,000,000, and twenty-three lives.

Information regarding the plan was revealed with the issuance of orders by the navy department assigning the salvage tug Widgeon to the task of locating sites for new stations along the coast.

BRAVERY MEDAL TO KAICHIRO YONEMURA

NEW YORK.—To Kaichiro Yonemura the thanks of the world are due. He is the Radio operator who flashed signals to San Francisco which first told of the Japanese earthquake disaster. In appreciation of his services on this occasion, the Radio Corporation medal carrying an honorarium of $500, has been presented to Mr. Yonemura through the American Chargé d'Affaires in Japan.

SICK VOYAGER GETS HIS CURE OVER AIR

LOS ANGELES.—Prescribing medicine by Radio recently saved the steamer Liberator returning to this port for medical aid for a sick passenger. The ship had just left Los Angeles bound for the Orient when a passenger fell ill. Radiograms exchanged with Police Surgeon T. P. Manning of the receiving hospital here described the medicines aboard and allowed a remedy to be prescribed.

PUTTING BIRDIES IN THE PHONES

Have you ever heard birdies in your phones? The eight little roller canaries are prize winners you have undoubtedly heard. They were last "miked" at WTAM, the Willard Storage Battery Company station, Cleveland. They have heen on the air at a numher of other places.

One Loud Speaker and Dance at Detroit Show

DETROIT.—The Radio show which closed here was pronounced a decided success. One loud speaker was used to do the receiving and prevented the usual bedlam of noise experienced at such shows. Local stations had special programs for show week and from 10 o'clock until midnight each evening the center of the big exhibition hall was cleared for Radio dancing.

Taxes for Broadcasting and Listening in Japan

TOKIO.—The Japanese government has recently announced regulations for the control of broadcasting, by which private enterprises will be permitted to broadcast on 363 meters wave length with a maximum range of 100 miles. Both broadcasting and receiving stations are to be taxed. The annual fee of the transmitting stations operating at the maximum distance is 500 yen. Receivers cost two yen.

KDKA'S PROGAMS SET LONDON AGOG

2LO OF LONDON REBROADCASTS PITTSBURGH

Britons See Chance to Link Empire Better—South Africa Hears London Relay of America

LONDON.—All England is agog these days over the tremendous power of Radio in strengthening and harmonizing the empire. The great impetus thus given Radio is largely a result of the recent rebroadcasting by Station 2LO here of several programs of music and speech broadcast on the low wave length of 100 meters from Station KDKA, Westinghouse, East Pittsburgh, Pa. Listeners in at Middleburg, South Africa, 6,000 miles away, reported that they had heard the broadcasts clearly.

Encouraged by the achievements of the two stations, Radio scientists of the British empire predict that 1924 will see trans-Atlantic Radiophone communication from home to home. Among these prophets is Professor A. M. Low of this city, a widely known physicist and Radio experimenter.

Type of Receiver Used at 2LO

The apparatus used by Station 2LO to relay KDKA's programs follows, along advanced lines, the receiver used during the war to find Zeppelins and field Radio stations of the enemy. There are nine tubes; seven amplify and two detect.

Transformers of an especial design couple the high frequency tubes of the set which is a form of superheterodyne. A movable core enables simultaneous adjustment of all Radio transformers for wave length. Using an aperiodic or untuned aerial inductance, only the secondary loose coupled circuit was tuned during the recent tests.

The variability of the Pittsburgh station's wave length caused some trouble, which, however, is expected to be overcome soon by use of a master oscillator on the KDKA transmitter.

Programs broadcast in Paris are to be reproduced here by similar means to those which marked the trans-Atlantic relays.

Boys' and Girls' Club "Meets" on Air Daily

Dues Are One Letter a Week in Big Brother Club

MEDFORD, MASS.—Eastern boy and girl Radiophans are becoming greatly interested in the newest broadcasting club conducted at Station WGI here. It has been named "The Big Brother Club." Over 200 boys and girls are enrolled as active members at the present time.

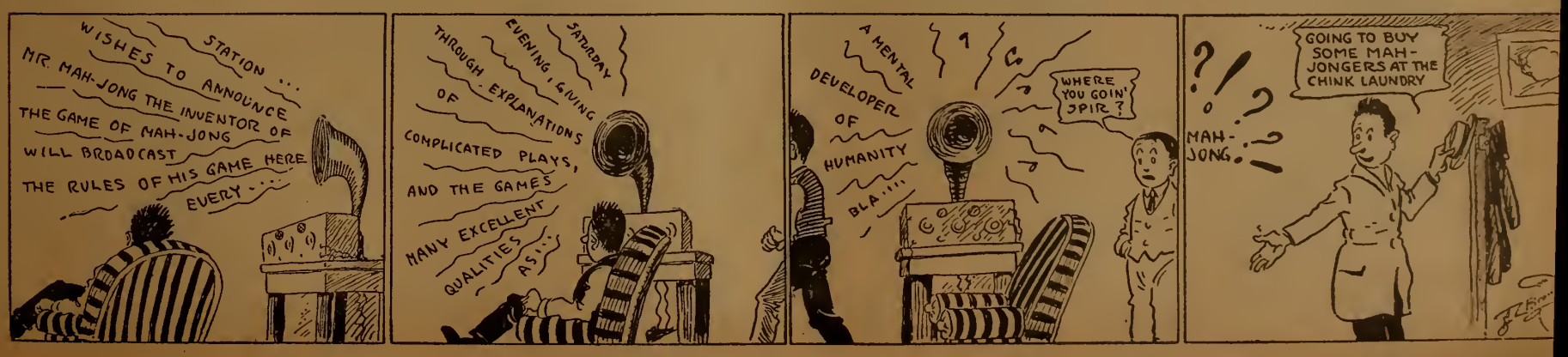
"The Big Brother Club" is not unlike the Boy Scouts and Camp Fire Girls in purpose and principle. It appeals to boys and girls from 9 to 12 years old, and according to the by-laws, "any boy or girl owning or listening in regularly on any receiving set is eligible." The dues are one letter each week to "Big Brother." Meetings held nightly from 6 to 6:15, Eastern time.

"The Big Brother Club" plans to use its educational possibilities to conduct spelling bees, history lessons, simple problems in mathematics and geography. The lessons will be put out in simple story form so that the boys and girls will not be reminded they are being taught lessons, but rather listening to an interesting broadcast. The Club has adopted the slogan, "Be Somebody's Big Brother Every Day."

New Design Amplifier at WBZ

SPRINGFIELD, MASS.—Continuing the program of improvement of Station WBZ here, the most recent addition to the equipment is a voice amplifier of entirely new design which reproduces and magnifies the sound impulses without distortion before they are "fed" to the station's transmitter.

THE ANTENNA BROTHERS Spir L. and Lew P. Or at a Chop Suey Palace



WEAF'S POWER RISE PLEASES LISTENERS

FANS TELL A. T. AND T. STATION ITS FEATS

Ninety Percent of 3,000 Letters Received Express Approval of High Power Experiments

NEW YORK.—Recent increases in the broadcasting power of Station WEAF, the American Telephone and Telegraph company, in answer to the demand of listeners in, resulted in the receipt of more than 3,000 letters from Radiophans over all the country.

About 90 percent of them approved the change in equipment which enabled the increase in volume. Five percent of the listeners wrote that they had experienced trouble caused by the overloading of receiving sets and the use of too many stages of amplification.

Two and one-half percent complained of noisy transmission and another two and one-half percent reported the "blanketing" of other stations. The latter were from listeners living a short distance from WEAF's transmitter.

Remedies for Troubles

In the first instance of trouble it was found that readjustment of receiving sets will easily remedy overloading and over-amplification. In the second instance, adjustment of the generators and the allied transmitting instruments will effect a remedy. In the third or last instance, many of the receiving sets are not sufficiently selective or are improperly handled.

The transmitting power of WEAF was recently reduced, as an experiment, to 500 watts. Two or three days later the power was raised to the normal or stipulated power of the station. The power was then increased to two kilowatts, and later to four, and five kilowatts. Experimentation will continue until a satisfactory level is determined.

In illustration of the manner in which the station has operated under test a congratulatory cablegram was received from Buenos Aires, 5,000 miles away by air line.

Radio Circuits

The Most Popular American Radio Circuits

50 Diagrams and Illustrations

Flewelling Hook-ups
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BROOKLYN STUDENT BUILDS RADIO AUTO

Controlled by Radio from a distance of several miles, operating on power from a storage battery it carries, this miniature car was built by Ole D. Engstrom, a student at the Brooklyn, N. Y., Polytechnic Institute. © Photonews

Uruguay Interest Grows

BUENOS AIRES.—Keen interest in Radio is developing in Uruguay. An increasing demand for apparatus is expected after the end of the hot weather.

Five Microphones Form Chain Strung in Hotel

Elaborate System Furnished for CKAC, Montreal

MONTREAL, P. Q.—As the result of an arrangement recently completed between La Presse, the Montreal French daily, the Mount Royal Hotel and the Marconi Wireless Company of Canada, the famous dance music of the Mount Royal Hotel orchestra is now being broadcast through the La Presse station, CKAC.

No matter in what public room of the great hotel the orchestras are playing, the music will be audible to Radio enthusiasts by means of the elaborate system of microphones installed by the Marconi Company. These microphones have been placed in the main dining-room, the Palm Court and the Salle Dorée on the ground floor, and in banquet and ball rooms on the ninth floor.

Cables attached to microphones in the five public rooms terminate in an operating room in the hotel. Here the converted sound energy from the microphones is passed through voltage and power amplifiers before being put on a telephone line to the La Presse station two miles distant. By an ingenious system of switches the operator in charge of the installation at the hotel will be able to bring any one of the microphones in the various public rooms into instant action.

For not having on his ship Radio equipment capable of transmitting 100 miles a Greek ship owner was fined $250.

HOME FOR AGED MEN GETS RECEIVNG SET

Club's Gift Takes Away Dullness of Daily Routine

DETROIT.—The Home Study club and engineers from WWJ, the Detroit News, have installed a large receiving set in the Arnold home for aged men here. Loud speakers have been placed in the halls and the aged men, many of whom are unable to leave the building owing to infirmities, are given a new grip on life each night.

Most of them have become tired of talking to each other and the Radio programs that come from the loud speakers in the halls are giving them the greatest kind of joy. A greeting occasionally from some outside station would furnish these unfortunate men unspeakable thrills. They are entirely dependent and have no pastime whatever outside of the recently installed Radio receiver.

Ireland to Lift Ban on Use of Foreign Apparatus

DUBLIN.—Broadcasting will soon start in the Irish Free State. A £30,000 broadcasting company and the Radio Association of Ireland, have recently been organized in Dublin and the government prohibition against the importation and use of foreign built Radio apparatus will probably be removed. Arrangements between the Irish postal authorities and the broadcasters were said to be nearing completion a month ago, awaiting the approval of the Dail.

The Ideal Radio Instrument for Your Home

"He who is content, always has enough."
—*Lao Tzu*

A Grebe Receiver in your home will make your contentment complete.

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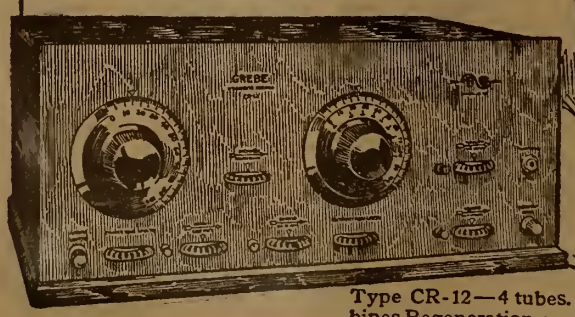

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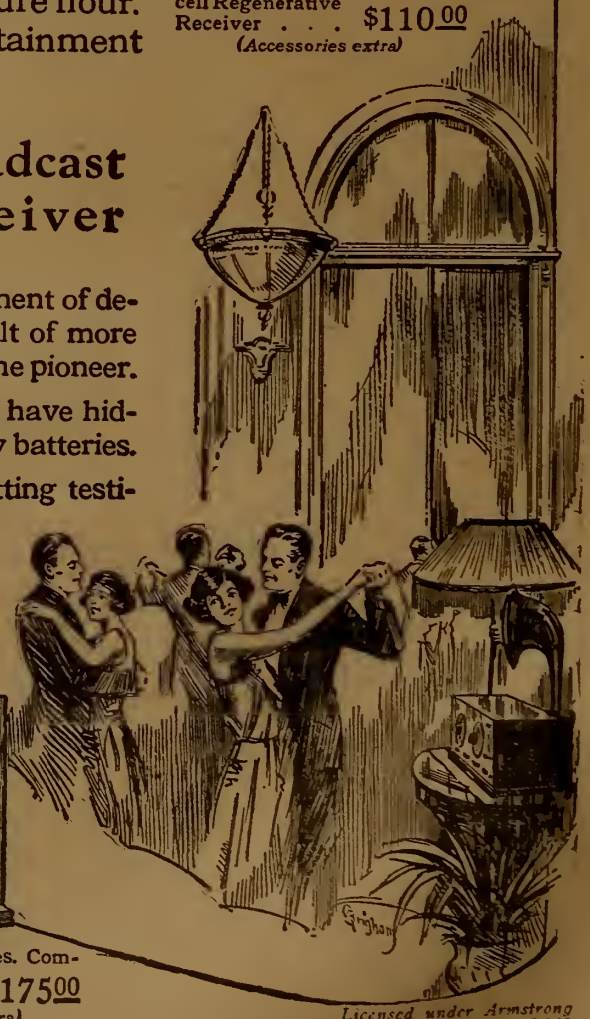

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WJAZ OPERA STARS PULL LETTERS

So great were the responses to the broadcasts of Chicago Civic Opera stars on Sundays during the past month, from Station WJAZ, that over 3,000 letters were received one week as a result of but one star's singing.

Three stars heard during the series of operatic concerts from Zenith-Edgewater Beach Hotel station are pictured. Left to right, Claudia Muzio, Myrna Sharlow and Florence Macbeth. Others were Irene Pavloska and Virgilio Lazzari.

BROADCAST MEOW OF MYSTERY CAT

"CHAMP" FELINE JOINS KYW STUDIO STAFF

Works on Chicago Programs for But One Daily Pint of Pure Cream

CHICAGO.—Next time Radiophans all over the country and beyond hear KYW announced it may sound a bit catty. Why? 'Cause the champion prowler of the world has attached itself to KYW's studio staff.

Whence it came none knows. But what it wants all know. And whether its four legs, one on each corner, according to convention, are those of a feline of the less deadly species or whether they are the pedal appendages of a lady cat makes no difference to the champ prowler.

"I've come to stay," he or she or it announced the other evening to the head of the studio staff. "You may announce me, when I give you the word, with the other celebrities." So without parley or further preliminary the latest on the program of KYW—The Mystery Cat— was introduced to the world.

The pay of the prowler premier (or premiere) is one pint of pure cream a day, according to agreement and by presents signed, sealed and delivered with all the required aforesaids and hereinbefores and to-wits.

Listeners in may expect to hear the pussyfoot prowler as soon as rehearsals are ended. Meanwhile—

Meow!

Lecture Course on Meat Industry Given by KYW

CHICAGO.—An innovation in broadcasting programs, a lecture course on the live stock and meat industry, is being broadcast from Westinghouse Station KYW here. Howard Leonard, chairman of the National Live Stock and Meat Board, recently opened the series of lectures.

The program for the remaining lectures, given at 9:15 p. m., Central time, is as follows:

January 24—"The Distribution of Meat Products to the Consumer," by John T. Russell. January 31—"Selection. Economical Buying and Preparation of Meat," by Miss Gudrun Carlson. February 7—"Twelve Minutes of Practical Meat Cooking," by Mrs. Grace Viall Gray.

Education Is Aim of New Utah "U" Plant

Plan to Assist in State-Wide Promotion of Learning

SALT LAKE CITY.—What some regard as a big step toward the popularizing of Radio in this vicinity is the construction of a 100-watt broadcasting station in the Physics Building of the University of Utah here. No decision has been made concerning the exact uses to which the new station will be put, but Professor Fred W. Reynolds, head of the Extension Division of the University, under whose direction the station will be conducted, said numerous plans were under consideration.

That lectures will be sent out freely is a foregone conclusion. There is much speculation concerning the part Radio will play in the promotion of education in the state hereafter, but that the new university broadcasting station will have a profound influence on every phase of higher education, at least, seems certain. University officials believe it will now be possible for all people of the state to be brought into closer contact with the university than has ever been possible before.

ANALYZE RESEARCH "DOPE" BY MACHINE

Tabulators Relieve Standards Bureau of Detail

WASHINGTON, D. C.—One of the problems which has several times confronted the Radio laboratory of the Bureau of Standards is the analysis of a large amount of complex data obtained in its investigations of Radio transmission phenomena. However, by using the tabulating machines of the Bureau of Census, it has been possible to make a comprehensive analysis of such data in a short length of time.

Several types of electric tabulating machines are in use all of which are designed to compile, classify and analyze statistical information. The original data are transferred to cards by means of punched holes which permit the machine electrically and automatically to classify and aggregate the various items recorded.

Three machines are used in this work, a key punch, a sorting machine, and a tabulating or counting machine.

The first Radio problem in which such an analysis was made by the Bureau was the investigation of signal fading conducted during 1920 and 1921. Another investigation which has been in progress since 1922 is the distance range tests on transmitting stations.

Camden Police Buy Set

CAMDEN, N. J.—The Camden police, by their own subscriptions, have purchased a six-tube receiving set. It has been installed in the headquarters of the department. The set will be used to furnish entertainment and to receive stations transmitting police reports.

AIRWAVE EXPERT TO AID LIGHT KEEPERS

Helps Adapt Radio to Service on Coast

WASHINGTON, D. C.—Radio has come to form so vital a part in the work of the U. S. Lighthouse Service that the aid of a Radio engineer has been secured to apply the best means of Radio communication and position finding in this coastwise service. John L. Preston, who has been active in the Radio Laboratory of the Bureau of Standards for the past five years, has been transferred to the Lighthouse Service, where he has taken up his new duties.

Radio has been employed in the Lighthouse Service for several years, handled through the efforts of the engineers on duty there with the co-operation of the Bureau of Standards, but, with the extension of the work in Radio direction finding as well as communication, a specialist has been found necessary.

The adoption of chess by Radio during the present winter is predicted by a prominent chess club official.

IF it's the outdoor antenna that's been holding you off, you want D-7-A or D-10 Portable the De Forest Radiophones that use an indoor loop aerial the size of a small picture frame—and bring in the broadcast of half the American Continent.

Authorized agents everywhere.

DE FOREST RADIO TEL. & TEL. CO.
Dept. R. D. 5 JERSEY CITY, N. J.

JACK, A DOG FAN, HAS HIS OWN SET

PAWS OFF PHONES WHEN LECTURES BEGUN

Every Kind of Music Wins His Approval—Insists on Listening In Nightly

ANN ARBOR, MICH.—This city claims to have, besides the University of Michigan, the only canine Radiophan in America. His name is Jack, and he is a full-blooded English bull, owned by Daniel B. Sutton, Jr. He has become so charmed and enthusiastic over Radio music that his owner has constructed a suitable headset that the animal wears with all the dignity of a human being.

One peculiar feature about Jack is that he cares only for music. Speeches or any other kind of broadcast program has no standing with him. Lectures especially bore him to tears, or rather to howls. Music, however, is his great delight. As soon as the family rises from dinner at night, along about seven o'clock, Jack lets it be known that he is ready for his concert and bedtime story.

Lectures Make Jack Paw Off Phones

Should there be a guest at dinner and Jack for the moment is forgotten, he stands around a short time and then sets himself down in front of his master, whines, cries and even howls if necessary, to divert attention to himself. And he keeps it up until someone gets him his headgear. Jack then lies down to enjoy his music.

Once in a while someone gets started on a lecture and then Jack sits up on his haunches and growls, howls and paws at his "headset" until it is off. Then he departs disgruntled. If the program happens to be music, however, Jack is perfectly happy. Jazz, band, orchestra or singing are all the same to him. He delights in it all.

He also is a unique canine in that he stands high as a member of the Red Apple club, which holds sway every Tuesday night from the studio of WCX, the Detroit Free Press.

A Radio set containing a detector, two stages of audio amplification and a pair of 2,000-ohm phones represents over five miles of wire.

POPULAR ANNOUNCER AS ARTIST SEES HIM

J. N. Cartier, director and announcer of Station CKAC, as seen by a cartoonist, doing a "high fling" in his new garb as First Lieutenant in the Royal Naval Canadian brigade. Fear not, girls, Cartier's new duties will not keep him away from the microphone, unless, of course, war duties should prevent.

New French Rule Aimed to Aid Amateur Transmitters

WASHINGTON, D. C.—French authorities have issued a set of regulations intended to encourage broadcasting and the use of Radio equipment by amateurs throughout the country, according to advices received here from Paris.

It is provided that receiving sets may be possessed by any citizen of France who will sign a formal declaration, receivable at any post office, stating the kind of equipment used and agreeing that no part shall be taken in the transmission of private correspondence. Sets in the possession of foreigners, or used to receive private correspondence, require individual authorization.

Genuine E.J. Flewelling PARTS

Are manufactured exclusively by the BUELL MANUFACTURING COMPANY, under the personal supervision of Mr. E. T. Flewelling. Look for the yellow carton and demand the genuine. If it is not manufactured by BUELL it is not a Flewelling part!

BUELL MANUFACTURING COMPANY
2977 COTTAGE GROVE AVE.
CHICAGO

Flewelling TUNERS $8.00

Flewelling SOCKETS $1.00

The Gripping Thrills of Radio

are easily obtained when you use Federal Standard Radio parts.

The reputation and tremendous resources of the Federal Telephone and Telegraph Company stand behind all radio parts bearing the Federal mark of manufacture.

Complete sets and over 130 different radio parts are now manufactured by Federal and can be obtained from all Federal dealers.

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

Boston New York Philadelphia Chicago
San Francisco Pittsburgh
Bridgeburg, Canada London, England

BLAMES FADING ON CHANGING WEATHER

TESTS TRACE SOURCE OF TROUBLES

Experimenter Believes Atmospheric Pressure Plays Big Part in Condition

BOSTON.—Chief among the experimenters here along the line of atmospheric pressure in connection with fading is John Baptista, who has found many interesting facts in connection with fading and weather.

"I am firmly convinced that atmospheric pressure is really the case of abnormal conditions existing in Radio reception in this section during the past three weeks. Stations on the southwest quarter of the United States were the most effected in the Summer. WBZ, which came in very steadily during the summer, has been fading occasionally, and so have WDAP, WWJ and other western stations. PWX, which I did not hear all Summer, has come in occasionally, as has WSB.

Finds Weather Plays a Part?

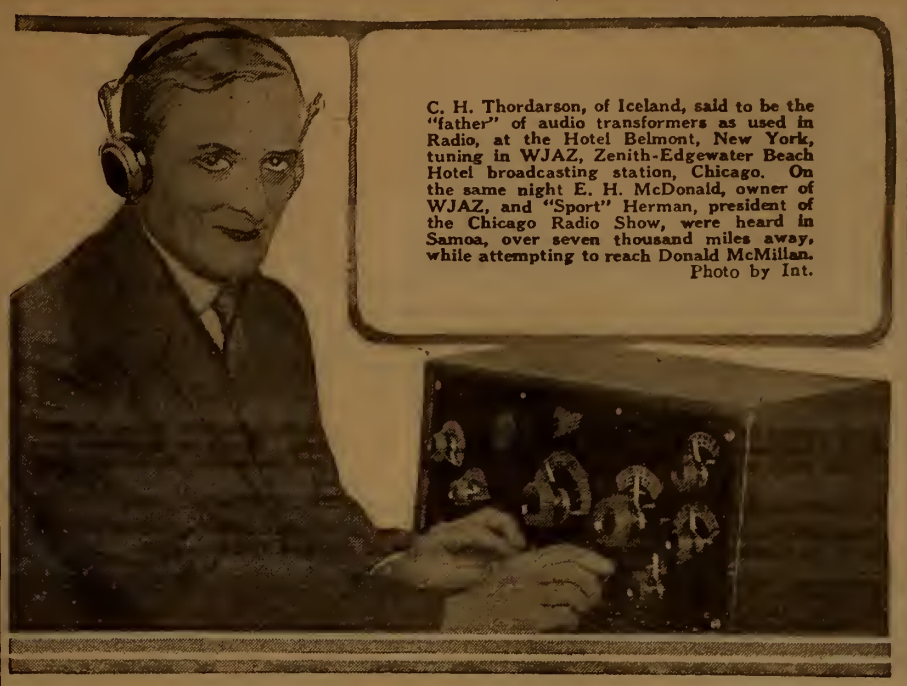
"The other evening, after trying hard as I could and getting nothing but a weak carrier wave, I suddenly picked up a very strong carrier wave, and found it to be 9CE, Sudbury, Ontario, on about 300 meters. I listened to this station working Canadian amateurs on CW and phone. Considering that this station is only a 50-watt transmitter, I feel that this reception was remarkable. No other stations were available.

"Studying the weather map the next day I found the isobar running from Cape May horizontally across the continent, going northwest at Canton, O. The difference in pressure between Cape May, N. J., and Bath, Me, was 9-10, while there was no difference in pressure between Boston and Sudbury, Ont. The isobar that ran from Boston took a course northerly of the Great Lakes, the pressure being 30.04 at both places. I have been unable to tune this station since, and studying the weather map I find that the isobars have never since been in that position.

Believes Waves Travel Isobars Best

"The same is true of Station WTAM, Cleveland. During one of the worst nights I ever experienced, WTAM was tuned in so clearly that it was remarkable. No other station was available; WGY and KDKA could not be held. In studying the weather map I found an isobar running from Boston direct to Cleveland, the pressure being the same at both places. While there was a difference of 5-10 between here and KDKA and 3-10 between here and WGY. In conclusion I find that when the isobars run from Boston to any distant point, reception is best from that point."

TRANSFORMER PIONEER TUNES IN



C. H. Thordarson, of Iceland, said to be the "father" of audio transformers as used in Radio, at the Hotel Belmont, New York, tuning in WJAZ, Zenith-Edgewater Beach Hotel broadcasting station, Chicago. On the same night E. H. McDonald, owner of WJAZ, and "Sport" Herman, president of the Chicago Radio Show, were heard in Samoa, over seven thousand miles away, while attempting to reach Donald McMillan. Photo by Int.

"King of Dance" Raises Turkeys and Listens In

LOS ANGELES.—Music, speech and other entertainment from both far and near drift into the palatial new home of Fred H. Solomon, known throughout the Southland as the "dance king." With the completion of his new residence in Topanga Canyon, in the Santa Monica range, Mr. Solomon had installed a magnificent receiving set, equipped with the most intricate and elaborate instruments known to Radio science today, with the result that its receiving qualities are not excelled by any private station in Southern California.

And under the thread-like shadows of Mr. Solomon's Radio station the "dance king" raises turkeys which are used to grace the banquet tables at his annual Christmas dinners for the 2,200 newsboys of Los Angeles.

Air Laws and Radio Map in Revised U. S. Leaflet

WASHINGTON, D. C.—A considerable number of inquiries received at the Radio laboratory of the Bureau of Standards call for similar elementary information regarding Radio publications, Radio laws and regulations, station and operator's licenses, and call books. In order to facilitate the handling of these inquiries, Circular No. 122 was prepared and recently revised. The new addition gives the more important Radio periodicals, lists the important Government Radio publications, and the Radio books of general interest issued by various publishers, gives a brief summary statement regarding the Radio laws and regulations of the United States and Canada, and gives a map showing the inspection districts.

HEAR CONCERTS IN TUBE UNDER RIVER

GROUP CONDUCTS TESTS BENEATH HUDSON

See New Hopes of Using Waves as "Life-Line" for Entombed Miners

NEW YORK.—Huddled in a dripping tunnel ninety feet below the surface of the Hudson river and 1,600 feet from an exit, a group of transit officials, electrical experts, "sand hogs," and newspaper men recently tuned in concerts broadcast from stations 500 miles distant, besides many nearby.

The experiment was conducted at the farthest end of the uncompleted Jersey-Manhattan tube of the dual vehicular tunnel by Radio technicians and New Jersey bridge and tunnel commissions.

See Value in Mine Emergencies

The Radio programs were heard distinctly, both by headset and loud speaker. The fact that the ether waves carried into the tunnel, penetrating thirty feet of water, sixty feet of mud, and several inches of steel, demonstrated, said those in charge of the experiment, that Radio could be used as a life-line of communication by entombed miners or deep sea divers.

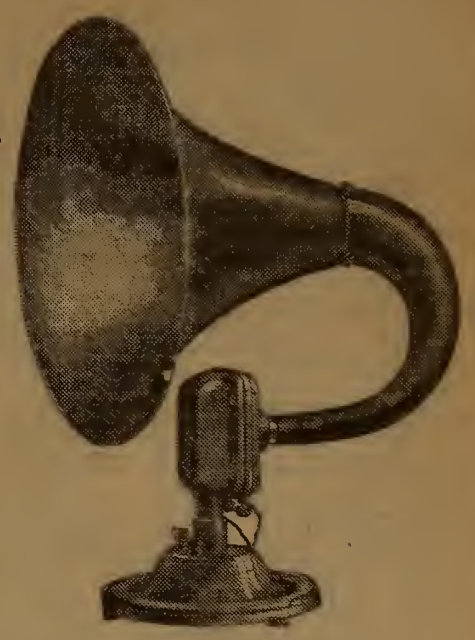
"This convinces us that the future will enable our divers and caisson workers, whose lives often are lost or imperiled when the telephone lines they communicate with are swept away, to carry small portable transmitting and receiving sets which will make them independent of all other means of communication," said M. M. Frohlich, secretary of the New York state bridge and tunnel commission, who instituted the tests.

Oil or vaseline is a poor conductor; do not put them on any switch contacts.

Complete Your Radio Outfit

Bring Out the Best in Your Receiving Set with a Bristol

TRADE MARK
AUDIOPHONE
REG. U. S. PAT. OFFICE
LOUDSPEAKER



IT TOOK six years to develop and perfect Audiophone. That is more time than the average person cares to spend on a Loud Speaker for his receiving set.

But here it is, all ready for you to use by simply connecting to the set.

No auxiliary batteries are necessary.

The tone is big, full, and rich, and without that scratchy, tinny noise so often heard in receiving. It can easily be heard all through the house, so that your own family and friends can enjoy it with you.

The finish is a beautiful, dull gold bronze.

Made in Three Sizes

Senior Audiophone .....Price $32.50
Junior Audiophone .....Price 22.50
Baby Audiophone .....Price 12.50

When signals are not sufficiently loud to give good results with the loud speaker, Bristol One-Stage Power Amplifier is recommended to build up the power so that it can be heard even in a large hall.....Price $25.00

Ask for Bulletins Nos. 3006 and AY-3011

THE BRISTOL COMPANY, Waterbury, Conn.

RADIO LINKS MEXICO AS TELEGRAMS FAIL

STATION IN NEWS PLANT GIVES REVOLT DATA

WBAP, Ft. Worth, Working with Obregon Regime, Maintains Steady Communication

FORT WORTH.—Station WBAP (Star-Telegram) is the quickest means of communication between Mexico and the United States. The Associated Press and a morning newspaper in Chicago are using the station nightly for the transmission of all news dispatches from Mexico and for communication with correspondents there.

Promptly at 11 o'clock (Central time) each night or 10:30 o'clock Mexican time, the dots and dashes begin to span the air between Mexico City and Fort Worth, an airline distance of more than 900 miles. Here the dispatches are put onto a direct telegraph wire to Chicago. The Associated Press news is handled in the same manner.

WBAP First in Mexico

The Fort Worth Tribune was first to resort to the use of Radio in the handling of Mexican news. Unable to find its correspondents scattered through Mexico, knowing that dispatches filed by telegraph were delayed for days (in some instances the dispatches, filed by mail, reached the Tribune more quickly than the telegraph) the Tribune decided to use Radio.

The United States department of commerce was appealed to and WBAP was granted special permission to use a wave length of 1,250 meters and to handle its Mexican communications on an experimental license 5XAP.

Mexicans' Radio Co-operates

Colonel A. Ramierez, chief of Radio communication for the Mexican government, with the approval of President Obregon, granted the use of the Mexican government's big station, XDA, at Chapultepec Castle, so that the world might quickly learn the various phases of the revolution.

The system was applied recently. The handling of the news traffic has been accomplished without a break. Even in this city, no complaint has been received from listeners in as to interference. This would indicate that WBAP's carrier wave is tuned so sharply that even Radiophans within a few blocks of the station are not troubled with heterodyning of waves. Communication is effected with no delay regardless of weather and atmospheric conditions. The transmission is made in code and voice.

Link Congress Hotel to KYW with Own Studio

Pompeian Room Music Now on Program Every Week

CHICAGO.—Studio number three of Westinghouse station KYW, located in the Congress Hotel, was opened here recently with a big celebration. On New Year's day their second studio, KYW-Evening American, located in the Hearst Building, was opened by the famous Ziegfeld Follies. The success of this new studio was instantaneous, and its reception so enthusiastic that the Westinghouse station, together with Harry T. Kaufman of the Congress Hotel Company, laid plans immediately for studio number three of KYW in the Congress Hotel.

Artists and entertainers participating in the opening included Miriam Kline, singer now appearing at a local theater; Ivantzoff, baritone from the Paris Grand Opera, and Clyde Doerr's orchestra. Listeners from coast to coast will now be able to enjoy the music from the Pompeian Room at the Congress several times each week, in addition to specially selected programs direct from the new studio.

Pennsylvania's "U" Asked to Teach Radio as Science

PHILADELPHIA.—The University of Pennsylvania has formed a Radio science league to increase and improve Radio transmission. Efforts are being made by officers of the league to place Radio in the scientific curriculum of the university. At present Radio lectures and meetings are not recognized as part of the curriculum. Iver O. Liljeros is the custodian of the league.

At its first meeting Arthur M. Hopwood, second vice-president, exhibited the original set used by him in the development of the Hopwood circuit, a copy of which was given in Radio Digest some time ago.

The Peking government has erected a powerful installation at Kashgar, near Chinese Turkestan. The station receives from Nauen, Tashkent, Rangoon, Colombo, and many other points.

FIRST WOMAN COMMERCIAL "OP"

The first woman in the United States to receive a commercial Radio operator's license is Mrs. Frank B. Chambers of Philadelphia, shown here at her instruments. She is an instructor in a school and while not teaching dons working clothes and huilds and assembles Radio apparatus. © U. & U.

A censorship of broadcast programs is proposed in France to prevent the circulation of erroneous news, particularly in respect of market transactions.

U. S. ADVISES ON ROAD CONDITIONS

Agricultural Bureau Adds Other New Features to Regular Service

WASHINGTON, D. C.—To meet popular demands the information sent out by the Weather Bureau of the Department of Agriculture by Radiophone from several stations has now been amplified to include river forecasts and stages, conditions of highways as affected by the weather, effect of weather on crops, weather reports from the principal crop areas, and special forecasts for the guidance of farmers in harvesting.

Co-operation with a number of small stations with limited range has been discontinued and several large and more powerful stations added. Forecasts for several states are now broadcast from a single station. The gradual discontinuance of the smaller and less powerful stations has left the bureau with a chain of well-distributed, reliable stations. All sections of the country are now able to obtain the forecasts.

KELLOGG RADIO PARTS

Easy { to Mount / to Wire / to Solder / to Tune

No Fussing or Re-drilling, Just Mount and Solder

They furnish every convenience for quick efficient assembly. And when connected—"O Boy!"

Did you ever hear such volume and still so clear and distinct!

That is the satisfaction of using Kellogg radio equipment—it puts the 'Ray' in Radio.

Join the group of "Happy Radio Fans." They are strong believers in quality, and Kellogg apparatus.

USE—Is the Test

KELLOGG SWITCHBOARD & SUPPLY COMPANY

1066 West Adams Street, CHICAGO

WHAT IS IT WE CALL "STATIC"?

How Does It Develop? How Does It Discharge and Why? Why Does Static Sometimes Affect Long Wave Length Reception and Other Times Bother on Short Waves? In which a Close Relation to the Study of Meteorology Is Found.

By Dr. A. Meissner — Part II

Editor's Note.—The author of this important series is chief engineer for one of the world's largest Radio communication companies, the Telefunken Company of Germany. He has been a leader in the science since Marconi sent his first message across the English Channel. Dr. Meissner promises to upset a few time honored theories. Now read—

THUS we learned last week that there are large accumulations of electricity at the boundary planes between the air strata. And since the accumulations here are so much greater than elsewhere in the strata we can scarcely escape the conclusion that it is here that the electricity originates. But how does this accumulation develop?

Dr. A. Meissner.

We can explain this as follows: We have two air strata which travel with different speed in contact with each other. One of these strata is warm, the other cold. They rub against each other and, in addition, it may happen that the difference in temperature and humidity causes clouds to form. Thus there is friction between air and air, or between air and cloud, and frictional electricity is developed.

One stratum becomes positively, the other negatively charged. Static, therefore, originates through friction, and it seems logical to assume that all atmospheric electricity is caused by friction partly between air strata and clouds and partly, perhaps, between the air and the earth's surface itself.

How Static Discharge Occurs

Now it happens that the strata, Figure 2, where the electricity develops are those in which the temperature sinks below zero centigrade (+32° Fahrenheit), so that water particles contained therein freeze into ice needles. Here it is reasonable to assume that the pointed shape of these needles permit large quantities of electricity to escape into the surrounding atmosphere. Thus masses of positive electricity originate, and as positive and negative electricity always develop simultaneously, a corresponding accumulation of negative electricity is created in the other strata. We might say that clouds of positive and negative ions form in the air.

If these clouds—by air currents or other accidental causes—are brought into proximity there will occur a neutralization of the oppositely charged accumulations. We have an invisible lightning discharge, and this invisible lightning is the most common cause of disturbing noises in our Radio receivers.

What Wave Lengths Are Covered

It is sometimes observed that these disturbances are strong when the receiver is tuned to short waves. But more often are they stronger when receiving long waves. How are we to explain this curious phenomenon?

We must turn again to the strata of the atmosphere and the inversions, and examine these strata under different weather conditions, at the same time observing which waves are disturbed under these conditions. Disturbances in a certain wave usually occur when a meteorological minimum (low pressure area) is just passing above us, is just approaching, or has just passed. Disturbances of short waves occur mostly when the front of a minimum is right above us, and in long waves when its rear is close by.

We must now form an idea of the air strata with which we have to do when such a minimum exists.

How Air Strata Clash

For this purpose it is better not to use the conventional weather map. The lines that indicate isobars, wind directions and temperatures on these maps as used in America and Europe are not satisfactory in this connection. We must represent the conditions so that a cross-section of the air strata is shown passing over a certain place in the direction of flow. This is much more illuminating.

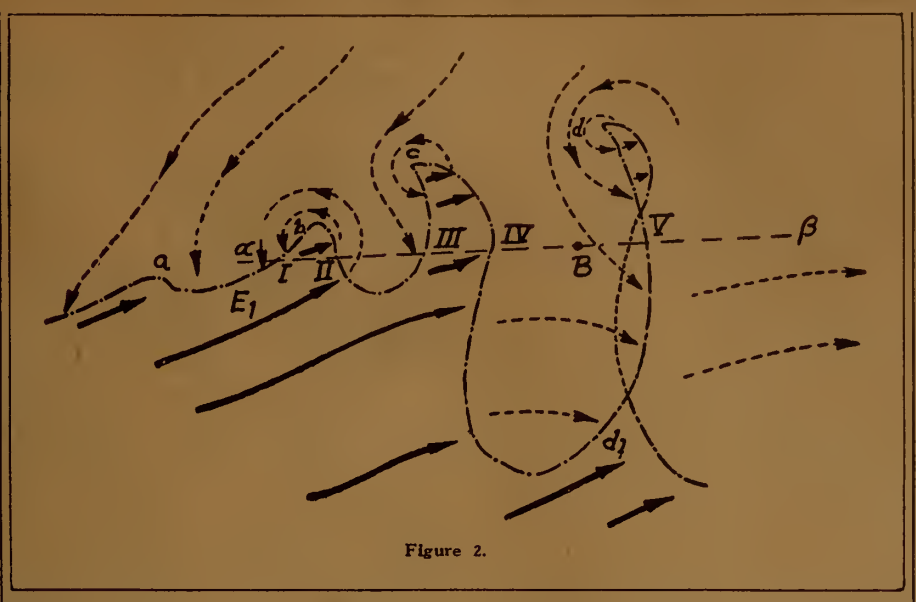


Figure 2.

We assume, therefore, that a minimum passes over a certain place, B in Figure 2. In other words, here a colder air current from the North (dotted arrows) strikes down into the warmer air strata from the South (heavier arrows). This inflow drifts with great intensity and pressure over B to the right.

If, now, we make a cut (line α to β) in the direction of drift of this flow (Figure 3), K is the cold air that flows in and presses mainly toward the right. At V, there are highly compressed air strata of different temperatures and different wind velocities. As we know from the kite experiment, the friction between such strata as we have here creates electricity. The strata become highly charged.

Strata Tightly Pressed Against One Another

But they are at this point pressed very closely against one another, because the cold lower air stratum passes swiftly to the right. Therefore, the strata, in a state of different electric charges, are also highly compressed. Equalization or neutralization thus can easily take place, and the occurrence of this manifests itself to us as a static disturbance. It happens very quickly when the masses of ion clouds lie close together under pressure. We experience a discharge shock of short duration, the equalization often taking only a few seconds.

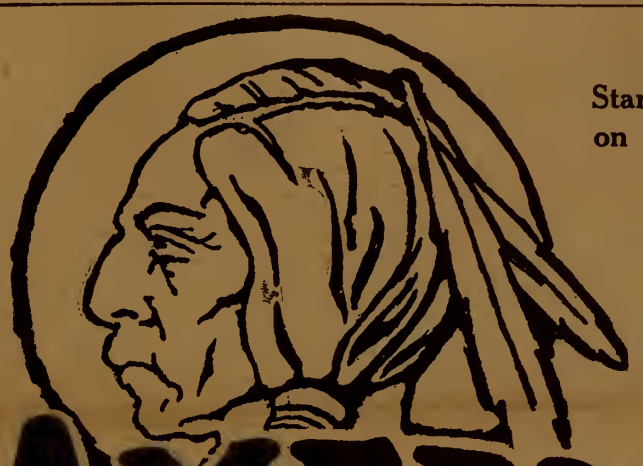
Long and Short "Wave" Static

Figure 4 represents such a shock. T signifies time. The receiving antenna with short self-oscillation is particularly susceptible to such a short shock, and we have consequently many disturbances in reception of short waves.

If, on the other hand, we consider the

(Continued on page 10)

More than half a million in service



Standard equipment on the better sets

ALL-AMERICAN

Amplifying

TRANSFORMERS

Remember!—when you buy an Amplifying Transformer, that

Every "All-American" is actually tested in a radio circuit before it leaves the factory!

We operate a radio Sending Station on one floor of our factory, and a Receiving Station on another floor.

Each "All-American" is hooked-up and thoroughly tested in this circuit, assuring the purchaser perfect amplification without distortion.

This is just one of the many reasons why—

ALL THE BETTER

Dealers Recommend

THE "ALL-AMERICAN"

For Power Amplification!

All-American Power Amplifying Transformers are the most efficient transformers ever designed for "Push-Pull" circuits. Each, $6. As they are the best, why pay more?

Neutrodyne Users!—Note

Exhaustive comparisons and tests by leading radio engineers have absolutely demonstrated that "All-Americans" are the most efficient of all makes, on the audio frequency side of Neutrodyne sets.

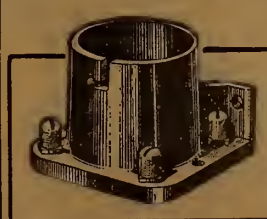
We Will Send

the latest All-American diagram and circular, describing Power Amplification; also the famous All-American book of Tested Hook-ups—on receipt of 4c in stamps to cover mailing charges.

RAULAND MFG. CO.

Pioneers in the Industry

206 N. Jefferson St., Chicago



All-American Socket

One-piece molded bakelite — for panel or base mounting. Finest socket money can buy. Only 75c.

All-American Audio

Frequency Transformers have no equal. 3:1, $4.50; 5:1, $4.75; 10:1, $4.75. The best you can buy. No need to pay higher prices!

LARGEST SELLING TRANSFORMERS IN THE WORLD

Watch for the new All-American Long Wave Radio Frequency Transformer suitable for Super Heterodyne circuits

WHAT IS IT WE CALL "STATIC"?

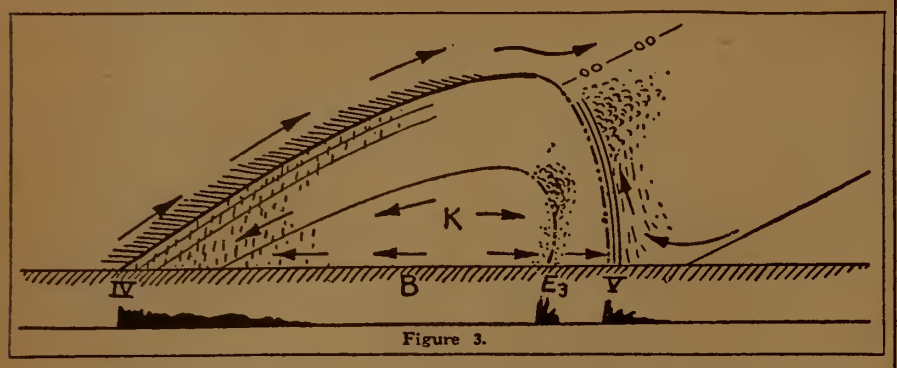


Figure 3.

(Continued from page 9)

rear of the minimum (IV, Figure 3) we find, here too, cold and warm air strata, with different velocities, coming together, the velocity of the cold air being much less. It forces the warmer strata above upward with less speed. Here, inversion strata are also encountered—i. e., strata of different speed and temperature, and consequently large quantities of positive and negative electricity develop. But because of the slower movement, these strata are not in so close contact, and neutralization of their apposite charges takes

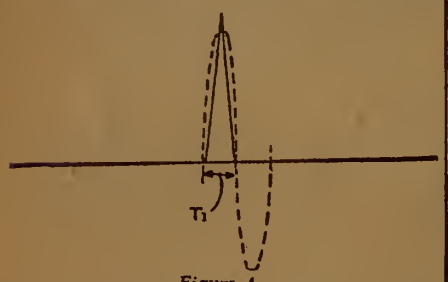


Figure 4.

a longer time than at V, Figure 3. Thus we obtain a picture, like Figure 5, of the neutralization process. The time T_2 is here longer than T_1 in Figure 4. That is, we have a disturbance of a nature that affects long wave reception. Conversely the short period disturbance, Figure 4, is more noticeable on shorter wave reception.

To confirm these conclusions, a mass of meteorological evidence must undoubtedly be accumulated through experiment and obsevation; but we have at last reached a point where we can assert that an explanation of the puzzling relation between

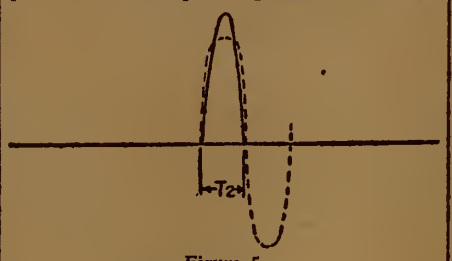


Figure 5.

the wave lengths and the disturbances is possible. We begin to see how closely related are the sciences of atmospheric electricity, meteorology and Radio, and how the development of all are interdependent.

(TO BE CONTINUED.)

Webster Joins Radio Board

WASHINGTON, D. C.—Lieut. E. M. Webster, of the Coast Guard Service, has been appointed on the Interdepartment Radio Advisory Committee to represent the treasury department. Lieut. Webster succeeds L. J. Heath, of the Public Health Service, as a representative of the treasury department.

ALWELL
Trade Mark

No More Shocks

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Wooden Handle Soldering Iron

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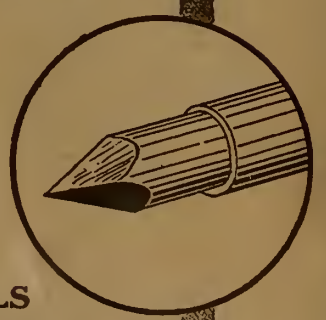

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OPERATING AND TROUBLE SHOOTING

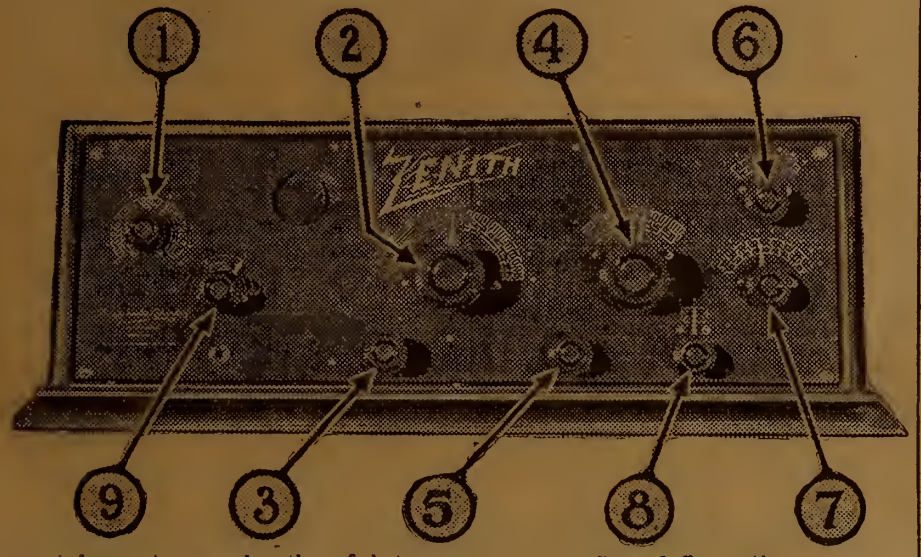
"OPERATING and Trouble Shooting" is a Radio Digest feature whose purpose is to study the late models of various standard receiving sets and to show the newly initiated broadcast listener, who has purchased such a set, how he can operate it to get the best there is in it and how he can overcome minor difficulties which may be causing some trouble. On pages 11, 12 and 13 this week the Zenith 3-R and Jones Symphony are described. Radiophans with other kinds of sets will also find these articles worth reading particularly the paragraphs on trouble finding.

For the Owner of a ZENITH 3-R Receiver

THE MODEL 3-R Zenith receiver combines a three-circuit Armstrong regenerative receiver with an audion detector and three-stage audio frequency amplifier equipped with a special selector primary circuit which eliminates interference by suitable adjustment of the controls of this circuit. The set is as simple in operation as the ordinary single circuit type of receiver. All tuning is accomplished by means of the secondary tuning knob 2 and the tickler knob 4. Both these controls are provided with small vernier knobs, 3 and 5, making it possible to secure fine adjustment without difficuty.

Wave Length Range

The wave length range of the Zenith 3-R is from 150 to 600 meters. "Wave length" in meters has no relation whatever to the distance over which signals may be received. It is purely a designation whereby the tuning of the receiver to one station among many may be accomplished. All broadcasting at the present time is carried on at wave lengths of between 220 and 580 meters, which band is well within the range of tuning.



Amplification

The three-stage amplifier incorporated in the 3-R is of special design and construction. The adjustment of this amplifier is the entire control, being accomplished by the single knob 9, which not only adds additional steps of amplification as desired, giving increased volume, but also turns the battery current on each tube as the various tubes are used, thus making the battery consumption only what is necessary to operate the tubes which are actually used.

Antenna to Be Used

Because of the selector primary circuit, the set requires a slightly different type of antenna than do other types of receivers. A receiving set will not function properly unless its antenna picks up or collects a sufficient amount of energy to operate it, and as an indoor aerial may be effectively screened from incoming Radio waves by the grounded steel structures surrounding it, no matter how sensitive our set, it cannot operate efficiently under such conditions.

In order to be effective, an aerial should be as high above the ground and above surrounding objects as possible. A single wire not exceeding 125 feet in over-all length, including the lead-in and the ground lead, is recommended. It is always desirable to run the antenna over as open a space as possible, rather than over buildings, trees and other objects of this kind.

Long Distance Reception

For long distance reception it should be kept in mind that the height of an aerial above the ground, or above the building on which it is mounted, is extremely important, and it can hardly be made too high for satisfactory results. The height of an aerial on a steel building may be considered as very little more than the height of the aerial off the roof. Aerials on such buildings should therefore be from 10 to 20 feet or more above the roof. All connections in the antenna or in the lead-in should be soldered, and soldering should preferably be done with a non-acid, non-corrosive soldering flux.

Ground Connection

It is important that the ground connection from the instrument be as short as possible. The ground connection should be made preferably to a cold-water pipe. If this is not available, a steam radiator pipe will do in many cases, although there are instances in which steam radiators are not effective grounds, due to the use of insulating expansion joints. If neither of these are available, an outside ground should be used, but for best results driven rods are not satisfactory, as they do not have sufficient surface, and consequently we recommend the burying of a piece of sheet metal approximately 4 by 6 feet in size, as deeply as local conditions will permit and preferably in moist earth. Surface is of utmost importance in securing a good ground.

In making the connection to a water pipe, it is practically impossible to solder a connection to such a pipe, unless the water is thoroughly drained from it, and consequentiy it is better in all such cases to use a simple ground clamp which should be securely attached to the pipe and to which the ground wire is connected.

Grounds on Farms

On farms or in other localities where water pipe and other grounds of this kind are not available, either a buried sheet metal ground or a ground consisting of a number of copper wires 30 to 50 feet or more in length may be connected together at a central point near the set and buried about a foot deep radially from this central point. The ground lead should be connected at the central point and run to the ground post of the receiver.

Installation of Antenna

With the foregoing explanation the user will have some general idea of what should be accomplished by the installation. The antenna itself may be supported from any convenient building, pole or structure, and need not be directly above the location where the receiver is installed. Wherever possible the antenna wire should be installed in a straight line; but if necessary, this portion may be bent at right angles or supported on insulators at several points, provided it does not double back sharply on itself.

Lead-In Insulation

The lead-in wire may require support in some cases, and if so, should be supported at a considerable distance from the side of the building, either by using an insulator similar to one of the antenna insulators, tied by means of a wire or cord, so as to hold it away from the side of the building, or by an insulator fastened to the end of a wooden pole extending from the side of the building.

The lead-in insulator or porcelain tube is usually located at some point convenient to the receiver, and the hole for it is always bored on a slant, so that water which runs down the lead-in wire will not enter the room, but will run off outside.

Lead-In Connections

The lead-in, which should be smaller than number 14 rubber covered copper wire, is run direct to the upper end of the lightning arrester, if one is used, or that end equipped with a spring connector and carried on from the connector direct to post "antenna" of the receiver. The lower end of the lightning arrester or that end fitted with a binding post connector, should be connected directly to the ground. This wire should run in as straight a path as possible from the arrester to the pipe used for the ground connection, a branch being taken off to post "ground" of the receiver.

Loud Speaker

When using a loud speaker, the cord or wiring between the set and the speaker should not be placed in such a position that it passes by the receiver. In other words, the loud speaker should always be placed to the left of the receiver looking at it from the front, in order to eliminate distortion and howls which sometimes results, if the cord passes by the

(Continued on page 12)

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Gentlemen:

I am writing to give you an experience which I recently had which may be of interest to you.

I am a Radio fan, and have experimented with many types of hook-up. I have also had the unfortunate experience of "blowing" several Radio tubes. Recently a friend of mine recommended your fuses, and I purchased three for my three-tube set which I am now using. Shortly after installing these fuses, in attempting to tighten a loose connection, my screwdriver accidentally touched the "B" battery lead. All three fuses were blown, and I realized that if it had not been for the Radeco Fuses I would have lost all the tubes in my set. I am inclosing herewith $3.00 for which please send me six fuses for UV201A tubes, as I do not wish to be without them. You are at liberty to use this letter in any way.

Very truly yours,
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127 Vandalia Ave., Cincinnati, Ohio

OPERATING AND TROUBLE SHOOTING

(Continued from page 11)

receiver too close to it. It is impossible to insert the plug carrying the A and B battery connection wrong in the socket in the receiver. as both the plug and socket are so keyed that they will only fit together in the right manner.

Tubes, Resistances to Use

When the installation has been completed the four vacuum tubes should be inserted in their respective sockets inside the instrument.

Only hard or "amplifier" tubes should be used for both detector and amplifier purposes. Any of the standard new type amplifier tubes now on the market will serve equally well. but soft or so-called detector tubes sh ld under no circumstances ever be used. The set is equipped in such a manner that either storage-battery or dry-cell operated tubes may be used.

Two sets of cartridge resistances are supplied. Those which are to be used with storage-battery tubes are distinguished by red markings, whereas the resistances to be used with the dry-cell tubes do not have this red marking. If dry-cell tubes are to be used, the four red resistance cartridges should be removed and the four unmarked cartridges inserted in their stead. Adaptors of some type will be necessary in order to use the UV-199 and other tubes of this type in the sockets which are supplied with the 3-R receiver. No other change is necessary.

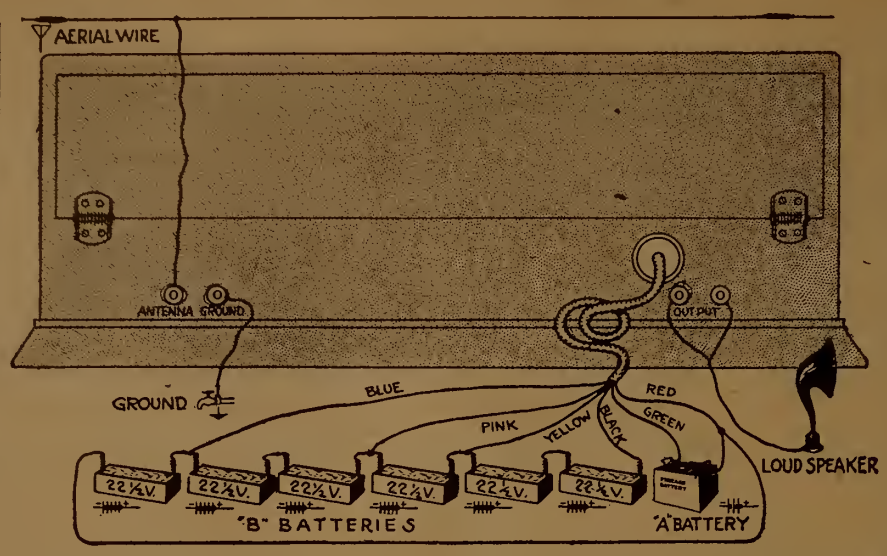
Use of Loud Speaker or Phones

Where a loud speaker is used, it should be attached to the two posts marked "output," found at the right of the instrument looking at it from the rear. The two connections from the loud speaker should be connected one way, and then reversed at the "output" posts of the set, as it will be found that they will operate better when connected one way than the other.

It is better to begin operating the receiver with the use of the headphones than attempt to use the loud speaker at first. The loud speaker should never be used while tuning. All tuning should be done using the headphones only, which may be done by inserting the plug attached to the headphone cord in the jack. When the headphone plug is inserted in this jack the loud speaker will be cut off automatically, and when the plug is pulled out, the loud speaker will be automatically thrown in.

How Tuning Is Done

In beginning to tune the receiver the headphone plug should be inserted in the jack and the switch 9 turned to point 2, which uses two stages of amplification. When the use of three stages of amplification is desired, turn knob 9 to point 3. The third stage of amplification will be necessary only on stages at extreme distances or where extreme volume is desired, and it is generally better to tune with two stages of amplification, and then if the volume is not sufficient on the loud speaker, the third may be added without another change in the tuning of the receiver. The use of three stages of amplification is not necessary for local reception.



Where storage-battery tubes are used, the rheostat 1 should be set at about point 8 or 9. No tuning or adjusting should be done with this rheostat, as it is intended purely to compensate for a drop in voltage of the storage battery with continued use and is not intended as a tuning adjustment. It will sometimes be necessary in order to get satisfactory volume to turn the filament rheostat 1 up to beyond point 9. There is no danger of burning out these tubes in the receiver if a 6-volt storage battery is used, even though the filament rheostat be brought all the way to point 10. It will be found, however, that the results will not be increased appreciably with the rheostat above point 7, and all that will be accomplished is the consumption of more battery current and consequent shortening in life of the tube.

When dry cell tubes are used, rheostat 1 should be set at point 4 to 6 for best results. Under no circumstances should tuning be done with the filament rheostat, but the best setting should be found and the rheostat left set at that point, all tuning being done with the proper knobs as outlined here.

Tuning to Wave Length

Knob 8 will be used mostly on point 2, for the majority of the broadcast stations. Amateurs and the low wave length broadcasting stations will be found with this knob on point 1, and a few of the higher wave length broadcasting stations will be heard with this switch on point 3. The method of adjustment in finding the station is identical regardless of the setting of this switch, as it simply governs the wave length range over which the receiver functions.

A little manipulation of the two switches 6 and 7 will show quite remarkable results and enable the user to obtain successful reception of signals from distant stations.

Reception of stations at extreme distances is dependent to some extent on weather conditions. There are times at which the maximum of distance cannot be secured through poor weather. This does not necessarily imply trouble. Before it is assumed that the receiver is not operating properly its operation should be observed over a period of nights.

Causes of Trouble

Trouble with the receiver can ordinarily be traced to one of several things, either a poor antenna or ground, a defective tube in either the detector or amplifier, or run-down A, B or C batteries. The use of a voltmeter in testing these batteries is advised so that the user may always be sure of the best results. When the signal strength is consistently low and there are scratching and rattling noises or a continual high-pitched whistle heard regardless of the station tuned in, or when the music and speech from all stations is distorted and not clear, the various dry batteries should be tested. If any are found over 20 percent below their rated voltage they should be replaced.

Life of Tubes and Batteries

Tubes ordinarily give no trouble unless they are defective when first purchased. If a tube has been used satisfactorily, it should continue to give satisfaction until the filament burns out. If the proper resistance cartridges are used, it should never be possible to burn out the filament of any of the tubes, unless improper connections are made.

The small-size B batteries when used with this set have an average life of three months. Larger sizes have correspondingly longer life.

When charging the storage A battery, changing connections on the receiver, or replacing B batteries, the battery plug at the rear of the set should always be removed in order to be certain that a wrong connection may not result in the burning out of the tubes.

New Chance for Amateur Song Writers in Radio

Broadcasters to Use Works Approved by Specht

NEW YORK.—Paul Specht, well known orchestra leader, has completed arrangements with the National Association of Broadcasters for the broadcasting of any songs submitted to him by unknown writers which meet with his approval.

Because the National Association of Broadcasters controls some fifty large stations from coast to coast and considering that Specht is one of the leading exponents of American dance music, the amateur writer will have the greatest opportunity for recognition that has ever been accorded the unknown artist.

Heretofore, amateur writers have been made the prey of "song sharks" who have swindled them of millions of dollars. The U. S. Government has stopped many of their operations, but the traffic still persists to such a degree that the Musical Industries Chamber of Commerce is still waging an organized warfare against the illegitimate music publisher or "song shark."

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NEW ORLEANS.—The voice of Radio is being used by the Orleans Parish Medical Society to propagate health talks. The talks are broadcast the third Friday of each month between 8 and 9 p. m., Central time. Tulane University station is being used.

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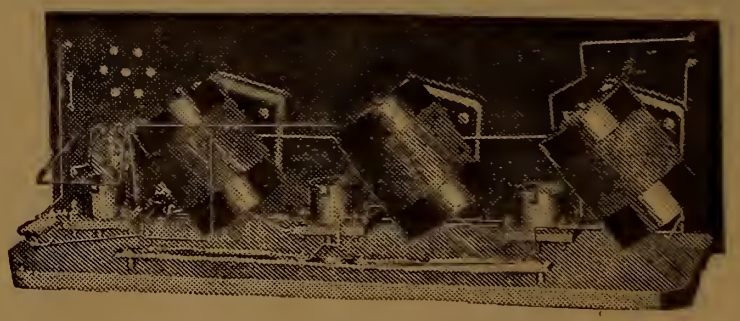

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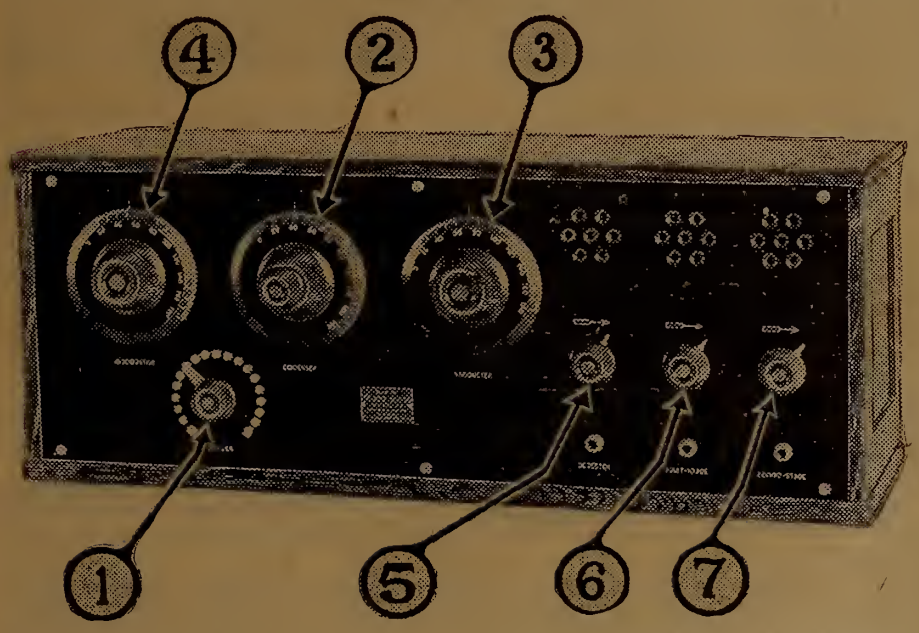
OPERATING AND TROUBLE SHOOTING

For the Owner of a Jones Radio Co. Symphony Receiver

THE CIRCUIT employed in the Jones Symphony receiver is what is known as the "single circuit." This circuit has been improved by changes in its fundamental principles, and through the addition of a circuit whereby we connect a variometer from aerial to plate. The selectivity and regenerative action as a result is greatly increased.

There are certain set rules that will teach one to tune in the desired stations, but there are so many other methods that one learns through familiarity with the receiver, that after it has been used for a short time, the individuality of the particular operator counts for most.

In explanation of the various dials and knobs that appear upon the panel of the set, let us describe in detail how each



functions and what its particular purpose is.

Explanation of Dials

The dial on the left, number 4, is what is known as the regenerator; that is, it controls the "tickler" or feedback element which amplifies the incoming signal without correspondingly amplifying the static conditions most always present in the air. This is where the regenerative circuit excels other circuits. It regenerates or amplifies, thus permitting reception over very great distances, without the annoying features usually found through the use of other non-regenerative circuits.

The dial next in line, number 2, is the variable condenser that is in series with the aerial and tunes in fractionally between the switch points, and gives the very finest tuning possible.

The dial, number 3, on the extreme right is the variometer which not only amplifies through regenerative action, but operates in such a manner as to eliminate the undesired station, even though that station is operating in the immediate vicinity.

Detector Filament Rheostat

The first knob, number 5, is the detector rheostat control and is automatically lighted when the plug is placed in the first jack, provided the knob is advanced from the off position clockwise.

The other knobs, numbers 6 and 7, are respectively the first and second stages of audio amplification and are automatically lighted through the insertion of the plug in the respective stage.

The circle of switch points, number 1, as shown on the bottom line of set at left, marked "coupler," are connected to tappings of the variocoupler and read from left to right clockwise, number 1 being, of course, at the extreme left. This is known as loading inductance and is employed to arrive at the proper wave length desired, by adding such number of switch points through the medium of the switch passing over them, as may be desired to reach a given wave length. As to the number to be used in any particular instance, absolute data cannot be given, as all aerials vary as to length. Consequently, as the aerial is lengthened, the number of switch points are correspondingly reduced, or as the aerial is reduced in length, it is necessary to correspondingly increase the number of the switch points. This is a matter that each individual will have to learn for each particular case.

We have now described in detail the meaning and functioning of each element as contained in the set, and will proceed to illustrate the simplest method of tuning in a station, for instance, that is sending on 400 meters.

Tuning Operation

First place the main switch on a point from say number 4 to number 8, all dials to be at 140. Then with plug to head set inserted into first or detector jack, turn detector knob 5 to the right until a "mushy" sound is heard in the receivers. Now turn the center (condenser) dial 2 very slowly to the left until a slight whistling sound is heard, which is the "carrier wave" upon which the sending station is broadcasting.

After the whistle is heard it is very easy through turning the condenser slowly to the desired point and afterwards tuning in to the true wave through the medium of the vernier represented by the extending knob on the condenser, to get the exact capacity necessary to bring in the station clearly.

Next adjust the regenerator dial 4 at extreme left to the point where the loudest signal is obtained. Follow the same method with the variometer dial 3, which will not only give additional regeneration, but tune out such stations as may be interfering with clear reception. Plug into the detector jack at first with the head phones on the head, afterwards plugging in on the various stages of amplification and regulating the volume and proper amount of filament current through the medium of the respective rheostats (dials 6 and 7).

Tube Precautions

That is practically everything that is necessary to know in order to properly operate the receiver, except to say that of course it is necessary to insert the proper tubes in their proper sockets; be doubly sure when attaching the A or lighting battery and the B or plate battery, that you have the wires running to the proper terminals as shown in the rear of the set, or it may cost you new tubes if you connect them to the improper battery.

The following suggestions are arbitrary in order to provide a starting point in tuning.

First plug the head set in the detector jack and turn the rheostat 5 in a clockwise direction until a slight noise is heard. Next do the same thing with the first stage jack. The noise should be slightly louder in this jack.

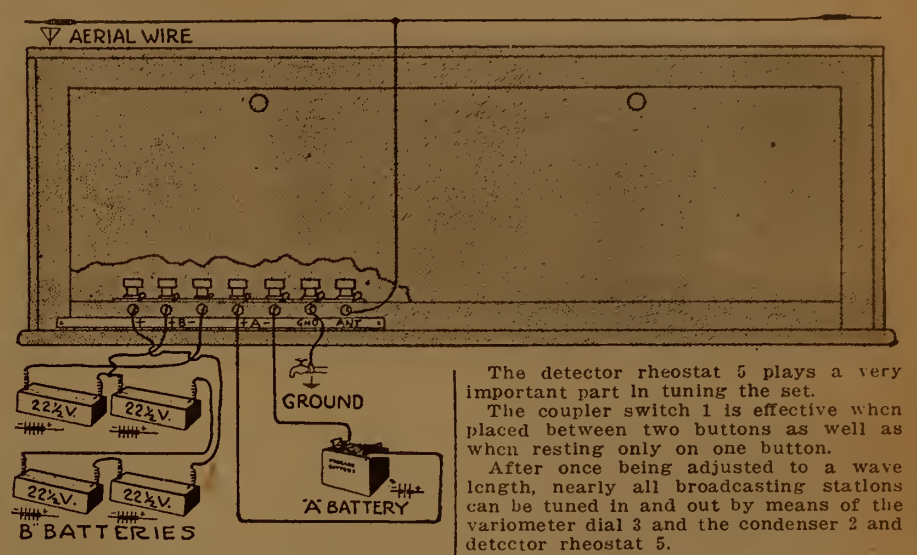
Arbitrary Tuning Directions

Next comes the direct tuning of the set itself which arbitrarily can be done as follows. Since all broadcasting is done on a wave length of about 360 meters, the coupler switch 1 will operate for the average antenna between points 4 and 10 counting from the left. Select point 7 to start.

The regeneration dial 4 is effective only through an arc of 90 degrees, between the arc of 90 and 180, making a setting of the dial to, say, 140.

Make the variometer 3 setting at 90. Now plug the head set in the first stage jack having the rheostats 6 set as explained above. Operate the condenser dial between 0 and 180 slowly and listen for the "whistle" of a broadcasting wave.

If results are not yet satisfactory increase the detector rheostat 5 slightly and proceed again. Proceed in this manner until a wave is found and then carefully move each dial until the best reception is obtained. It will be noted that the adjustment on the detector rheostat is delicate.



After once getting the wave, shift the coupler switch 1 to various points and make readjustments in order to obtain the best point for adjustment.

Refining Adjustments

After properly tuning in one station and familiarizing one's self as much as possible with the dials in this adjustment the remainder of the tuning is comparatively easy. The degree of loudness can be regulated by either moving the plug from stage to stage in the jacks or adjusting the rheostats.

The following points should be remembered in tuning the sets:

The vernier of the condenser 2 (controlled by the small knob) is a most important factor in tuning. In many cases it is possible to tune in from one to four stations by merely advancing or retarding the knob of the vernier. It is helpful to advance this knob part way before beginning to tune.

The detector rheostat 5 plays a very important part in tuning the set.

The coupler switch 1 is effective when placed between two buttons as well as when resting only on one button.

After once being adjusted to a wave length, nearly all broadcasting stations can be tuned in and out by means of the variometer dial 3 and the condenser 2 and detector rheostat 5.

Antenna to Use

Best results with the receiver have been accomplished by using an aerial with approximate lengths varying from 75 to 150 feet, with an elevation of from 30 to 50 feet or higher.

The lead-in wire connecting the aerial to the receiving set should be as short and direct as possible, avoiding square corners in wire and keeping as far as possible from all metallic objects, which have connection to earth. Avoid running aerial or lead-in wire in parallel with electric light wires.

Ground wire not less than 14 gauge copper wire should be run from receiver to ground. This wire may be connected to the heavy copper ground wire leading from arrester or made on an entirely separate lead going to the earth. A good ground connection is very necessary to assure the maximum efficiency of the receiver, and many times undesirable noises which cannot be eliminated are due to loose connections on the aerial and poor earth connections.

A Battery Suggestions

It is recommended that a 6-volt 120-ampere hour storage battery be used. The

(Continued on page 14)

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The most ingenious variable air condenser ever conceived
No outside Spring Connections—True Capacities.

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SEND RADIO POWER FOR SCIENCE MEET

DR. W. R. WHITNEY SHOWS HORNLESS SPEAKER TOO

Show Savants at Cincinnati Headway of International Tongue to Meet Radio Needs

CINCINNATI.—Modernism as arrayed against fundamentalism, not only in relation to ecclesiastical but to material theories, has won another victory. Coldly analytic investigators, during the recent annual convention here of the American Association for the Advancement of Science, the world's greatest body of its kind, reported conclusions which were said to refute not only the Biblical story of Babel but the proposition that "there is nothing in a vacuum."

Actual demonstrations were staged before an audience of the world's greatest savants by Dr. W. R. Whitney, director of the research laboratories of the General Electric company.

By means of an intricate apparatus, which was the result of years of intense study and experimentation, he caused a high frequency current to pass without the aid of wires through several inches of air to an ordinary 110-volt incandescent electric light bulb which then immediately became illuminated.

Nearest to Radio Power Transmission

"This comes about as near to the 'wireless' transmission of power," said Dr. Whitney, "as we have yet seen." He produced the 2,000,000-cycle alternating current in the vacuum tube by oscillating the ordinary 60-cycle current supplying the lights in the building which housed the convention.

The noted scientist also exhibited a loud speaker without a horn. He showed how it could reproduce a voice of any magnitude by means of a device consisting in the main of a disc about three feet in diameter. The disc was connected to a microphone and amplifier for the purpose of demonstrating how sounds were reproduced. The contrivance eliminated most of the tonal distortion so commonly found in such devices.

Radio Offsets Confusion of Babel

Efforts of linguists during the last quarter century to establish an international tongue, more especially since the practicable development of Radio, are likely to become successful, according to Dr. F. G. Cottrell, chairman of the committee on international auxiliary language of the convening body. Like views were presented by S. W. Stratton, former director of the U. S. bureau of standards.

Dr. Cottrell said: "The new world tongue will probably be a combination of the few types now in existence. Some of them are almost universal. This kind of language would simplify the world's political and business mechanism, would bring all the world to the doorstep of each of its inhabitants."

JONES SYMPHONY SET

(Continued from page 13)

best results are obtained with batteries that have been especially constructed for Radio work. Considerable difficulty has been experienced where worn out automobile batteries have been used. These batteries in most cases causing a noisy receiving set.

The A battery should be located as near the receiving set as is practical in order that the leads may be as short as possible. Not less than number 12 wire should be used where the batteries are located close to the set. Where it is necessary to locate the battery at some distance larger leads should be used.

Setting Up the Receiving Set

After assuring yourself that all connections have been properly made to your aerial, ground and A and B batteries, all rheostats should be turned as far to the left as possible. After this is done the detector tube should be placed in the socket immediately to the rear of detector rheostat and, amplifiers being placed in remaining sockets, the receiver is ready for operation and tuning.

It has been found advantageous to keep a record of dial readings. They vary, of course, with different installations and antenna. In many cases it is possible to relocate stations on these readings with a very slight adjustment of vernier on condenser and detector rheostat.

Keeping a record of readings not only saves a great deal of time ordinarily wasted in "hunting" for stations but enables us to pick up desired stations in a more satisfactory manner.

There are several possible connections that will receive any one station, but a certain number of these are found to be best, and of that certain number some will eliminate interference from the local stations while others are highly satisfactory if there is no local broadcasting going on.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE INSTRUCTIONS FOR USE BELOW)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCN, Calgary, Alta.	440	12:00- 1:00	Silent	11:00- 2:00	Silent	Silent	11:00- 1:00	Silent
CKAC, Montreal, Que.	430	Silent	6:00-10:30	Silent	6:00-10:30	Silent	6:00-10:30	3:30- 4:30
CYB, Mexico City, Mex.	425	Silent	7:00- 8:30	Silent	7:30- 9:30	Silent	7:00- 8:30	Silent
CYL, Mexico City, Mex.	440	Silent	8:30-10:00	Silent	Silent	8:30-10:00	Silent	Silent
KDKA, E. Pittsburgh, Pa.	326	5:00- 9:00	5:15-11:30	5:30- 9:00	5:15-11:30	5:15- 9:00	5:15- 9:00	6:30- 7:30
KDZE, Seattle, Wash.	455	10:30-12:30	Silent	10:30-12:30	Silent	10:30-12:30	Silent	Silent
KFAE, Pullman, Wash.	330	9:30-11:00	Silent	9:30-11:00	Silent	9:30-11:00	Silent	Silent
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	Silent	8:30- 9:00	9:00-10:00	9:00-10:00	Silent
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:30-12:30	9:30- 1:00	9:30- 1:00	9:30- 1:00	9:30- 2:00	9:30- 1:00	8:00-10:00
KHJ, Los Angeles, Calif.	395	8:45- 9:30	8:45- 2:00	8:45- 2:00	8:45- 2:00	8:45- 2:00	8:45- 2:00	10:00-12:00
KLX, Oakland, Calif.	509	Silent	10:00-12:00	10:00-12:00	10:00-12:00	10:00-12:00	Silent	Silent
KPO, San Francisco, Calif.	423	10:00- 1:00	10:00- 1:00	10:00-12:00	10:00- 1:00	Silent	10:00- 2:00	10:30-12:00
KSD, St. Louis, Mo.	546	8:00- 1:00	8:00- 1:00	8:00- 1:00	8:00-10:30	Silent	7:15- 9:00	Silent
KYW, Chicago, Ill.	536	Silent	8:00- 9:30	8:00-12:30	8:00- 9:30	10:00-12:00	8:00- 9:30	Silent
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 7:40	5:45- 7:40	7:05- 7:40	Silent	Silent
PWX, Havana, Cuba	400	Silent	Silent	7:30-10:00	Silent	Silent	7:30-10:00	Silent
WBAP, Fort Worth, Texas	476	7:30-10:45	7:30-10:45	7:30-10:45	7:30-10:45	7:30-10:45	7:00- 7:30	5:00- 6:00
WBAV, Columbus, O.	390	8:00-10:00	Silent	Silent	Silent	8:00-10:00	Silent	4:00- 5:00
WBZ, Springfield, Mass.	337	6:00- 9:00	6:30- 9:00	5:00-11:00	6:30- 8:00	5:00-11:00	6:30- 8:00	5:45- 8:30
WCAE, Pittsburgh, Pa.	462	7:30- 8:30	7:30- 8:30	7:30- 8:30	7:30- 8:30	7:30- 8:30	7:30- 8:30	5:30- 6:30
WCAP, Washington, D. C.	469	Silent	6:30- 9:00	Silent	6:15-11:00	Silent	6:30-11:00	6:20- 9:45
WCBD, Zion, Ill.	345	8:00-10:00	Silent	Silent	Silent	8:00-10:00	Silent	2:30- 5:30
WCX, Detroit, Mich.	517	7:30- 9:00	7:30-11:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	Silent	6:15- 7:15
WDAF, Kansas City, Mo.	411	8:00- 1:00	11:45- 1:00	8:00- 1:00	11:45- 1:00	8:00- 1:00	11:45- 1:00	Silent
WDAP, Chicago, Ill.	360	Silent	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	9:15-11:15
WDAR, Philadelphia, Pa.	395	6:30- 9:55	6:30- 7:00	6:30-10:00	6:30- 7:00	6:30-12:00	6:30- 7:00	1:00- 3:00
WEAF, New York, N. Y.	492	6:30- 9:00	6:00- 9:00	6:30- 9:00	6:00-11:00	6:30- 9:00	6:30-11:00	6:20- 9:00
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	Silent	8:30- 9:30	8:30- 9:30	8:30-11:00	6:00-11:00
WFI, Philadelphia, Pa.	395	6:00- 6:30	6:00- 8:00	6:00- 6:30	6:00- 8:00	6:00- 6:30	6:00- 8:00	6:30- 7:30
WGI, Medford, Mass.	360	Silent	6:05- 7:30	6:30- 8:00	6:00- 7:30	6:30- 8:00	6:30- 8:00	7:30-10:00
WGR, Buffalo, N. Y.	319	5:30-11:00	5:30- 7:45	5:30-11:00	5:30- 7:45	5:30-11:00	5:30- 7:45	2:00- 3:00
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	Silent	6:45- 9:00	6:45-10:30	8:30- 9:30	6:30- 7:30
WHA, Madison, Wis.	360	7:30- 8:30	Silent	7:30- 8:30	Silent	7:30- 8:30	Silent	Silent
WHAS, Louisville, Ky.	400	Silent	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	4:00- 5:00
WHAZ, Troy, N. Y.	380	8:00- 9:30	Silent	Silent	Silent	Silent	Silent	Silent
WHB, Kansas City, Mo.	411	7:00- 7:45	7:00-10:00	7:00- 7:45	7:00-10:00	7:00- 7:45	7:00- 7:45	8:00-10:00
WHK, Cleveland, O.	283	5:00- 5:30	5:00- 5:30	5:00- 5:30	5:00- 5:30	5:00-10:00	5:00- 5:30	7:00- 8:30
WHN, New York, N. Y.	360	6:30-11:00	8:30-11:00	6:30-11:00	8:30-11:00	8:30-11:00	6:30-11:00	8:30-11:00
WIP, Philadelphia, Pa.	509	5:00- 6:30	5:00-11:00	5:00- 6:30	5:00-10:00	5:00- 6:30	5:00-11:00	8:30-11:00
WJAR, Providence, R. I.	360	Silent	6:00- 7:00	6:00-11:00	Silent	6:00- 9:00	Silent	Silent
WJAX, Cleveland, O.	390	Silent	6:30- 8:30	Silent	7:00- 9:30	Silent	Silent	Silent
WJAZ, Chicago, Ill.	448	Silent	10:00- 2:00	10:00- 2:00	10:00- 2:00	10:00- 2:00	10:00- 2:00	6:00- 9:00
WJY, New York, N. Y.	405	Silent	6:30-10:30	Silent	6:30-10:30	6:30-10:30	Silent	5:00- 5:30
WJZ, New York, N. Y.	455	6:00-10:30	6:00-10:30	6:00-10:30	6:00-10:30	6:00-10:30	6:00-10:30	6:00- 9:30
WKAQ, San Juan, P. R.	360	Silent	7:00- 8:30	6:00- 7:00	Silent	7:00- 8:30	Silent	Silent
WLAG, Minn.-St. Paul.	417	Silent	Silent	9:15-10:45	Silent	9:15-10:45	9:15-12:30	7:45- 9:15
WLW, Cincinnati, O.	309	10:00-12:00	10:00-12:00	8:00-10:00	10:00-12:00	Silent	Silent	Silent
WMAQ, Chicago, Ill.	448	Silent	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	Silent
WMC, Memphis, Tenn.	500	8:30- 9:30	8:30-12:00	Silent	8:30- 9:30	8:30-12:00	8:30- 9:30	Silent
WNAC, Boston, Mass.	278	5:00- 9:00	7:00- 9:00	5:00- 9:00	7:00- 9:00	5:00- 9:00	8:00- 9:00	6:30- 8:30
WOAI, San Antonio, Texas	385	Silent	9:30-10:30	Silent	7:30- 8:30	Silent	Silent	9:30-10:30
WOAW, Omaha, Neb.	526	6:00-11:00	6:00-11:00	Silent	6:00-11:00	6:30-11:00	6:00-11:00	9:00-11:00
WOC, Davenport, Ia.	484	8:00- 9:00	Silent	8:00-11:00	8:00- 9:00	8:00- 9:00	9:00-10:00	7:00-11:00
WOO, Philadelphia, Pa.	509	6:30-1:000	Silent	6:30-10:00	Silent	6:30-10:00	Silent	Silent
WOR, Newark, N. J.	405	5:15-10:00	5:15- 6:30	5:15-10:00	5:15- 6:30	5:15- 6:30	5:15-10:00	Silent
WOS, Jefferson City, Mo.	441	8:00- 9:30	Silent	8:00- 9:30	Silent	8:00- 9:30	Silent	7:30- 8:30
WRC, Washington, D. C.	469	7:00- 9:00	Silent	7:00- 9:00	Silent	7:00- 9:00	Silent	Silent
WRM, Urbana, Ill.	360	Silent	7:00- 9:30	Silent	8:30- 9:30	Silent	Silent	Silent
WSAI, Cincinnati, O.	309	Silent	8:00-10:00	Silent	8:00-10:00	Silent	10:00-12:00	Silent
WSB, Atlanta, Ga.	429	8:00-12:00	8:00-12:00	10:45-12:00	8:00-12:00	8:00-12:00	8:00-12:00	7:30- 9:15
WSY, Birmingham, Ala.	360	Silent	8:00- 9:00	Silent	Silent	8:00- 9:00	Silent	8:00- 9:00
WTAM, Cleveland, O.	390	Silent	Silent	7:00- 9:30	Silent	Silent	8:00-10:00	Silent
WWJ, Detroit, Mich.	517	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30-11:00	7:30- 9:00	Silent	4:00- 5:00

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. This table includes only the evening broadcasts, and on Sunday, the late afternoon program.

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D172	Tubular Porcelain Lead-in Insulators, 6-in.	.10
D173	Reinartz Coil	1.45
D174	Cockaday Coil	2.42
D175	2 in. Dial and Knob	.25
D176	3 in. Dial and Knob	.35
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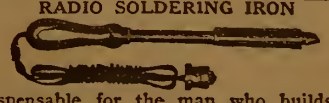

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CURRENT PROGRAMS TO TUNE FOR

Tuesday, January 22

CKAC, Montreal, Can. (Eastern, 430), 4:15 p. m., Studio entertainment; 7:00, Kiddies' stories in French and English; 7:30, Rex Battle and his Mt. Royal Concert Orchestra; 8:30, Studio entertainment; 10:30, Joseph C. Smith and his Mt. Royal Hotel Dance Orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 12:10 p. m., Concert, Daugherty's Orchestra; 6:00, Concert arranged for re-broadcasting in England: "God Save the King," "Down South," "Look Morris," Musical Scenes from the "Mikado," Orchestra; Solos, Josiah Poole and Frederick Rogers; "Going Home," Orchestra and chorus accompaniment; "God and Our Good Cause," "Three Tone Pictures from Tower of Babel," "Landsighting," "Soldiers' Chorus," Male Chorus; Solos, Burton Mustin; 7:00, Fort Pitt Hotel Orchestra, Harry Hoehle, director; 7:30, "Infection from the Mouth," Dr. Bea Proctor McGee; 7:45, Children's period; 8:15, "Order," one of the virtues presented in Benjamin Franklin's Autobiography, Dr. Ray Ewers, pastor of the East End Christ Church; 8:30, "Make a Will Day," A. Devoe P. Miller, of Dun and Moorhead, attorneys, seventh of the series of "Thrift Week," talks; 8:40, "What Is an American Citizen?" Hon. James T. Beggs; 11:30, Special Late Evening Concert, Queen City Orchestra and talent from the Pittsburgh Theaters.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Emma M. Barilett concert; 10:00-1:00, Henry Robinson Trio.

KFKX, Hastings, Neb. (Central, 283), Re-broadcasts program of KDKA.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Jeannette P. Cramer, home economics editor of the Oregonian; 8:00, Talk for farmers, Oregon Agricultural College extension service.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert program, Mary Christine Albin, pianist; 2:30-3:30, Matinee musicale Mary Christine Albin, pianist; 6:45-7:30, The weekly visit of "The Sandman," and "Queen Titania"; 8:00-10:00, Program presented by Kalinofsky and his Band Sinfonico; 10:00-12:00, Art Hickman's Orchestra.

KPD, San Francisco, Calif. (Pacific, 423), 8:00-10:00 p. m., Operetta, "The Persian Garden," Wiley B. Allen Company; 10:00-11:00, E. Max Bradfield's versatile band.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., Artist recital, John A. Wynn, baritone; Edna Feldman, pianist; Emma G. Walter, accompanist; 11:30, Recital, choir of the First Presbyterian Church.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 2:35 p. m., Studio program; 6:50, Children's bedtime story; 8:00-8:28, Program, American Farm Bureau Federation, "The Farmer Helps Himself," J. W. Coverdale; 8:30-9:30, Musical program, Herble Mintz, pianist; A. W. Kaney, specialty act; Sallie Menkes, accompanist.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert group of artists from Strawn; 9:30-10:45, Monthly recital, Fort Worth Harmony Club.

WBZ, Springfield, Mass. (Eastern, 337), 7:00 p. m., Farmers' period, "More Milk for Less Work," Prof. F. H. Branch, of the Mass. Agri. College; 7:30, Bedtime story for the Kiddies; 8:00, Katherine Gravelin, pianist; Grace Loomis Kempton, soprano; 9:00, Bedtime story for Grown-ups, Orison S. Marden.

WCAP, Washington, D. C. (Eastern, 469), 7:30-10:00 p. m., joint program with WEAF, N. Y. C.; concert of music and short talks on subjects of national interest.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Musical matinee, Eddie Kuhn's K. C. A. C. Orchestra; 6:00-7:00, Piano tuning in number on Duo-Art; Address, E. O. Moffatt, third of a series of travelogues; Address, J. Frank Smith, manager of the Good Roads Association of Greater Kansas City; Children's period; Fritz Hanlein's Trianon Ensemble; 11:45-1:00 a. m., Nighthawk Frolic: The Merry Old Chief and Coon-Sanders Novelty-Singing Orchestra.

WDAP, Chicago, Ill. (Central 360), 10:00 p. m., Bush Conservatory of Music; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily almanac; 12:00 m., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00 p. m. Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 7:50, Dramatic review, Arnold Abbott.

WEAF, New York, N. Y. (Eastern, 492), 11:20-11:30 a. m., Board of Education; 11:30-11:50, Adele Woodward on Motion Pictures; 11:50-12:00, American Agriculturist; 4:00-5:00 p. m., New Orleans Jazz Band; 7:30-7:40, Thornton Fisher Sport Talk; 7:40-7:50, Robert Lowrey, pianist; 7:50-8:10, Sir Charles Higham; 8:10-8:20, American Surety Co.; 8:30-9:00, Brooklyn Eagle News and Review; 9:00-9:30, National Carbon Trio; 9:30-9:45, Columbia Phonograph Co.; 9:45-10:15, National Carbon Quartet; 10:15-11:00, Program by Knox Hat Co.

WFAA, Dallas, Texas (Central, 475), 12:30-1:00 p. m., Address, DeWitt McMurray; 8:30-9:30, Musical program, Jessie McKee's Orchestra; 11:00-12:00, Belcanto Male Quartet.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concert Orchestra; 6:30, Meyer Davis Bellvue Stratford Concert Orchestra; 7:00, Bedtime stories, Cousin Sue; 8:00, Radio playlet, WFI players.

WGI, Medford Hillside, Mass. (Eastern, 395), 12:00 m., Selections on the Ampico in the Chickering; Amrad Round Table; Selections on the Brunswick Console; 3:00 p. m., Amrad Women's Club program; Descriptive musicale, Chickering & Son's Company; 3:45, "Tuesday Tea Talk," David McGregor Cheney; 6:30, Meeting of the Big Brother Amrad Club; 7:00, Evening program: "Africa from Cape Town to the Congo," Commercial Traveler, A. S. Flint; Character sketches, Will Adams; Stanley H. Greenlaw and his Musical Saw accompanied by Royal "Rocky" Roberts.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., "Origin of Manners," Mrs. Arthur Crocker; 6:30, Dinner music, String Trio of Ten Eyck Hotel; 7:45, Musical program, Pittsfield, Mass., talent: "Band March," Dunbar's Orchestra; "Forgotten," William McNamara, baritone; "Second Hungarian Rhapsody," Claire Nesbit and Eleanor Eagen, pianists; "At Dawning," Leo Southern, tenor; "Mammy Land," "Dirty Hands—Dirty Face," Orchestra; "To a Wild Rose," "Lindy Lou," F. M. T. A. Ladies' Sextet; "Hungary," Anna Larkin and Eleanor Eagan, pianists; "Regrets d'Amour," Anna McCarthy, saxophonist; "An Open Secret," Dorothy C. Moran, soprano; "Martha," Orchestra; "By the Waters of Minnetonka," "Wanderer's Night Song," Sextet; "Dedication," Eleanor Eagan, pianist; "Home Building," George Haynes; "Just That One Hour," Luke Madden, tenor; "Through the Night," Orchestra; "Love in Springtime," Kathleen Burke, soprano; "Southern Melodies," Skip Handlon, banjoist; "Tomorrow Morning," Orchestra.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections, Walnut Theater Orchestra, Walter Davison, conductor; "Just Among the Home Folks," a daily humorous column appearing in the Courier-Journal; Selections by the Strand Theater Orchestra, Harry S. Currie, conductor; Selections, Alamo Theater organ; 7:30-9:00, One-hour concert, Presbyterian Seminary Male Quartette, J. B. Green, 1st tenor; K. G. Tucker, 2nd tenor; J. H. Meengs, baritone; D. F. Barnett, bass; J. B. Green, pianist; Reading: An Interesting Historical Episode.

WJAX, Cleveland, Ohio (Eastern, 390), 7:30 p. m., Program arranged by the Cleveland News-Leader; Bedtime story, E. G. Johnson; 7:45, Musical program from the Cleveland Automobile Show by "The Melody Maids" and "The Saxophone Sextette."

WJAZ, Chicago, Ill. (Central, 447.7), 10:00 p. m.-2:00 a. m., Violet Tait, soprano; June Wise, pianist; Helen Prettyman, cellist; Orlole Orchestra.

WJY, New York, N. Y. (Eastern, 405), 7:30 p. m., Harold Dellon program; 7:45, "Etiquette," a Doubleday Page talk; 8:00, Harold Dellon program; 8:30, Concert, St. Cecilia Club.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Afternoon Auditorium concert; 4:00, Harper's Bazaar Fashions; 4:15 ."The Scientific Study of Children," Dr. Charles E. Benson; 4:45, Dance program, Original Memphis Five; 5:15, Popular songs, Arthur Haule; 7:00, Supper music, Paul Specht and his Almanac Orchestra; 8:00, "General Thrift," Senator Copeland; 8:15, "The Salesman and the Purchasing Agent," Fred C. Russell, Controller, Alexander Hamilton Institute; 8:30, Cleveland Symphony Orchestra, Nicholai Sokoloff, director; 10:30, Dance program, Hotel Astor Orchestra.

WLAG, Minneapolis-St. Paul, Minn. (Central, 417), 10:45 a. m., Household hints; 11:35, Surprise program; 2:00 p. m., "The Physical Education Law," Edgar W. Evarts; 2:40, Daylight concert; 4:00, Short story; 5:30, Children's hour, Mildred Simona, story teller; 6:00, "Dog Racing," Earl Arnold; 6:15, George Osborn's Minneapolis Athletic Club Orchestra; 7:30, Farm Lecture program.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Topics of Interest to Women; 10:00, Program from the Cincinnati 4th Street Store of the Starr Piano Company, featuring Gennett Record Artists, Robert Perutz, violinist; Harvey Brownfield, accordian pianist; Charles Schemmel, Arthur Biddle, Howard Biddle, singers; Lela Lembar, pianist; Gennett Recording Dance Orchestra.

WMAQ, Chicago, Ill. (Central, 447.5), 4:30 p. m., Glenn Dillard Gunn School of Music; 8:30, WMAQ Orchestra; 9:15, Program, Kiwanis Club.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Program arranged by Margurite Storch; 11:00, Midnight Frolic.

WOAW, Omaha, Neb. (Central, 526), 6:30 p. m., Dinner program, Carl Lamp's Orchestra; 9:00, Concert, Seventeenth U. S. Infantry Band, Herman Webel, bandmaster, "The American Legion," "The Merry Wives of Windsor," Selection of Scotch Melodies, "Jolly Fellows," "The Spring Maid," "Sambo's Holiday," "Cossack Revels," "Pekoe Dance," "Valse Russe," "Serenade," "Woodland Whispers," "My Sweetie Went Away"; Vocal solos, O. D. Temple.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Scarlet Fever," A. C. Hinrichs; 5:45 Chimes.

WOR, Newark, N. J. (Eastern, 405), 2:30-2:45 p. m., Marion Estelle Adam, contralto; 2:45-3:00, Piano solos, Lillian Carson Terhune; 3:00-3:15, "The Speaking Voice"—a talk by Mrs. W. T. Mullally of New York; 3:15-3:30, Marion Estelle Adam, contralto; 3:30-3:45, "Thrift & School Children," Charles Potter and E. K. Sexton, assistant superintendent of schools, Newark, N. J.; 3:45-4:00, Piano selections by Lillian Carson Terhune; 6:15-6:30, Halsey Miller and his orchestra: "Music While You Dine"; 6:30-6:45, Man in the Moon Stories; 7:00-7:30, Halsey Miller and his orchestra.

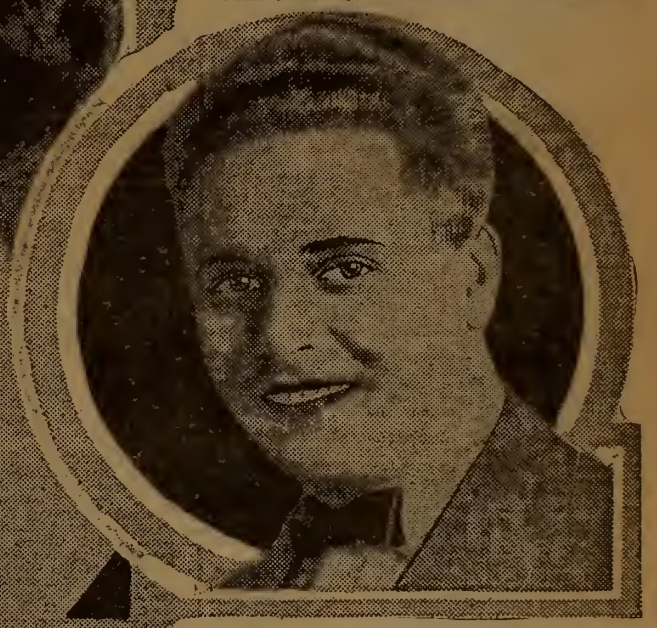
WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner," Woman's Editor; 9:45, "Ironing Day," Fred Shaw, pianist; 3:00 p. m., Detroit News Orchestra; 7:00, Detroit News Orchestra; Thaddeus Wronski, vocalist; Betty Schmult and her orchestra.

Headliners of the Week

OF course, I expect you to listen in this week *Thursday* and *Saturday* to the Opera, because these are the last two times this season that the Chicago Civic Opera Company will be heard over the Radio. It has been a rare treat that the Opera Company has given us with the aid of KYW and WMAQ, and I am sure that we all want to thank the Stars and the Company for the pleasure they have given us.

Tuesday WJAX promises a pleasing program with "The Melody Maids." *Wednesday* there are three interesting lectures to hear. For the builder WLAG offers "How to Reduce the Cost of Your New Home," and WGY "Home Building." If you like astronomy, Prof. Joel Stebbin's lecture on "Friendly Stars in Winter Skies," from WHA, will be very much worth while. If you cannot sleep *Thursday* night and are sitting up lonesomely with toothache or blues, tune in for WDAF somewhere after midnight and be soothed to sleep by Miss Norma Mannering at the Newman Theater Pipe Organ. The Wednesday Morning Choral Club will be heard from WFAA. *Friday*, John Sylvester will play on an accordion at KGW. There are not many musical instruments now that have not made their Radio début. A religious Cantata entitled "The Cradle of Bethelem," will be presented by the Ficzgerald Memorial Church Choir, *Sunday*, at KPO. Musical Chapel Services by the First Congregational Church will be given by WOAW. *Monday*, I must confess, my attention is attracted and my curiosity aroused by the title of Mr. Bigclow's talk from WEAF, "Wild Women I Have Known." I wonder what he means?

—THE PROGRAM LADY.



Of the Radio artists presented herewith Miss Florence Meermans, at the left, is a newcomer in the field. She is a violinist, as you see, and a pupil of the Cleveland School of Music. You will have an opportunity to hear her delightful artistry in connection with the school's program at WJAX, on January 24. Above is Luana Van Camp, whose pleasing voice is a favorite with listeners in to WHK, Cleveland. She will sing again at the evening concert, January 27. Charles Cordray (right) is the well-known director of the "Slowpokes" orchestra, featured regularly by WLAG, the Minneapolis-St. Paul station. It is not quite clear why he has given his organization such a name, for there is nothing slow about their performances.

Wednesday, January 23

CKAC, Montreal, Can. (Eastern, 430), 1:45 p. m., Rex Battle and his Mt. Royal Hotel concert orchestra; 4:30, Joseph C. Smith and his Mt. Royal Hotel dance orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 12:10 p. m., Concert, Broudy's Orchestra, David Broudy, conductor; 6:00, Concert arranged for re-broadcasting in England, by the Edgar Thompson Troubadours, George Colburn, violinist; Peter Castora, mandolinist; Thomas Lloyd, guitarist; George R. Hurrell, tenor; Evan Lloyd, baritone; Nellie Powell Lloyd, accompanist; 7:00, Concert, Pittsburgh Athletic Association Orchestra, Gregorio Scalzo, director; 7:30, "Etiquette," Mrs. Chester B. Story; 7:45, Children's period; 8:15, "York Minster," Grayce Druitt Latus, Travel Editor of the Pittsburgh Post; 8:30, Concert, Westinghouse Community Chorus Double Quartet, Alfred Bartletti, director; A. G. Popcke, pianist; Nicholas M. Muscaro, violinist; Alice King and Arthur Brown, accompanists, Program: "A Hunting We Will Go," "Where Are You Going My Pretty Maid," "Sweet Little Woman of Mine," Quartet; "Come Where the Wild Flowers Bloom," soprano and alto duet and quartet; "Sleep, Little Darling," Male quartet; "Last Night," "I Am Drifting Back to Dreamland," soprano; "When the Bell in the Lighthouse Rings Ding Dong," bass; "There's Sunlight in Your Eyes," alto; "Bedouin Love Song," bass; "Good Night," Ladies quartet.

KFAE, Pullman, Wash. (Pacific, 330), 7:30 p. m., Vocational Citizenship, Dr. Hamilton; Erna Cavelle soprano, vocal instructor; "New Things to Read," Alice L. Webb; Instrumental music.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Nick Harris Detective Stories; 10:00-11:00, Hollywoodland Community Orchestra.

KFKX, Hastings, Nebr. (Central, 283), Re-broadcasts program of KDKA.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Children's program; 8:00, Concert of Old Time Music, Walker Brothers; 9:00 Alexander Hamilton Institute Business talk, James Albert; 10:00, Dance music, George Olsen's Metropolitan Orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert, 2:30-3:30 p. m., Matinee musicale; 6:45-7:30, Children's program, Bedtime story; 8:00-10:00, Program, Wiley B. Allen Company, R. W. Bouyea; 10:00-12:00, Art Hickman's Orchestra.

KPD, San Francisco, Calif. (Pacific, 423), 6:00-7:00 p. m., Dinner concert, Crystal Cafeteria Orchestra, Mrs. Dace Randall, leader; 8:00-9:00 Play, "The Bear," "The Shadow in the Glen," Players Club of San Francisco; 10:00-11:00, E. Max Bradfield's Palace Hotel Dance Orchestra; 5:30 p. m., Children's half hour.

KSD, St. Louis, Mo. (Central, 546), 7:00 p. m., Program, Seth Abergh's Concert Ensemble; Arne Arnesen, violinist; 9:00, Program, Fred Sonnen, harmonica soloist and assisting artists; 11:00, Dance music, Rodemich's Orchestra.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 6:50 p. m., Children's bedtime story; 8:00-8:58 Musical program; Mabelle Sherman Lewis, soprano; Matilda Balkin, violinist; Concert, Male quartette of Benton Harbor, Mich.; George Gonyer, 1st tenor; Arthur E. Jones, bass; Sallie Menkes, accompanist; Eleanor Balkin, accompanist; Joseph Betz, baritone; E. C. Edmunds, baritone; 9:05, Reviews of the Latest Books, Llewellyn Jones; 10:00-12:30, Midnight Revue: A. W. Kaney, specialty act; H. A. Fall, singer; Herb. Mintz, pianist.

PWX, Havana, Cuba (Eastern, 400), 8:30 p. m., Concert, General Staff Band of the Cuban Army.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, Sam S. Losh, baritone and pianist featuring a group of his pupils; 9:30-10:45, Concert, Texas Hotel Orchestra, George Freeman's Sooner Serenaders.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., Dinner concert, WBZ Quintette; 7:30, Bedtime story for the Kiddies; Humorous program; 11:00, Program of Chamber music, WBZ Quintette; Charles H. Young, tenor; Mrs. Miriam M. Thomson, accompanist.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Musical matinee, Johnnie Campbell's Kansas City Club Orchestra; 6:00-7:00, School of the Air, Piano tuning in number on Duo-Art; Weekly health talk given under auspices the Health Conservation Association; Address, speaker from Swift & Co.; Children's period; Fritz Hanlein's Trianon Ensemble; 8:00-9:15, Classical concert, pupils of Mrs. Marjorie

(Continued on Page 16)

CHICAGO CIVIC OPERA SEASON I

Opera "Carmen" from WMAQ, January 24

CARMEN, a gypsy, is arrested for stabbing one of the factory girls and placed in Don Jose's charge, whom she bribes to release her. He is arrested for letting her go. While awaiting his release, Carmen meets Escamillo, a toreador. When Don Jose comes out of prison, he quarrels with his superior officer for flirting with Carmen and is compelled to join a band of smugglers. Escamillo follows Carmen, and the two men fight. They are separated by the gypsies and Carmen. While Don Jose is away at his mother's deathbed, Carmen and the gypsies follow Escamillo to Seville to watch a bull fight. Don Josa meets and kills her, just as the victorious toreador comes out. In remorse he throws himself across her body, and the curtain falls. The tragic ending of the beautiful opera is one of the strongest, dramatically, of the whole repertoire.

—THE PROGRAM LADY.

Wednesday, January 23

(Continued from Page 15)

Rosa Ryan; 11:45-1:00 a. m., Nighthawk frolic, The Merry Old Chief and Coon-Sanders Novelty-Singing Orchestra.

WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Salvation Army Staff Band; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:00 m., Organ recital, Stanley theater; Dinner music, Arcadia Cafe Concert Orchestra; Edna Finestone, pianist; 2:00 p. m., Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 7:43, Features from Stanley Theater.

WEAF, New York, N. Y. (Eastern, 492), 7:00-7:30, United Synagogue of America; 7:30-7:40, Thornton Fisher Sport Talk; 7:50-8:00, American Agriculturist; 8:10-8:20, Bridge Talk; 8:20-8:35, Teresa Wolf Rashkis, soprano; 8:35-8:45, American Bond & Mortgage Co.; 8:45-9:00, Jacquelina De Moor, pianist; 9:00-9:15, Board of Education; 9:15-9:45, Raymond G. Parker, tenor.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., Address, W. C. Everett, Methodist Book Concern, Lamar & Barton, on "Some Good Books to Read."

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Orchestra; 3:00, piano solos, Loretta Kerk; 6:00, Bedtime stories, Cousin Sue; 6:30, Meyer Davis Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selections on the Ampico; Amrad Round Table; Selections on the Brunswick Console; 6:30 p. m., Meeting of the Big Brother Amrad Club; Message to Camp Fire Girls, Charles W. Casson, "Big Smoke"; 7:30, "Science Up to Date," Scientific American; 7:30, Evening program: Program by the Concert Company, F. Chester Mann, director.

WGY, Schenectady, N. Y. (Eastern, 380), 6:30 p. m., "Adventure Story," Youth's Companion.

WHA, Madison, Wis. (Central, 360), 7:30 p. m., "Friendly Stars in Winter Skies," Prof. Joel Stebbins, Prof. Astronomy, director of Washburn Observatory.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections by the Strand Theater Orchestra, Harry S. Currie, conductor; "Just Among Home Folks"; Selections by the Walnut Theater Orchestra, Walter Davidson, conductor; Dancing lesson No. 7, especially prepared for WHAS by Arthur Murray, Marguerietta A. King, pianist; 7:30-9:00, Concert, auspices of Hanry L. Dixon Hawaiian Studio; Reading: An Interesting Historical Episoda.

WIP, Philadelphia, Pa. (Eastern, 509), 6:05 p. m., Dinner music, Jordan-Lewis Dance Orchestra, direction Bob Lewis; 7:00, Uncle Wip's bedtime stories.

WJAZ, Chicago, Ill. (Central, 447.7), 10:00-2:00 a. m., Lillegard Trio; "Faded Love Letters," "Pekin," "Unfortunate Blues," "There's Nobody Else But You," "20th Century Blues," "My Dream Moon," Oriola Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 7:00, A Shadowland Story, Florence Smith Vincent; 7:45, "The Progress of the World," a Review of Reviews talks; 8:00, Irving Selzer and his Cafe Boulevard Orchestra; 8:30, Talk, Hon. George P. Nicholson; 8:45, Phoenix Male Quartette; 9:00, At Home with J. Andrew White and his guest; 9:15, United States Navy Night Program; 10:30, Dance program, Harold Stern and his Hotel Majestic Orchestra.

WLAG, Minneapolis-St. Paul, Minn. (Central, 417), 5:30, Children's hour, Mrs. Robert Cargill, story teller; 6:00, Sport Hour; 7:30, Farm lecture program; "How to Reduce the Cost of Your New Home," Robert T. Jones; 9:30, Music and drama—MacPhail Players, Maude Moore, director.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Mrs. William Dunning, William Afsprung, Rev. R. Filbrant; 8:00, Mid-Winter Concert program and Entertainment by the Shrine Band, Henry Fillmore, director; Eddie Ball, Howard Hafford, Billie Waterworth.

WMAQ, Chicago, Ill. (Central. 447.5), 7:00 p. m., Georgene Faulkner, the Story Lady—Stories for the children; 7:30, Weekly lecture from Northwestern University; 8:30, WMAQ Orchestra; 9:15, Concert.

WOC, Davenport, Iowa (Central, 404), 7:30, "The Women's Relations to State Fair Activities," Mrs. H. R. Clemens; 8:00, pipe organ recital, Mrs. S. J. Burich, organist; Mrs. H. E. Vedder, contralto; 10:00, Program by Choir of the Spencer Memorial Church of Rock Island; Talk, Rev. Frank Marston.

WOR, Newark, N. J. (Eastern, 405), 6:15-6:30, Helen E. Davis, Hawaiian guitar and banjoist, assisted by Sidney Koppel; 6:30-6:45, Albert E. Sonn, Newark Sunday Call; 6:45-7:00, Helen E. Davis; 8:00-8:15, Nathaniel Robin, composer-pianist of New York and former pupil of Ernest Block; 8:15-8:45, Arthur Murray, assisted by Kenneth Kitchen'a Club Orchestra; 9:00-9:15, Billy M. Williams, Scotch comedian and singer of Sir Harry Lauder Songs; 9:15-9:30, Congressman Guy Campbell of Pennsylvania, on "Close-Ups of Washington"; 9:30-9:45, Billy M. Williams, Scotch Comedian; 10:00-11:00, Jimmy Clarker'e Entertainers.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Dance program, S. C. Stancill's Novelty Six Dance Orchestra.

WTAM, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Orchestral numbers by Louis Rich's Orchestra, Elanora Hanry, soprano; Mr. J. E. Morris, tenor; Instrumental numbers, Aileen Gouday, pianist; Novelty muelcal numbers, Eddie Peabody on tha banjo, mando-cello, violin and guitar.

WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "To-night's Dinner," Woman's Editor; 12:00 m., Jean Goldkette's Orchestra; 7:00 p. m., Detroit Newe Orchestra; Russell G. Raab, tenor.

Thursday, January 24

CKAC, Montreal, Can. (Eastern, 430), 4:15 p. m., Studio entertainment; 7:00, Kiddies stories in French and English; 7:30, Rex Battle and his Mt. Royal Hotel concert orchestra; 8:30, Studio specials; 10:30, Joseph C. Smith and his Mt. Royal Hotel danca orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 12:10 p. m., Concert, Daugherty'e Orchestra; 6:00, Concert arranged for re-broadcasting in England, KDKA Little Symphony Orchestra, Victor Saudek, director; Cyclo Quartet; MacDowell Quartet; Artists from the etudio of Lyman A. Perkins; 7:00, Concert, Fort Pitt Hotel Orchestra, Harry Hoebie, conductor; 7:30, Weekly Chat with the Farmers, Frank E. Mullen; 7:45, Children'e period; 8:30, Addresses from the Traffic and Transportation Association Banquet, J. C. Davis, Director General of Railroads, Washington, D. C.; F. A. Butterworth, Assistant General Freight Agent, Pera Marquette Railroad Company, Chicago, Ill.; Toastmastar, S. S. Butler, Freight Traffic Manager; Music, Gane's American Seven; 11:30, Special Late Evening Concert.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Y. M. C. A. Program and Opera Story; 10:00-11:00, Vocal and Instrumental Concert.

KFKX, Hastings, Nebr. (Central, 283), Re-broadcasts program of KDKA.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Woman's story program; 8:00, Dramatic program, Doris Smith; 10:00, Dance music, George Olsen's Metropolitan Orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert; 2:30-3:30, Matinee musicale presenting Maybelle Strock, soprano; 6:45-7:30, Children's program, Bedtime story; 8:00-10:00 De Luxa program; 10:00-12:00, Art Hickman's Orchestra.

KPO, San Francisco, Calif. (Pacific, 423), 6:00-7:00 p. m., Dinner program, Georga Lipscbultz and Musio Masters from the Loew'e Warfield Theater; Lela Johnstone, dramatic soprano; 8:00-9:00, Organ recital, G. Herold M. Scbulteis; 9:00-10:00, Vladimir Rassouchine, Russian pianist; Mrs. Dorothy McClure Hunt, soprano; Leonida Coroni, baritone; 10:00-11:00; Palace Hotel Dance Orchestra.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., Dorothy Jacobson, pianist; Aba Jackson, violinist; Carl Rosenbaum, tenor.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 2:35 p. m., Studio program; 6:50, Children's bedtime etory; 8:00-8:20, Twenty Minutes of Good Reading, Rav. C. J. Pernin; 8:30-9:30, Sam Goldstein, tenor; Anna Mildnar, reader; Orchestra of the Chicago Boys Cluh No. 5; Joseph J. Grill, director; Madam Emma Roe, accompanist; 9:15, program, National Liva Stock and Meat Board, "Tbe Distribution of Meat Products to tbe Consumer," John T. Russell.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, Junior Euterpean Club, Mra. J. Edward Cooley, director; 9:30-10:45, Concert, artists from Howard Payne College.

WBZ, Springfisld, Mass. (Eastern, 337), 7:00 p. m., "Preparation of Federal Income Tax Returns," Thomas McCarry; 7:30, Bedtima story for the Kiddies; Farmers' period Letter from the New England Homestead; 8:00, Concert, Haydn Male Quartette; Arthur G. Harwood, 1st tenor; Eric Anderson, baritona; Joel Anderson, pianist; Edward L. Davis, 2nd base; 9:00, Bedtime story for Grown-upe, Orison S. Marden.

WCAP, Washington, D. C. (Eastern, 469), 7:15-9:45 p. m., Orchestra; 10:00-12:00, Dance music, Meyer Davis' Le Paradis Band.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Musical matinee, D. Amhert Haley's Dance and Concert Orchestra; 6:00-7:00, School of tha Air, Piano tuning in numher on Duo-Art; Address, speaker from William Jewell College; "What Tbink Ya of Christ?" by Dr. Ray Palmer; Address, J. H. Mercer, Kansas Live Stock Association; Cbildren'e period; Fritz Hanlein'e Trianon Ensemble; 11:45-1:00 a. m., Nighthawk Frolic: The Merry Old Chief and Coon-Sanders Novelty-Singing Orcbestra; Pipe organ recital, Norma Mannering.

WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Northweetern School of Music; Jack Chapman'e Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 2:00 p. m., Arcadia Cafa Concert Orcbestra; 7:30, Dream Daddy's bedtime stories.

WEAF, New York, N. Y. (Eastern, 492), 11:50-12:00 a. m., American Agriculturist; 4:30-5:00 p. m., Henry Lange, pianist; 7:00-7:30, N. Y. Federation of Churches; 7:30-7:40, Thornton Fisher Sport Talk; 7:40-7:55, Dr. Owen Lovejoy; 7:55-8:20; Joel Coffey, pianist; 8:20-8:30, Bank of America; 8:30-9:30, Hunter College Musical Program; 9:30-9:45, Columbia Phonograph Co.; 9:45-10:00, Louisiana Gulf Coast Club; 10:00-11:00, Joint Concert by Louise Huhbard, soprano; Earle Tuckerman, haritone; Katberine Gunn, pianist; 11:00-12:00, Vincent Lopez through courtesy Gimbel Bros.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "Some Ethics of Law Practice Explained to the Layman"; 8:30-9:30, Musical program, Wednesday Morning Choral Club, Mrs. Ralph C. Smith, program chairman.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevua Stratford Concert Orchestra; 6:00, Bedtime storiss, Cousin Sue; 6:30, Meyer Davis Bellevue Stratford Orchestra; 8:00, Boy Scouts Radio Corps.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selections on the Ampico; Amrad Round Table; Selections on the Brunswick Console; 6:30 p. m., Meeting of tha Big Brotber Amrad Club; 7:00, Evening program: "Stories for Parents," Children's Aid Association, "David's Escape," Alfred Whitman; Concert, Saugus High School Glee Club, C. Francis Wood, director.

WGY, Schenectady, N. Y. (Eastern, 380), 7:45, "A Few Moments with New Books," L. L. Hopkins; WGY Orchestra; Drama, "The Passing of the Third Floor Back," WGY Players, Cast: Joey Wright, a retired hookmaker, Charles S. Baumes; Christopher Penny, a painter, Edward E., St. Louis; Major Tompkins, retired, Frank Oliver; Mrs. Tompkins, Ruth Bentley-Snow; Vivian, the Major's daughter, Rose Cohn; Japa Samuels, of tbe City; Jerome Lovenheim; Harry Larcomb, his jackal, Barrington Havans; Miss Kite, Clara Swanker; Mrs. Percival Da Hooley, Cousin of Sir George, Margaret V. Smith; Stasia Fiavey, Lola Sommers; Mrs. Sharp, the landlady, Helen Camphell; The Third Floor Back, Edward H. Smith; "Meditation," WGY Orchestra.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections, Walnut Theater Orchestra, Walter Davidson, conductor; "Just Among Home Folks," a daily column appearing in the Courier-Journal; Selections, Strand Thaater orchestra, Harry S. Currie, conductor; 7:30-9:00, Fifty-minute concert, Kentucky Aces, H. J. Christie, director and banjo and baritone soloist; A. Newman, Spooner, trumpeter; Eddie Aubin, pianist; Kenneth Bryant, saxophonist and clarinetist; Clarence Zoeller, drummer; Virginia Hadfield, contralto; Esther Stout, accompanist; Robert Studer, violinist; King Waller, accompanist; Four-minuta digest of International Sunday School lesson for Sunday, January 27th, Rev. David Sweets; Four-minute Radio Forum talk.

WIP, Philadelphia, Pa. (Eastern, 509), 6:05 p. m., Jack Lewis and Ocean City Pier Orchestra; 7:00, Uncla Wip'a hedtima stories.

WJAX, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Special dance program by the Cleveland Hotel Orchestra, Ivan Francisci, director; 9:00, Concert program, Faculty Cleveland School of Music; Ruby Cheveller, director.

WJAZ, Chicago, Ill. (Central, 447.7), 10:00-2:00 a. m., Program of Instrumental Novelties, Wade-Twichell Piano Company; "Back Home in Pasadena," "Dream Daddy," "Pekin," "Susie," "Sobbing Blues," "My Dream Moon," Oriola Orchestra.

WJY, New York, N. Y. (Eastern, 405), 9:00 p. m., Oue act of the "Flying Dutchman," National Opera Company of America; 10:30, Brean and Toblas.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Afternoon Auditorium concert; 4:00, "The Natural Equipment of ths Child," Dr. Charles E. Benson; 4:15, Mrs. John Dalton, soprano; 5:00, Carlyle Straub, poems; 7:00, "Jack Rabbit Stories," David Cory; 8:15, Evening organ recital on the Auditorium organ; 9:00, "Adventures in Scandinavia," Wurt W. Barnitz; 9:15, Margaret Manierre, soprano, 9:45, Vincent Coppola, pianist; 10:30, Danca program, Hotel Commodore Orchestra.

WLAG, Minneapolis-St. Paul, Minn. (Central, 417), 10:45 a. m., Household hints; 11:35, Surprise program; 2:00 p. m., Talk, Dean F. J. Wulling of the School of Pharmacy of the University of Minnesota; Weekly dancing lesson, Tess Cooperman; 2:40, Daylight concert, Ronning's Air Raiders; 4:00, Short story, Mildred Simons; 5:30, Children's hour, Tess Cooperman, story teller; 6:00, "Dogs," Dr. J. S. Dick, Jr.; 6:15, Oshorn's Minneapolis Athletic Club Orcheetra; 7:30, Farm lecture program.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Adelaide Apfel, pianist; Women Voters, J. A. Ridgely; 10:30, Scenes from Oscar Wild's "Lady Windemere's Fan," directed hy Helen Schuster Martin, Cast: Mrs. Erlynne, Norma Gerdsen; Lady Windemere, Evelyn Lilly; Lord Windemere, Willard Crain; Lord Darlington, Joseph Flick; Lord Augustus, Joseph Schreck; Cecil Graham, Maynard Babbs; Mr. Dumby, Robert Sprague; "Serenade Espagnole," "From tbe Canchrake," Freda Siauter; "Il est doux, il est bon," "Trees," Lillian Dent; "Cadiz," "Spinning Song," "The Banjo Pickers," Majory Garrigue, pianist; "Spirit Flower," "Hard Trials," "Lillian Dent; "Farewell to Cucullain," "Ghost Dance," Freda Slauter; 11:00, Justin Huber Dance Orchestra.

WMAQ, Chicago, Ill. (Central, 447.5), 7:00 p. m. Weekly talk to Boy Scouts; Financial talk, Roy Munger; Talk, Rockwell R. Stephens, Auto Editor of the Daily News; 7:45, opera "Carmen," by Chicago Civic Opera Company, broadcaet direct from Auditorium Theater.

WMC, Memphis, Tann. (Central, 500), 8:30 p. m., Chisca Hotel Philharmonic Orchestra.

WOAW, Omaha, Neb. (Cantral, 526), 6:00 p. m., Every Child's Story Hour, Grace Sorenson, editor and publisher of Every Child's Magazine; 6:30, Dinner Hour Program, Omaha Chapter of Izaak Walton League, Harry Fitch, director, Concord Club Saxopbone Band, "Fish and Fishing," Orin D. Steel, U. S. Federal Gama Warden; Mrs. Perry Rose, pianist; "Our Game and Wiid Life," "Where Can Fish and Game Cast Their Vote?" Orin D. Steele; Keno Four, Floyd Paynter, first tenor; Arthur Paynter, second tenor; Clare Young, baritone; Paul Jordan, bass; David Robei, pianist; 9:00, Community program, Falls City, Alvin A. Burger, director, Merritt'e Screnaders Dance Orchestra; Lucille Thomae, pianist; Elk's Male Sextette; Trombone solos, Ray Lane; St. Thomas Episcopal Choir; Nellia Lee Holt, pianist; Sacred Heart Convent String Quartet; Oscar Bennett, haritone.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Renal Stones," Karl G. Stephan; 5:45, Chimes concert; 6:30, Sandman's Visit; 8:00, "Honolniu Moon," "Jog Along," "Tbey All Lova the Irish," "Rose of Paradise," "Midsummer Night Blues," "In the Land of Sweet Sixteen," P. S. C. Orchestra, Gerald M. Barrow, director; V. B. Rochte, baritone.

WOR, Newark, N. J. (Eastern, 405), 2:15-1:30 p. m., Sara Schuyler Butler, Chairman of Republican committee of New York City—"Woman, the Citizen"; 2:45-3:00, Helen Stone, soprano; 3:00-3:15, Gertrude Boyle, sculptress; 3:15-3:40, Helen Stone, soprano; 3:40-4:00, Edward Farley, 12-year-old pianist; 6:15-6:30, "Vocational Education," W. T. Mullally of Educational Committee, Y. M. C. A., New York; 6:30-7:30, "Music While You Dine," Tom Cooper'a Country Club Orchestra.

WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "To-night's Dinner," Woman's Editor; 12:00 m., Dance muslo, Jean Goldkette's Orchestra; 3:00 p. m., Detroit News Orchestra; 7:00, Detroit News Orchestra; Anne Campbell, Detroit News Poet; Nona E. Dobson, soprano; Whitney Scherer, pianist.

On Friday evening, January 25, Richard Headrick, child moving picture star, will take part in the children's program broadcast from KHJ, Los Angeles. He is a very pleasing little fellow.

Walter C... players, who ... week from ... formance will ...

Below, the Melo Club dance orchestra with its director, David Reich. They play regularly from WHN, New York, and may be heard again January 24.

Friday, January 25

CKAC, Montreal, Can. (Eastern, 430), 1:45 p. m., Rex Battle and his Mt. Royal Hotel dance orchestra; 4:30, Joseph C. Smith and His Mt. Royal Hotel danca orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 12:10 p. m., Concert, Broudy's Orchestra; 6:00, Concert, arranged for re-broadcasting in England, Westingbousa Band, T. J. Vastine, director; Alice Christina King, soprano, Program: Selections hy Band, "Radio Wave," "In a Woodland Glade," Spanish Serenade "La Paloma," "Superha," Excerpts from "Attiia," "Danny and His Hobby Horse," "Knights of Old"; Soprano solos, "Love's Merchant," "I Hear a Thrusb at Eve"; 7:00, Organ recital, Lucile Hale, from Cameo Motion Picture Theater; 7:15, Radio Boy Scouts' Meeting, Richard Victor, Scoutmaster; 7:45, Children's period; 8:15, Sunday School Lesson for January 27, Dr. R. L. Lanning; 8:30, "Hungarian Comedy," "Ohillan, Dance," "In Dear Old Scotland," "Babillage," Arahian Divertissement; "Chimes of Normandy," "Orientale," "Alhum Leaf," "Terintella Foressatta," Westinghouse Band, T. J. Vastine, director.

KFAE, Pullman, Wash. (Pacific, 320), 7:30 p. m., Talk, Dr. E. A. Bryan, research professor in economics; Recital, Mu Phi Epsilon, women's honorary musical society; "Efficient Work and Its Reward," Dr. Hamilton.

WFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Marion Warde Kiddies' Program; 10:00-11:00, Myra Belle Vickers Songsters.

KFKX, Hastings, Nsbraska (Central, 283), Rebroadcaste program of KDKA.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Lecture by Margery Smith; 8:00, Accordion solos, John Sylvester; 8:15, Dance music, George Olsen's Metropolitan orchestra; 9:00, "How the Oregon Development program will teli the Story of Oregon," O. W. Meilke; 10:30, Hoot Owls with Pantages frolic.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert; 2:30-3:30, Matinee musicale; 6:30-7:00, Children's program presenting Richard Headrick, silver-sheet juvenile; Bedtime story, "Uncle John"; 7:00-7:30, Organ recital, Arthur Blakeley, organist; 8:00-10:00, Program presented through courtesy of Wee Tot's Villa, Metta Merrill Purinton; "Francis Thompson, The Mystic Poet," Walter F. McEntire; 10:00-12:00, Art Hickman's Orchestra.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 12:30 p. m., "The Progress of the World." Review of Reviews; 6:50, Children'a bedtime story; 10:00-12:30, Midnight Revue: Herb Mintz, pianist; "Sen" Kaney specialty act; Sallie Menkes, accompanist; R. D. Hinkle, baritone; 11:00-11:10, Clyde Doer and his Orchestra from the Pompeiian Room of the Congress Hotel; 12:00-12:30, W. Remington Welch, organist.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, Broadway Baptist Sunday School Class; 9:30-10:45, Concert, Old Time Orchestra of Weatherford.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., Dinner concert, WBZ Quintette; 7:00, "Quick Thinking," Youth's Companion; 7:30, Bedtime story for the Kiddies; Current Book Review, R. A. MacDonald, Court Square Book Store; Bedtime story for Grown-ups, Orison S. Marden; 11:00, Program of Chamber Music, WBZ Quintette; Anna Wollner, contralto; Mrs. Eleanor Turner La Zazzera, accompanist.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Musical Matinee, Leo R. Davis Radio Orchestra; 6:00-7:00, Schooi of tha Air, Piano tuning in number on Duo-Art; Address, speaker from Kansas City Children's Bureau; Children's period; Fritz Hanlein's Trianon Ensemble; 8:00-9:15, Novelty Night, WDAF's Burlesque Program; 11:45-1:00 a. m., Nighthawk frolic, The Merry Old Chief and Coon-Sanders Novelty-Singing Orchestra.

WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Cambridge Sisters; George R. Hill, Jr., baritone; Margaret Richards, soprano; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:00 m., Organ recital, Stanley Theater; dinner music Arcadia Cafe Concert Orchestra; 2:00 p. m., Arcadia Cafe Concert Orchestra; 7:50, Book review, Robert Bruce; 8:00, Arcadia Cafe Concert Orchestra; 9:00, Playlet by WDAR Radio Players, Walter Greenough, director; 10:10, Howard Lanin's Arcadia Cafe Dance Orchestra; Special Morning Glory Club featurea; Songs, Harry Glyn.

WEAF, New York, N. Y. (Eastern, 492), 11:00-11:30 a. m., Mary Sandall from Town Hall; 11:50-12:00, American Agriculturist; 4:00-4:30 p. m., Shirley Portnoi, violinist; 4:30-5:00, Bertha Lescander, pianist; 7:30-7:40, Thornton Fisher Sport Talk; 7:50-8:00, Eveready Battery Talk; 8:00-8:30, Billy Jones & Ernest Hare; 8:30-8:45, Mrs. Gifford Pinchot; 8:45-9:00, W. Glascon Green, bass; 9:00-10:00, Astor Coffee Orchestra.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., Address, "Israel Saved at the Red Sea," Dr. Robert Stewart Hyer; 8:30-9:30, Paul Skinner's Orchestra.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Concert, WFI Male Quartet; 6:00, Bedtime stories, Cousin Sue; 6:30, Meyer Davis Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selections on the Ampico in the Chickering; Amrad Round Table; Selections on the Brunswick Console; 3:00 p. m., Amrad Women's Club program: "Down on tha Cape," Dorothy H. Goodwin; Afternoon musicale, Brunswick Console; Talk, Dorothy Dean, director Metropolitan Division Mass. Council of Girl Scouts; 6:30, Meeting of the Big Brother Amrad Club, 7:30, Evening program: Selected verses, Charles L. H. Wagner, Radio poet; "Mumps," Henry Copley Green; 7:45, Draxton Drake, tenor: Address, Edward Dana, General Manager of the Boston Elevated Railways; 8:15, Drayton Drake, tenor.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 4:00, Tea time music, Martha Gompb, harpist; Katherine Stang violinist; 6:30, 7:30, Vincent Lopez Hotel Statler Dance Orchestra; 7:30, Digest of the day's news; 9:00, Orchestra, Sterling Dance Orchestra, direction of Kenneth Jollies.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., "New Uses for the Old Washstand," Modern Priscilla; 6:30, Children's program; 7:35, Health talk, N. Y. State Dept. of Health; 7:45, "Zampa," National Biscuit Company Band, Fran Blanco, conductor; "Tannhauser," Band; "Mary," William Totterdale, tenor; "Angelus," Band, "Showers of Gold," C. Alessio, cornetist; "Cantabile," Band; "Baking Biscuit by the Rillions," Clarke E. Davis; March from "The Prophet," Band, "Bonnie Wee Thing," William Totterdale, tenor; "A La Invitation," Band; "Killarney," William Totterdale; "Swedish Coronation

IDS WITH "MARTHA" FROM KYW

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ir next per-
January 25.

Above is Loretta Kerk, pianist and official accompanist of Station WFI, Philadelphia. But she also shines as a soloist on the piano, as you will find if you tune her in Wednesday, January 23, or the following Saturday.

Opera "Martha" from KYW, January 26

IN THIS opera the impossible comes to pass. A poor young farmer falls in love with a lady and finally marries her. This is the way it happens. Lady Harriet goes to the fair with her maid Nancy and Tristan, disguised as peasants. Two young farmers engage them as servants. When the farmers, Plunkett and Lionell, have dragged them home, they are surprised to learn that they can do no work. After the farmers have retired Tristan helps the girls escape. The next day Lionell sees Lady Harriet and knows that she is his Martha. In spite of the difference in rank, he asks her to marry him. She calls the hunters and tells them Lionell is insane. Nancy and Harriet decide to help Lionell. They take the ring to the Queen and discover that Lionell is an earl's son. This of course, makes everything end happily.

—THE PROGRAM LADY.

March," Band; "Cavatina," R. Ricci, clarinetist; "Dreams of Erin, Band; 10:30, Program, National Biscuit Company: "Fantastique," National Biscuit Company Band; "William Tell Overture," Band; "A Spirit Flower," Clementine Pardi, soprano; "Songs for the Old Folks," Band: "Ritorna Vincitor," Clementine Pardi; "Dance of the Hours," Band; "Production of Quality Biscuit," Frederick Beers; "A Hunting Scene," Band; "Extase," C. Alessio, cornetist; "War March of the Priests," Band; "Calm as the Night," Clementine Pardi; "Ballet Egyptian," Band; "Andante," M. Ricci, clarinetist; "Orpheus," "American Patrol," Band.

WHA, Madison, Wis. (Central, 360), 7:30 p. m., Readings from Literature.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections, Strand Theater Orchestra, Harry S. Currie, conductor; "Just Among Home Folks," a daily humorous column appearing in the Courier-Journal; Selections, Walnut Theater Orchestra, Walter Davidson, conductor; 7:30-9:00, Concert, auspices of Helen I. Mitchell; Reading, An Interesting Historical Episode.

WHK, Cleveland, Ohio (Eastern, 283), 9:00 p. m., Concert program arranged by the Cleveland Radio Dealers' Association; Dance music by Tomson's Novelty Orchestra, Stephen Tomson, director and pianist; Vocal numbers, George Seegist, baritone.

WIP, Philadelphia (Eastern, 509), 6:05 p. m., Dinner music, Jimmy Campbell and Little Club Orchestra: 7:00, Uncle Wip's bedtime stories.

WJAZ, Chicago, Ill. (Central, 447.7), 10:00-2:00 a. m., Program, Columbia School of Music; "Faded Love Letters," "Misfortune Blues," "Sunshine of Mine," "Drifting Back to Dreamland," "So This Is Venice," "By Low Bay," Oriole Orchestra.

WJY, New York, N. Y. (Eastern, 405), 7:30 p. m., Popular Song concert, Philip Krumholz; 7:45, Popular song concert, Edgar Donnell Pub. Co.; 10:00, Charles D. Isaacson program.

WJZ, New York, N. Y. (Eastern, 455), 12:15 p. m., Friday Noon Hour of Music from Brick Presbyterian Church, Nevada Van de Veer, contralto; Mildred Dilling, harpist; 3:00, Organ recital, Leo Riggs; 4:00, Ida Karlyn, soprano; 5:00, "The Larger Aspect of World Affairs," New International Interpreter; 7:30, Burr McIntosh, the Cheerful Philosopher; 8:00, "From New York to San Francisco in an Air Mail Plane," Hon. Paul Henderson; 8:15, Looseleaf Current Events; 8:30, Concert, City Island Orchestra of eighteen pieces with fifteen male voices; 9:30, "Work of the New York Assembly," Julius Berg; 9:45, Sterling Male Quartette; 10:00, Address, Gen. Charles H. Sherrill; 10:15, Sterling Male Quartette; 10:30, Paul Specht and his Alamac Hotel Orchestra dance program.

WLAG, Minneapolis-St. Paul, Minn. (Central, 417), 10:45 a. m., Household hints; 11:35, Surprise program; 2:00 p. m., Woman's club talk, arranged by the Community Fund, "Bringing America to the Foreign Born Woman," Margaret Chapman; 2:40, Daylight concert; 4:00, Short story reading, Mildred Simons; 5:30, Children's hour, Alpha Stalson, story teller; 6:00, Sport program; 7:30, Farm lectures; 9:30, Concert.

WMAQ, Chicago, Ill. (Central, 447.5), 4:30 p. m., Pupils of Bush Conservatory; 7:00, Music Memory Contest, Mrs. Marx E. Oberndorfer; 8:30, WMAQ Orchestra; 9:15, Harold Ayers, violinist; Mrs. O. A. Jennison.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Program arranged by Christine Eifler Fowler; 11:00, Midnight Frolic.

WOAW, Omaha, Neb. (Central, 526), 6:30 p. m., Dinner program, Mispah Lodge Masonic Orchestra, W. M. Olson, director; Florence B. Palmer, soprano; Paynter Brothers; 9:00, WOWL Dance program, Frank Hodek's Orchestra.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Water Purification," C. A. Russell; 5:45, Chimes Concert; 6:30, Sandman's visit; 7:30, Sunday School Lesson, Dr. Frank Willard Court, pastor; 8:00, Musical program, Erwin Swindell, director; Exchange Club of Rock Island.

WOR, Newark, N. J. (Eastern, 405), 2:30-2:45 p. m., Josephine Boughan, mezzo-contralto, accompanied by Frances Hortense; 2:45-3:00, Soprano solos by Ruth Dale; 3:00-3:15, Mary E. Dryer, President Women's Trade Union League, on "Conditions of Women in Germany"; 3:15-3:30, Henry Hull, co-star of "The Other Rose," now at Morosco Theatre, N. Y.; 3:30-3:45, Josephine Boughan, mezzo-contralto; 3:45-4:00, Soprano solos, Ruth Dale; 6:15-6:30, Charles Amsterdam, semi-classical and popular piano solos; 6:30-7:00, Man in the Moon Stories; 7:00-7:30, Fritzie Leighton Entertainers of New York.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Emerson's Orchestra.

WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner," Woman's Editor; 3:00 p. m., Detroit News Orchestra; 7:00, Detroit News Orchestra; J. Richard Scott, tenor; Francis Firth, baritone; 10:00, Dance music, Jean Goldkette's Orchestra; 11:00, Detroit News Orchestra.

Saturday, January 26

CKAC, Montreal, Can. (Eastern, 430), 7:00 p. m., Kiddies' Stories in French and English; 7:30, Rex Battle and his Mt. Royal concert orchestra; 8:30, Studio Specials; 10:30, Joseph C. Smith and his Mt. Royal dance orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 1:30 p. m., Concert, Daugherty's Orchestra from McCreery's Dining Room; 6:00, Recital, Negro Spirituals, Harry Austin, Harvey B. Gaul; "Oh, Mary Don' You Weep," "Ride on, King Jesus," "Inch Worm," "What a Trying Time," "The New Born Babe," "Nobody Knows," "Sometimes I Feel," "Mississippi Boat Song," "I'm a Travelin'," Trio from the KDK Little Symphony Orchestra; 7:30, "Bringing the World to America," "Our World"; 7:45, Children's period; 8:15, "Liability for Automobile Accidents," James C. Reed, Prof. of Business Law, U. of Pittsburgh; 8:30, Addresses and Music from the 11th Annual Banquet of the Westinghouse Veteran Employes' Association, M. B. Lambert, toastmaster; Westinghouse Band, T. J. Vastine, director; Blue Ridge Male Quartet.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Vocal and Instrumental; 8:00-9:00, Special Dance Music; 10:00-11:00, Instrumental and Vocal.

KFKX, Hastings, Nebraska (Central, 283), Re-broadcasts program of KDKA.

KGW, Portland, Ore. (Pacific, 492), 5:30 p. m., Children's program; 10:00, Dance music, George Olsen's Metropolitan Orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert; 2:30-3:30, Matinee musicale; 6:45-7:30, Children's program presenting Helene Pirie, screen juvenile; Bedtime story; 8:00-10:00, De Luxe program; 10:30, Program presenting Salvatore Santaella, pianist; M. Ochi Albi, Russian cellist; Chico de Verde, violinist.

KPO, San Francisco, Calif. (Pacific, 423), 8:00-12:00 midnight, Dance music, Art Weldner and his popular dance orchestra.

KSD, St. Louis, Mo. (Central, 546), 7:00 p. m., Orchestra concert, organ and instrumental specialties broadcast direct from the Missouri Theater.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 6:50, Children's bedtime story; 7:45, opera "Martha," by Chicago Civic Opera Company, broadcast direct from Auditorium Theater. This is the last opera of the season.

PWX, Havana, Cuba (Eastern, 400), 8:30 p. m., Concert, Studio of Station PWX, Carlos M. Vallves, pianist; Paquite Elias, soprano; Emilio Leon, violincellist; Hans Hirsch, violinist; Dulce Maria Verdes, soprano.

WBAP, Fort Worth, Texas (Central, 476), 7:00-7:30 p. m., Review of the Interdenominational Sunday School Lesson and Radio Bible Class of Mrs. W. F. Barnum.

WBZ, Springfield, Mass. (Eastern, 337), 7:00 p. m., Dinner concert, Hotel Kimball Trio, Jan Geerts, violinist and director; Angela Godard Lonergan, cellist; Paul Lawrence, accompanist; 7:30, Bedtime story for the Kiddies; "Bringing the World to America," "Our World Magazine"; 8:00, Concert, Berean Male Quartette, Roy H. Nott, 1st tenor; Dwight L. Underwood, 2nd tenor; Byron P. Hayden, 1st bass; J. William Hayden, 2nd bass; 9:00, Bedtime story for Grown-ups, Orison S. Marden.

WCAP, Washington, D. C. (Eastern, 469), 7:30-10:00 p. m., Joint program with WEAF, N. Y. C.; 10:00-12:00, Dance music, orchestra.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Musical matinee, The Riley-Ehrhart Orchestra; 6:00-7:00, School of the Air, Piano tuning in on Duo-Art; Address, Edgar A. Linton, writer-lecturer; Children's period; Fritz Hanieln's Trianon Ensemble; 11:45-1:00 a. m., Nighthawk Frolic, The Merry Old Chief and Coon-Sanders Novelty-Singing Orchestra.

WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Harmony Girls, Jerry Sullivan, Bob Brown, Melodians, Charles Wellman, Jack Chapman's Orchestra.

WDAR, Philadelphia (Eastern, 395), 11:45 a. m., Daily Almanac; 12:00 m., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00 p. m., Arcadia Cafe Concert Orchestra; 4:30, Piano solos, Edna Finestone; 7:30, Dream Daddy's bedtime stories.

WEAF, New York, N. Y. (Eastern, 492), 4:00-5:00 p. m., Boh Fridkins Orchestra; 5:00-5:30, Kitty Borchmann, lyric soprano, and Edna Riester, mezzo soprano; 7:30-8:00, Alexander James, tenor; 8:00-9:00, American Chicle Trio and Quartet; 9:00-9:10, Sophie Irene Loeb; 9:15-10:00, Siegmund Grosskopf, violinist; 10:00-11:00, Special Musical Program; 11:00-12:00, Vincent Lopez Orchestra through courtesy Gimbel Bros.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "Igneous Rocks," Dr. Ellis W. Shuler; 8:30-9:30, Musical program, W. A. Green Company's Choral Club, Earle D. Behrends, director; 11:00-12:00, Mrs. O. Ledford and assisting musicians.

WFI, Philadelphia (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Orchestra; 3:00, Loretta Kerk, pianist; 6:00, Bedtime stories, Cousin Sue; 6:30, Meyer Davis Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 6:30 p. m., Meeting of the Big Brother Amrad Club; 7:30, Evening program: New England Business Problems, Arthur R. Curnick; Arthur Murray's course in Ball Room Dancing by Radiophone, Lesson No. 8; Musicale.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 4:00, Tea time music, Martha Gomph, harpist, Katherine Stang, violinist; 6:30, Vincent Lopez Hotel Statler Dance Orchestra; 7:30, Digest of the day's news.

WGY, Schenectady, N. Y. (Eastern, 380), 9:30 p. m., Dance music, Jack Symonds' Orchestra.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections, Walnut Theater Orchestra, Walter Davidson, conductor; "Just Among Home Folks," a daily column appearing in the Courier-Journal; Selections, Strand Theater Orchestra, Harry S. Currie, conductor; Selections, Alamo Theater, organ; 7:30-9:00, One-hour concert, auspices of the University of Louisville Male Quartette, Jonah Skiles, director; William Thelsen, 1st tenor; James Goff, 2nd tenor; Lane Kendall, 1st bass; Jonah Skiles, 2nd bass; W. L. Braun, accompanist; Selections, Barney Rapp and his orchestra; Selections; Seelbach Hotel Orchestra.

WJAZ, Chicago, Ill. (Central, 447.7), 10:00-2:00 a. m., Helen Louise Shaffer, pianist; Joseph Lynne, violinist; Anna Mallery, soprano; Harold Jenkins, baritone; "In Love," "Marcheta," "Sobbing Blues," "My Dream Moon," "Sunflower Maid," "Susie," "Pekin," "So This Is Venice," Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 5:00 p. m., Dance program, Jules Berkins' Rosemont Orchestra; 7:00, "Uncle Wiggily Stories," Howard Garis; 7:30, Concert, Estrella Mandolin Club; 7:45, Harper Brothers Literary talk; 8:00, Concert, Estrella Mandolin Club; 8:45, Ernest Ehler, tenor; 9:00, Address, Hon. Fiarello H. LaGuardia; 9:15, "The Land We Live In," Secretary Davis; Canadian Society Dinner.

WLAG, Minneapolis-St. Paul, Minn. (Central, 417), 10:30 a. m., Household hints; 11:35, "Tho Postcard Club"; 2:00 p. m., "Personality," O. V. Simon; 2:30, Daylight concert; 4:00, Short story reading, Mildred Simons; 5:00, Weekly radio lecture, Ray R. Sweet; 5:30, Weekly meeting of the Children's Radio Health and Toothbrush Club of America, Dr. F. W. Pepper, presiding; 6:00, Sport program; 9:17, Musical program of negro folk songs, Andrew Male Quartet; 10:30, Dance program, St. Paul Athletic Club Orchestra.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., "You Americans," Ada Ward.

WOAW, Omaha, Neb. (Central, 526), 6:30 p. m., Dinner program, Ackerman's Orchestra; 9:00, Program, auspices of Omaha Printing Company, Instrumental Trio, Desella Strawn, violinist, Cleda Strawn, pianist, Elizabeth Strawn, cellist; "Dreaming Alone in the Twilight," Ray Sage, baritone; "Silver Crown," Henry E. Tagger, banjoist; "Homing," Emily Mitzlaff Furnish, soprano; "Ave Maria," Rose Dubnoff, violinist; "Maid of the West," E. H. Strickler; "Polish Dance," Louis Rambour, pianist; "Goodbye," Geraldine O'Maily DeBacker, contralto; "Poet's Dream," The Strawn Sisters; "Ono Fleeting Hour," Ray Sage, baritone; "Golden Bell Waltz," Henry E. Tagger, banjoist; "Fantasia," Louis Ramhour; "The Sweetest Story Ever Told," Emily M. Furnish, soprano; "Caprice Basque," Rose Dubnoff; Recitation, Charles R. Docherty; "I'm in Love," E. H. Strickler; "Romance," The Strawn Sisters; "Ave Maria," Geraldine O. DeBacker; "Turkish March," Rose Dubnoff.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Chemistry of Bread Making," C. C. Hall; 5:45, Chimes; 6:30, Sandman's Visit; 9:00, Orchestra program, "Don't Say That You Won't Cry," "Always Looking for a Little Sunshine," "While Bells of Memory Chime," "You Said You'd Die for Me," "Old-Fashioned Days," "You're Like a Baby," P. S. C. Orchestra, Gerald M. Barrow, director; V. B. Rochte, baritone.

WOR, Newark, N. J. (Eastern, 405), 2:30-3:00 p. m., Children's program arranged by "Uncle Robert"; 3:00-3:15, Helen Gaubis, coloratura soprano; 3:15-3:30, Piano selections by Dorothy Drummon; 3:30-3:45, Soprano solos, Helen Gaubis; 3:45-4:00, Dorothy Drummon, pianist; 6:15-7:15, Kenneth Kitchen's Club Orchestra; 7:30-8:00, Fred J. Bendel, Sporting Editor; 8:00-9:00, Vernon Orchestra of Montclair; 9:00-9:15, Lillian Mae Challenger, mezzo-contralto; 9:15-9:35, Hon. Herbert C. Pell, Chairman, Democratic Committee; 9:35-9:45, Frank B. Gillereth, consulting engineer, on "The One Best Way to Do Your Work"; 10:00-11:00, Jimmie Shearer and his Revue.

WTAM, Cleveland, Ohio (Eastern, 390), 9:00 p. m., Dance program by the WTAM Orchestra; vocal and instrumental solos by popular entertainers.

WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner," Woman's Editor; 3:00 p. m., Detroit News Orchestra; 7:30, Detroit News Orchestra. Special program for Detroit's Ice Carnival.

Sunday, January 27

KFI, Los Angeles, Calif. (Pacific, 469), 10:00-10:45 a. m., L. A. Church Federation Service; 4:00-5:00 p. m., Vesper Services, Federated Church Musicians; 6:45-7:30, Opera Story and Concert; 10:00-11:00, Theron Bennett's Packard Six.

KHJ, Los Angeles, Calif. (Pacific, 395), 10:00 a. m., Sermon; 10:30-12:30 m., Organ recital and entire religious service from First Methodist Episcopal Church, Rev. Elmer E. Helms, pastor; Arthur Blakeley, organist; 7:00-7:30 p. m., Organ recital, Arthur Blakeley, organist.

KPO, San Francisco, Calif. (Pacific, 423), 11:00-12:00 m., Church services, Rev. Rober Jackson, pastor of Fitzgerald Memorial Church, talk on "God's Radio"; Religious Cantata, "The Cradle of Bethichem," Fitzgerald Memorial Church Choir; 8:30-10:00, Concert, Rudy Seiger and his Fairmont Hotel Orchestra.

KYW, Chicago, Ill. (Central, 536), 11:00 a. m., Central Church Service, Dr. F. F. Shannon, pastor; Musical program, Daniel Protheroe, director; 6:30 p. m., Excerpts from the New Testament—An American Translation by Prof. E. J. Goodspeed, William Z. Nourse; 7:00, Chicago Sunday Evening Club, Speaker, Dr. H. E. Fosdick, Edgar Nelson, musical director.

WBAP, Fort Worth, Texas (Central, 476), 11:00-12:15 p. m., Church services, First Presbyterian Church, Rev. J. K. Thompson; 4:00-5:00, Concert, Rialto Theater; 5:00-6:00, Sabbath Day vesper concert.

WBZ, Springfield, Mass. (Eastern, 337), 10:55 a. m., Church services; 6:45 p. m., Sunday Vespers; 8:30, Church services.

WCAP, Washington, D. C. (Eastern, 469), 11:00 a. m., Religious services from one of the Churches of Washington; 4:00 p. m., Service at Bethlehem Chapel, Episcopal Cathedral, Mt. St. Alban; 7:20-9:00, Joint program with WEAF, N. Y. C.; 9:00-10:00, Organ recital from Skinner Organ Company at N. Y. C.

WDAP, Chicago, Ill. (Central, 360), 2:15 p. m., Drake Coucert Ensemble.

WDAR, Philadelphia (Eastern, 395), 2:00 p. m., Concert, Arcadia Cafe Concert Orchestra; Ferl Sarkozi, director.

WEAF, New York, N. Y. (Eastern, 492), 2:45-3:45 p. m., N. Y. Federation of Churches Program; 3:45-5:00, Dr. S. Parkes Cadman; 7:30-9:00, Capitol Theatre Symphony Orchestra and Staff; 9:00-10:00, Skinner Organ Recital.

WFAA, Dallas, Texas (Central, 476), 6:00-7:00 p. m., Radio Bible Class, Dr. William M. Anderson, Jr.; 9:30-10:00, Address, Dr. G. M. Gibson, pastor Munger Place Methodist Episcopal Church; 10:00-11:00, Oak Cliff Orchestra, Durward Cline, director.

WFI, Philadelphia (Eastern, 395), 7:30 p. m., Church services, Arch Street Presbyterian Church.

WGI, Medford Hillside, Mass. (Eastern, 360), 4:00 p. m., Twilight program: "Adventure Hour," Youth's Companion; Musicale; 8:30, Evening program: Talk on "World Unity," auspices of the Greater Boston Federation of Churches; Evening's musicale.

WGY, Schenectady, N. Y. (Eastern, 380), 10:30 a. m., Church services, First Presbyterian Church, Rev. William H. Hopkins, pastor; 3:30 p. m., Program, WGY Symphony Orchestra; 7:45, Church Services, First Presbyterian Church.

WHAS, Louisville, Ky. (Central, 400), 9:57 a. m., Organ music; 10:00, Church services, First Christian Church, Rev. Dr. E. L. Powell, pastor; 4:00-5:00 p. m., Concert, Post Office Quartette; Roy DeBord, 1st tenor; G. A. Emerson, 2nd tenor; I. Kimbrough, baritone; J. Payne, bass.

WHK, Cleveland, Ohio (Eastern, 283), 8:00 p. m., Concert program of operatic and popular numbers by the WHK Trio and popular entertainers; Ben Silverberg, pianist; Ben Burtt, pianist, and Max Schmitt, cellist and director.

WJAZ, Chicago, Ill. (Central, 447.7), 6:00-9:00 p. m., Artist Series program: Adelbert Hugelot, pianist, teacher at the American Conservatory of Music; Herbert Butler, violinist, teacher at the American Conservatory of Music; "Old Southern Melodies," "La Paloma," "My Dream Moon," "Raymond Overture," Selections from Aida, "When My Ship Comes Sailing Home," Oriole Orchestra.

WLW, Cincinnati, Ohio (Central, 309), 9:30 a. m., Sunday School Services, Editorial Staff of Sunday School Publications of the Methodist Book Concern; 11:00 p. m., Services, Church of the Covenant, Rev. Frank Stevenson, Minister; 7:45, Services, Church of the Covenant, Rev. Frank Stevenson, minister.

WOAW, Omaha, Neb. (Central, 526), 9:00 a. m., Radio Chapel Service, Rev. R. R. Brown; 6:00 p. m., Bible Study Hour, Mrs. Carl Gray, director; 9:00, Musical Chapel Service, Zion English Lutheran Church, Rev. Nels Lungren, pastor.

WOC, Davonport, Iowa (Central, 484), 9:00 a. m., Sacred Chimes concert; 1:30 p. m., Orchestra concert, P. S. C. Orchestra; 7:00, Organ recital; 8:00, Church service; 9:00, Musical Program, Erwin Swindell, director; P. S. C. Orchestra.

WOR, Newark, N. J. (Eastern, 405), 2:30-3:15 p. m., Olga Enika Shaw, soprano; 3:15-3:30, Olga Enika Shaw; 3:30-4:00, Fred J. Whitehouse Revue; 8:00-8:15, Mr. Alfred J. McCosker of New York Morning Telegraph, "Current Motion Pictures"; 8:15-8:30, Adelaide Soper, contralto; 8:30-8:45, Bill Steinke, "Radio Cartooning"; 8:45-9:45, Program under direction of Mabelanna Corby; 9:45-11:00, New York Orchestra.

WOS, Jefferson City, Mo. (Central, 440.9), 7:30 p. m., Church services, Central Evangelical Church, Rev. E. W. Berlekampf, pastor.

WWJ, Detroit, Mich. (Eastern, 517), 7:30 a. m., Services, St. Paul's Episcopal Cathedral; 2:00 p. m., Detroit News Orchestra.

Monday, January 28

KPO, San Francisco, Calif. (Pacific, 423), 8:00-9:00 p. m., G. Herold Montague Schulteis, organist; 9:00-10:00, Agnes Herzer, soprano; Harriette French, violinist; Walter Dupre, baritone; Orlando Pinelli, piano-accordionist; "Events in the Near East," Arthur Warren; 10:00-11:00, E. Max Bradfield's versatile band.

KSD, St. Louis, Mo. (Central, 546), 8:30 p. m., Vocal and instrumental specialties, orchestra and organ music broadcast direct from the Grand Central Theater.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert; 9:30-10:45, Concert of novelty natures, I. N. McCrary Rubber Company.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., Dinner concert, WBZ Trio; 7:00, Humorous program; 7:30, Bedtime story for the Kiddies; 8:00, Concert by the WBZ Trio.

WDAR, Philadelphia (Eastern, 395), 11:45 a. m., Daily Almanac; 12:00 m., Organ recital, Stanley Theater; dinner music, Arcade Cafe Concert Orchestra; piano solos, Edna Finestone; 2:00 p. m., Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 7:50, Moving Picture review, James Nassau; 10:10, Howard Lanin's Arcadia Cafe Dance orchestra.

WEAF, New York, N. Y. (Eastern, 492), 7:30-7:40 p. m., Thornton Fisher Sport Talk; 7:50-8:00, Peoples Trust Co.; 8:00-8:20, Hoxie N. Fairchild; 8:20-9:10, John Prindle Scott and assisting Artists; 9:10-9:30, "Wild Women I Have Known"—talk by E. F. Bigelow; 9:30-10:30, Mozart String Quartet; 10:30-11:00, Hazel Keller, dramatic soprano.

WFI, Philadelphia (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Orchestra; 6:00, Bedtime stories, Cousin Sue; 6:30, Meyer Davis Bellevue Stratford Orchestra.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections, Strand Theater Orchestra, Harry S. Currie, conductor; "Just Among Home Folks," a daily column appearing in the Courier-Journal; Selections, Walnut Theater Orchestra, Walter Davison, conductor; "The Larger Aspect of World Affairs," Frederick Dixon, editor of the International Interpreter.

WHAZ, Troy, N. Y. (Eastern, 380), 9:00 p. m., Popular program of old-time melodies, Radio Male Quartet, Trorad Mixed Quartet, Will H. Wade, director; Educational address on Chemical Engineering.

WLW, Cincinnati, Ohio (Central, 309), 8:00 p. m., Special concert, The College of Music; 9:00, Crosley Theatrical Review; "Faded Love Letters," "Hod Hands," "Sunflower Maid," "Marcheta," "Sunshine of Mine," "The Land of Sweet Sixteen," Roger Hill and his Orchestra; Songs, Rose Shank; Russel Cook, violinist; C. W. Curran, pianist.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Concert, Hotel Gayoso Concert Orchestra, Prof. Gasper Pappalardo, director.

WOAW, Omaha, Neb. (Central, 526), 6:30 p. m., Dinner program, Randall's Royal Orchestra; 9:00, Program, Frank Buckingham, director; "The Minstrel Man," "Breath of Spring," Omaha String Club; Grayce Jackson, soprano; Mr. Tipton, mando-cellist; "Pilgrims' Chorus from Tannhauser," "Sing Ling Ting," Omaha String Club; "Cavatina," Frank Buckingham, mandolinist; "The Hand of You," Grayce Jackson, soprano; "Beautiful Night," "Lady Meddlesome," Omaha String Club; "Collar City," Frank Buckingham, banjoist; "Love's Old Sweet Song," "Marcheta," Grayce Jackson; Intermezzo, "Cavalleria Rusticana," Omaha String Club; "Le Cygne," Mr. Tipton; "Rococo," Omaha String Club; "Hawaiian Air," Frank Buckingham, mandolinist; Intermezzo Lion du Bal, Omaha String Club; "Love's Sorrow," Grayce Jackson, soprano.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., Educational program; 5:45, Chimes; 6:30, Sandman's visit; 8:00, Musical program, Erwin Swindell, director.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Band concert, "Radio-Famous," Missouri State Prison Concert Band, Virgil W. Combs, handmaster.

CHICAGO CIVIC OPERA SEASON ENDS WITH "MARTHA" FROM KYW

Opera "Carmen" from WMAQ, January 24

CARMEN, a gypsy, is arrested for stabbing one of the factory girls and placed in Don Jose's charge, whom she by her charms induces to let her escape. While awaiting his release, Carmen meets Escamille, a toreador. When Don Jose comes out of prison, he quarrels with his superior officer for flirting with Carmen and is compelled to join a band of smugglers. Escamillo follows Carmen, and the two men fight. They are separated by the gypsies and Carmen. While Don Jose is away at his mother's deathbed, Carmen and the gypsies follow Escamillo to Seville to watch a bull fight. Don Jose meets and kills her, just as the victorious toreador comes out. In remorse he throws himself across her body, and the curtain falls. The tragic ending of the beautiful opera is one of the strongest, dramatically, of the whole repertoire.

—The Program Lady.

Walter Greenough (center) and his players, who give Radarios every week from WDAR. Their next performance will be Friday, January 25.

Below, the Melo Club dance orchestra with its director, David Relch.. They play regularly from WHN, New York, and may be heard again January 24.

On Friday evening, January 25, Richard Headrick, child moving picture star, will take part in the children's program broadcast from KHJ, Los Angeles. He is a very pleasing little fellow.

Above is Loretta Kerk, pianist and official accompanist of Station WFI, Philadelphia. But she also shines as a soloist on the piano, as you will find if you tune her in Wednesday, January 23, or the following Saturday.

Opera "Martha" from KYW, January 26

IN THIS opera the impossible comes to pass. A poor young farmer falls in love with a lady and finally marries her. This is the way it happens. Lady Harriet goes to the fair with her maid Nancy and Tristan, disguised as peasants. Two young farmers engage them as servants. When the lasses, Plunkett and Lionell, leave dragged them home, they are surprised to find that they can do no work. After the farmers have retired Tristan helps the girls escape. The next day Lionell sees Lady Harriet and knows that she is his Martha. In spite of the difference in rank, he asks her to marry him. She calls the hunters and tells them Lionell is insane. Nancy and Harriet decide to help Lionell. They take the ring to the Queen and discover that Lionell is an earl's son. This of course, makes everything end happily.

—The Program Lady.

Wednesday, January 23

(Continued from Page 15)

Roso Ryan; 11:45-1:00 a. m., Nighthawk frolic, The Merry Old Chief and Coon-Sanders Nonety Singing Orchestra.

WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Salvation Army Staff Band; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:00 m., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00 p. m., Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 7:45, Features from Stanley Theater.

WEAF, New York, N. Y. (Eastern, 492), 7:00-7:30, Thornton Fisher Sport Talk; 7:30-8:00, American Agriculturist; 8:10-8:20, Bridge Talk, Wolf Hasl; 8:20-8:35, Bureau of Standards; 8:35-8:45, American Bond & Mortgage Co.; 8:45-9:00, Jacqueline De Moor, pianist; 9:00-9:15, Board of Education; 9:15-9:45, Raymond O. Parker, tenor.

WFAA, Dallas, Texas (Central, 476), 12:30-1:30 p. m., Address, W. C. Everett, Methodist Book Concern, Lamar & Barton, on "Some Good Books to Read."

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Orchestra; 3:00, piano solos, Loretta Kerk; 6:30, Bedtime stories, Uncle Sue; 6:30, Meyer Davis Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selections on the Amplico; Armand Rotondi, violinist; 8:10-8:20, Bridge Talk; 8:20-8:35, Bureau of Standards; 8:35-8:45, American Bond & Mortgage Co.; 8:45-9:00, Jacqueline De Moor, pianist; 9:00-9:15, Board of Education; 9:15-9:45, Raymond O. Parker, tenor.

WHAD, Chicago, Ill. (Central, 447.6), 7:00 p. m., Bedtime stories by the Georgess Faulkner, the Story Lady for children; 7:30, Weekly lecture for children; 8:00, Weekly lecture for adults; 9:15, Concert.

WGC, Davenport, Iowa (Central, 484), 7:30, The Wanen's Relations to Business, Mrs. Ruth Bryan Owen; 8:00, nine organ recital, Mrs. S. J. Burleigh.

WHA, Madison, Wis. (Central, 535), 7:00 p. m., Program of the Symphony Orchestra; 8:00, Church of Rock Island; Talk, Rev. Frank Marshall.

WOR, Newark, N. J. (Eastern, 405), 6:15-8:30, Helen F. Gaubis, Hawaiian guitar and banjoist, assisted by Shelnut Hawaiian quartet; 6:45, Albert H. Sonn, lecture; 7:00, Talk, Dr. George P. Nicholson; 8:45, Phoenix Male Quartet; 9:00, Alfred Heaton, violinist, assisted by Mrs. Heaton, pianist; 9:30, Talk, Rev. Dr. Samuel Robin, composer-pianist of New York and former pupil of Ernest Schelling; 9:45, Arthur Hackney, assisted by Kenneth Kitchen's Club Orchestra; 10:00-10:15, Billy M. Williams, Scotch comedian and singer of Sir Harry Lauder songs; 10:15-10:30, Congressman Guy Campbell of Pennsylvania on "Closeups of Washington"; 10:30-10:45, Billy M. Williams, Scotch comedian; 10:00-11:00, Jimmy Clarke's Entertainers.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Dance program, S. C. Stancill's Novelty Six Dance Orchestra.

WTAM, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Orchestral numbers by Louis Koch's Orchestra, Elanora Reary, soprano; Mr. J. E. Merrin, tenor; Instrumental numbers, Alice Gouinlock, Novelty musical numbers, Eddie Peabody on the banjo, mando-cello, ukelin and guitar.

WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "To-night's Dinner," Woman's Editor; 12:00 m., Dance music, Goldkette's Orchestra; 7:00 p. m., Detroit News Orchestra; Russell G. Raab, tenor.

KHJ, Los Angeles, Calif. (Pacific, 305), 12:30-1:15 p. m., Concert; 2:30-3:30, Matinee musicale presenting Estelle Strock, soprano; 5:45-7:30, Children's program, Bedtime story; 8:30-10:00 De Luxe program; 10:30-12:30, Art Hickman's Orchestra.

KPO, San Francisco, Calif. (Pacific, 423), 6:00-7:30 p. m., Dinner program, George Lipschultz and Music Masters from the Low's Warfield Theater; Lela Johansiene, dramatic soprano; 8:00-9:30, Organ recital, G. Herold M. Schmidt; 9:30-10:30, Vladimir Rassoukine, Russian pianist; Mrs. Dorothy McClure Hunt, soprano; Leonida Corconi, baritone; 10:30-11:30; Palace Hotel Dance Orchestra.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., Dorothy Jacobson, pianist; Abe Jackson, violinist; Carl Rosenbaum, tenor.

KYW, Chicago, Ill. (Central, 536), 11:25 a. m., Table talk, Mrs. Anna J. Peterson; 2:25 p. m., Studio program; 6:30, Children's bedtime story; 8:00-8:20, Twenty Minutes of Good Reading, Rev. H. J. Ferall; 8:30-9:30, Sam Goldsmith, tenor; Anna Mildner, reader; Orchestra of the Chicago Boys Club No. 5; Joseph J. Grill, director; Haidare Emma Roe, accompanist; 9:30-10:00, National Live Stock and Meat Board, "The Distribution of Meat Products to the Consumer," John T. Russell.

WSAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, Junior Eotterpeh Club, Mrs. J. Edward Cooley, director; 9:30-10:45, Concert, artists from Howard Payne College.

WBZ, Springfield, Mass. (Eastern, 337), 7:00 p. m., "Preparation of Federal Income Tax Returns," Thomas McCarry; 7:30, Bedtime story for the Kiddies; Farmers' Period; Letter from New England Homestead; 8:00, Concert, Haydn Male Quartette; Arthur O. Harwood, 1st tenor; Lee Anderson, baritone; Carl Anderson, pianist; Edward L. Davis, 2nd bass; 9:00, Bedtime story for Grown-ups, Orison S. Marden.

WAP, Washington, D. C. (Eastern, 469), 7:45-9:45 p. m., Orchestra; 10:00-12:00, Dance music, Meyer Davis' La Paradis Band.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Musical matinee, D. Ambert Haley's Dance and Concert Orchestra; 8:00-9:30, School of the Air, Piano tuning in number on Duo-Art. Address, speaker from William Jewell College; "What Think Ye of Christ?" by Ray Palmer; Address, J. H. Mercer, Kansas Live Stock Association; Children's period; Fritz Hanlein's Orpheans Ensemble; 9:45-10:00 p. m., Nighthawk Frolic; The Merry Old Chief and Coon-Sanders Nonety-Singing Orchestra; Pipe organ recital, Nemo Manuering.

WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Northwestern School of Music; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 2:00 p. m., Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories.

WEAF, New York, N. Y. (Eastern, 492), 11:50-12:20 a. m., American Agriculturist; 4:30-5:30 p. m., Dance music, Biltmore Hotel Orchestra; 6:00-7:00, Dinner concert, Ritz-Carlton Orchestra; 7:00-7:30, Thornton Fisher Sport Talk; 7:40-7:55, Dr. Owen Lovejoy; 7:55-8:20; Joel Coffey, pianist; 8:20-8:30, Bank of America; 8:30-9:30, Hunter College Musical Program; 9:30-9:45, Columbia Phonograph Co.; 9:45-10:30, Leviathan Club Concert Club; 10:30-11:20, Joint Concert by Louise Hubbard, soprano; Earle Tuckerman, baritone; Katherine Gunn, pianist; 11:20-12:00, Vincent Lopez through courtesy Cimbel Bros.

WFAA, Dallas, Texas (Central, 476), 12:30-1:30 p. m., "Some Ethics of Law Practice Explained to the Layman"; 8:30-9:30, Musical program, Wednesday Musical Club; Talk, Mrs. Ruth Smith, program chairman.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concerts; 6:30, Bedtime stories, Cousin Sue; 6:30, Meyer Davis Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selection on the Amplico; Armand Rotondi, violinist; 8:10-8:20, Bridge Talk; 8:20-8:35, Bureau of Standards; 8:35-8:45, American Bond & Mortgage Co.; 8:45-9:00, Jacqueline De Moor, pianist; 9:00-9:15, Board of Education; 9:15-9:45, Raymond O. Parker, tenor.

WHAD, Chicago, Ill. (Central, 447.6), 7:00 p. m., Bedtime talk, Mrs. Anna J. Peterson; 2:25 p. m., Studio program; 6:30, Children's bedtime story; 8:00-8:20, Twenty Minutes of Good Reading, Rev. H. J. Ferall; 8:30-9:30, Sam Goldsmith, tenor; Anna Mildner, reader; Orchestra of the Chicago Boys Club No. 5; Joseph J. Grill, director; Haidare Emma Roe, accompanist; 9:30-10:00, National Live Stock and Meat Board, "The Distribution of Meat Products to the Consumer," John T. Russell.

WSAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, Junior Eotterpeh Club, Mrs. J. Edward Cooley, director; 9:30-10:45, Concert, artists from Howard Payne College.

WBZ, Springfield, Mass. (Eastern, 337), 7:00 p. m., "Preparation of Federal Income Tax Returns," Thomas McCarry; 7:30, Bedtime story for the Kiddies; Farmers' Period; Letter from New England Homestead; 8:00, Concert, Haydn Male Quartette; Arthur O. Harwood, 1st tenor; Lee Anderson, baritone; Carl Anderson, pianist; Edward L. Davis, 2nd bass; 9:00, Bedtime story for Grown-ups, Orison S. Marden.

WAP, Washington, D. C. (Eastern, 469), 7:45-9:45 p. m., Orchestra; 10:00-12:00, Dance music, Meyer Davis' La Paradis Band.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Musical matinee, D. Ambert Haley's Dance and Concert Orchestra; 8:00-9:30, School of the Air, Piano tuning in number on Duo-Art. Address, speaker from William Jewell College; "What Think Ye of Christ?" by Ray Palmer; Address, J. H. Mercer, Kansas Live Stock Association; Children's period; Fritz Hanlein's Orpheans Ensemble; 9:45-10:00 p. m., Nighthawk Frolic; The Merry Old Chief and Coon-Sanders Nonety-Singing Orchestra; Pipe organ recital, Nemo Manuering.

WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Northwestern School of Music; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 2:00 p. m., Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concerts; 6:30, Bedtime stories, Cousin Sue; 6:30, Meyer Davis Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selection on the Amplico; Armand Rotondi, violinist; 8:10-8:20, Bridge Talk; 8:20-8:35, Bureau of Standards; 8:35-8:45, American Bond & Mortgage Co.; 8:45-9:00, Jacqueline De Moor, pianist; 9:00-9:15, Board of Education; 9:15-9:45, Raymond O. Parker, tenor.

WHAD, Chicago, Ill. (Central, 447.6), 7:00 p. m., Bedtime talk, Mrs. Anna J. Peterson; 2:25 p. m., Studio program; 6:30, Children's bedtime story; 8:00-8:20, Twenty Minutes of Good Reading, Rev. H. J. Ferall; 8:30-9:30, Sam Goldsmith, tenor; Anna Mildner, reader; Orchestra of the Chicago Boys Club No. 5; Joseph J. Grill, director; Haidare Emma Roe, accompanist; 9:30-10:00, National Live Stock and Meat Board, "The Distribution of Meat Products to the Consumer," John T. Russell.

WSAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, Junior Eotterpeh Club, Mrs. J. Edward Cooley, director; 9:30-10:45, Concert, artists from Howard Payne College.

WBZ, Springfield, Mass. (Eastern, 337), 7:00 p. m., "Preparation of Federal Income Tax Returns," Thomas McCarry; 7:30, Bedtime story for the Kiddies; Farmers' Period; Letter from New England Homestead; 8:00, Concert, Haydn Male Quartette; Arthur O. Harwood, 1st tenor; Lee Anderson, baritone; Carl Anderson, pianist; Edward L. Davis, 2nd bass; 9:00, Bedtime story for Grown-ups, Orison S. Marden.

WAP, Washington, D. C. (Eastern, 469), 7:45-9:45 p. m., Orchestra; 10:00-12:00, Dance music, Meyer Davis' La Paradis Band.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Musical matinee, D. Ambert Haley's Dance and Concert Orchestra; 8:00-9:30, School of the Air, Piano tuning in number on Duo-Art. Address, speaker from William Jewell College; "What Think Ye of Christ?" by Ray Palmer; Address, J. H. Mercer, Kansas Live Stock Association; Children's period; Fritz Hanlein's Orpheans Ensemble; 9:45-10:00 p. m., Nighthawk Frolic; The Merry Old Chief and Coon-Sanders Nonety-Singing Orchestra; Pipe organ recital, Nemo Manuering.

WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Northwestern School of Music; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 2:00 p. m., Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories.

WEAF, New York, N. Y. (Eastern, 492), 11:50-12:20 a. m., American Agriculturist; 4:30-5:30 p. m., Dance music, Biltmore Hotel Orchestra; 6:00-7:00, Dinner concert, Ritz-Carlton Orchestra; 7:00-7:30, Thornton Fisher Sport Talk; 7:40-7:55, Dr. Owen Lovejoy; 7:55-8:20; Joel Coffey, pianist; 8:20-8:30, Bank of America; 8:30-9:30, Hunter College Musical Program; 9:30-9:45, Columbia Phonograph Co.; 9:45-10:30, Leviathan Club Concert Club; 10:30-11:20, Joint Concert by Louise Hubbard, soprano; Earle Tuckerman, baritone; Katherine Gunn, pianist; 11:20-12:00, Vincent Lopez through courtesy Cimbel Bros.

WFAA, Dallas, Texas (Central, 476), 12:30-1:30 p. m., "Some Ethics of Law Practice Explained to the Layman"; 8:30-9:30, Musical program, Wednesday Musical Club; Talk, Mrs. Ruth Smith, program chairman

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26

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GRAM LADY.

476), 6:00-7:00 p. m.,
m M. Anderson, Jr.;
Gibson, pastor Mun-
Church; 10:00-11:00,
Cline, director.
, 7:30 p. m., Church
an Church.
Eastern, 360), 4:00 p.
ture Hour." Youth's
ening program: Talk
the Greater Boston
's musicals.
n, 380), 10:30 a. m.,
terian Church, Rev.
:30 p. m., Program,
45, Church Services,

0), 9:57 a. m., Organ
irst Christian Church,
:00-5:00 p. m., Con-
DeBord, 1st tenor;
Kimbrough, baritone;

33), 8:00 p. m., Con-
pular numbers by the
ners; Ben Silverberg,
Max Schmitt, cellist

.7), 6:00-9:00 p. m.,
rt Hugelot, pianist,
atory of Music; Her-
the American Con-
ern Melodies," "La
'Raymond Overture,"
Ship Comes Sailing

309), 9:30 a. m.,
ial Staff of Sunday
odist Book Concern;
the Covenant, Rev.
Services, Church of
son, minister.
), 9:00 a. m., Radio
n; 6:00 p. m., Bible
rector; 9:00, Musical
ltheran Church, Rev.

84), 9:00 a. m., Sa-
., Orchestra concert,
recital; 8:00, Church
Erwin Swindell, di-

5), 2:30-3:15 p. m.,
15-3:30, Olga Enika
ehouse Revue; 8:00-
New York Morning
Pictures"; 8:15-8:30,
-8:45, Bill Steinke.
Program under direc-
:00, New York Or-

440.9), 7:30 p. m.,
elical Church, Rev.

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ank; Russel Cook,

WMAQ, Chicago, Ill. (Central, 447.5), 4:30 p. m., Pupils of Bush Conservatory; 7:00, Music Memory Contest, Mrs. Marx E. Oberndorfer; 8:30, WMAQ Orchestra; 9:15, Harold Ayers, violinist; Mrs. O. A. Jennison.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Program arranged by Christine Eifler Fowler; 11:00, Midnight Frolic.

WOAW, Omaha, Neb. (Central, 526), 6:30 p. m., Dinner program, Mispah Lodge Masonic Orchestra, W. M. Olson, director; Florence B. Palmer, soprano; Paynter Brothers; 9:00, WOWL Dance program, Frank Hodek's Orchestra.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Water Purification," C. A. Russell; 5:45, Chimes Concert; 6:30, Sandman's visit; 7:30, Sunday School Lesson, Dr. Frank Willard Court, pastor; 8:00, Musical program, Erwin Swindell, director; Exchange Club of Rock Island.

WOR, Newark, N. J. (Eastern, 405), 2:30-2:45 p. m., Josephine Boughan, mezzo-contralto, accompanied by Frances Hortense; 2:45-3:00, Soprano solos by Ruth Dale; 3:00-3:15, Mary E. Dryer, President Women's Trade Union League, on "Conditions of Women in Germany"; 3:15-3:30, Henry Hull, co-star of "The Other Rose," now at Morosco Theatre, N. Y.; 3:30-

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Musical matinee, The Riley-Ehrhart Orchestra; 6:00-7:00, School of the Air, Piano tuning in on Duo-Art; Address, Edgar A. Linton, writer-lecturer; Children's period; Fritz Hanlein's Trianon Ensemble; 11:45-1:00 a. m., Nighthawk Frolic, The Merry Old Chief and Coon-Sanders Novelty-Singing Orchestra.

WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Harmony Girls, Jerry Sullivan, Bob Brown, Melodians, Cherles Wellman, Jack Chapman's Orchestra.

WDAR, Philadelphia (Eastern, 395), 11:45 a. m., Daily Almanac; 12:00 m., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00 p. m., Arcadia Cafe Concert Orchestra; 4:30, Piano solos, Edna Finestone; 7:30, Dream Daddy's bedtime stories.

WEAF, New York, N. Y. (Eastern, 492), 4:00-5:00 p. m., Bob Fridkins Orchestra; 5:00-5:30, Kitty Borchmann, lyric soprano, and Edna Riester, mezzo soprano; 7:30-8:00, Alexander James, tenor; 8:00-9:00, American Chicle Trio and Quartet; 9:00-9:10, Sophie Irene Loeb; 9:15-10:00, Siegmund Grosskopf, violinist; 10:00-11:00, Special Musical Program; 11:00-12:00, Vincent Lopez Orchestra through courtesy Gimbel Bros.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., [illegible] 2:00-3:00 p. m., [illegible] 4:00-5:00 p. m., [illegible] 6:00-7:00 p. m., [illegible] 8:00-9:00 p. m., [illegible] 10:00-11:00 p. m., Excerpts from the New Testament—An American Translation by Prof. E. J. Goodspeed, William Z. Nourse; 7:00, Chicago Sunday Evening Club, Speaker, Dr. H. E. Fosdick, Edgar Nelson, musical director.

WBAP, Fort Worth, Texas (Central, 476), 11:00-12:15 p. m., Church services, First Presbyterian Church, Rev. J. K. Thompson; 4:00-5:00, Concert, Rialto Theater; 5:00-6:00, Sabbath Day vesper concert.

WBZ, Springfield, Mass. (Eastern, 337), 10:55 a. m., Church services; 6:45 p. m., Sunday Vespers; 8:30, Church services.

WCAP, Washington, D. C. (Eastern, 469), 11:00 a. m., Religious services from one of the Churches of Washington; 4:00 p. m., Service at Bethlehem Chapel, Episcopal Cathedral, Mt. St. Alban; 7:20-9:00, Joint program with WEAF, N. Y. C.; 9:00-10:00, Organ recital from Skinner Organ Company at N. Y. C.

WDAP, Chicago, Ill. (Central, 360), 2:15 p. m., Drake Concert Ensemble.

WDAR, Philadelphia (Eastern, 395), 2:00 p. m., Concert, Arcadia Cafe Concert Orchestra; Feri Sarkozi, director.

WEAF, New York, N. Y. (Eastern, 492), 2:45-3:45 p. m., N. Y. Federation of Churches Program; 3:45-5:00, Dr. S. Parkes Cadman; 7:30-9:00, Capitol Theatre Symphony Orchestra and Staff; 9:00-10:00, Skinner

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Concert, Hotel Gayoso Concert Orchestra, Prof. Gasper Pappalardo, director.

WOAW, Omaha, Neb. (Central, 526), 6:30 p. m., Dinner program, Randall's Royal Orchestra; 9:00, Program, Frank Buckingham, director; "The Minstrel Man," "Breath of Spring," Omaha String Club; Grayce Jackson, soprano; Mr. Tipton, mando-cellist; "Pilgrims' Chorus from Tannhauser," "Sing Ling Ting," Omaha String Club; "Cavatina," Frank Buckingham, mandolinist; "The Hand of You," Grayce Jackson, soprano; "Beautiful Night," "Lady Meddlesome," Omaha String Club; "Collar City," Frank Buckingham, banjoist; "Love's Old Sweet Song," "Marcheta," Grayce Jackson; Intermezzo, "Cavalleria Rusticana," Omsha String Club; "Le Cygne," Mr. Tipton; "Rococo," Omaha String Club; "Hswaiian Air," Frank Buckingham, mandolinist; Intermezzo Lion du Bal, Omaha String Club; "Love's Sorrow," Grayce Jackson, soprano.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., Educational program; 5:45, Chimes; 6:30, Sandman's visit; 8:00, Musical program, Erwin Swindell, director.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Band concert, "Radio-Famous," Missouri State Prison Concert Band, Virgil W. Combs, bandmaster.

Radiophone Broadcasting Stations

Corrected Every Week—Part III

CHALLENGE SUPPORTS LIST'S CORRECTNESS

ONE DOLLAR will be paid to every Radiophan reader of Radio Digest submitting the most errors in any one station's listing in the Directory of Radiophone Stations, which appears in four parts, serially continuously, on page 18. Letters must reach Radio Digest's office not later than one week from date of issue corrected. Readers are not limited to correcting one station. Turn in corrections for as many stations as you can find—if you can find errors! Use separate sheet of paper for each station submitted and place name and address on each sheet.

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

WHK, Cleveland, O. 283 meters. 100 watts. Warren R. Cox. Daily ex Sun, 12:30-1:30 pm, music; 6-6:30, news, music. Fri, 9-11 pm. Dance program. Sun, 8-9:30 pm, concert. Eastern.

WHN, New York, N. Y. 360 meters. 100 watts. Loew's State Broadcasting Station. Daily ex Sun, 9:30-11 am, 2:15-3:15, 3:45-5:30. Mon, Wed, Sat, 7:30-12 pm. Tues, Thurs, Fri, 9:30-12:00 pm. Sun, 3-6 pm, 9:30-12 pm. Eastern.

WHT, Rogers, Mich. 300-600-706 meters. Michigan Limestone & Chem. Co.

WIAB, Rockford, Ill. 252 meters. 50 watts. Joslyn Automobile Co. Mon, Fri, 8-9 pm, music. Central.

WIAC, Galveston, Tex. 360 meters. 100 watts. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Philadelphia, Pa. 254 meters. 100 watts. Howard R. Miller.

WIAF, New Orleans, La. 234 meters, 10 watts. G. A. DeCortin. Tues, 8-9:30 pm. Sun, 10-11:30 am. Central.

WIAI, Springfield, Mo. 252 meters. 100 watts. Heer Stores Co. Daily ex Sun. 10:30-11 am, reports, news, weather. Tues, 7:30-8:45 pm. Sat, 6:30-7:30 pm, music entertainment. Central.

WIAJ, Neenah, Wisc. 224 meters. 100 watts. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 278 meters. 200 watts. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 360 meters. 100 watts. School of Engineering of Milwaukee. Slogan, "In the Land of the Sky Blue Water." Mon, Tues, Thur, Fri, 10-10:30 am, 11:30-12 m, music, news; 5-6 pm, music, news; 7-7:30, music, speeches. Central.

WIAQ, Marion, Ind. 226 meters. 10 watts. Chronicle Pub. Co. Daily ex Sun, 4:30-5 pm; Tues, Thurs, 8-9. Central.

WIAS, Burlington, Ia. 360 meters. 100 watts. Home Elec. Co. Slogan, "Burlington, On The Mississippi." Tues, 8-9 pm, concert. Thurs, 7:15-3:15 pm, concert. Central.

WIAU, Le Mars, Ia. 360 meters. 20 watts. Am. Trust & Savings Bank.

WIK, McKeesport, Pa. 234 meters, 500 watts. K & L Electric Co.

WIL, Washington, D. C. 360 meters. 10 watts. Continental Elec. Supply Co. Discontinued temporarily.

WIP, Philadelphia, Pa. 509 meters. 500 watts. Gimbel Bros. Slogan, "Watch Its Progress." Daily ex Sun, 1-2 pm, 3-4:30, 6-6:45, music; 7-7:30 pm, bedtime stories. Tues, Thurs, 8-10 pm, concert. Tues, Sat, 10:10-12 pm, concert. Sun, 4-6 pm; 9:30-12. Eastern.

WJAB, Lincoln, Nebr. 275 meters. 500 watts. Am. Elec. Co. Mon, Thurs, 8-9 pm, music, special. Central.

WJAO, Waco, Tex. 360 meters. 150 watts. Jackson's Radio Engineering Lab. Daily ex Sun, 4-4:30 pm, news, music. Mon, Fri, 8-9, concert. Sun, 11-12 am, church service. Sun, 7:30-8:30 pm. Central.

WJAF, Muncie, Ind. 360 meters. 10 watts. Muncie Press and Smith Pub. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, 2-3:30 pm, church services. Central.

WJAG, Norfolk, Nebr. 283 meters. 250 watts. Norfolk Daily News. Daily ex Sun, 12:15 pm, 5, 5:30, reports. Sun, 3:30-6 pm, music. Central.

WJAK, Greentown, Ind. 254 meters. 25 watts. Rev. Clifford L. White. Slogan, "The Radio Parson." Daily ex Sat, Sun, 6-7 pm. Thurs, 8 pm, music. Sat, 7 pm, sermonette, music. Central.

WJAM, Cedar Rapids, Ia. 268 meters. 20 watts. D. M. Perham. Slogan, "Cereal City of the World." Daily ex Sun, 10 am, 11:30, 1:30 pm, markets, reports. Tues, Wed, Fri, 7:15 pm, music. Sun, 2:45 pm, music. Central.

WJAN, Peoria, Ill. 280 meters. 100 watts. Peoria Star. Slogan, "The Grandview City of Illinois." Daily ex Sun, 9 am, 9:15, 11:30, 1:30 pm, markets, weather agriograms. Tues, Thurs, 9:15-10:45 pm, concert. Sun, 11:30 am, 7:45 pm, church services. Central.

WJAQ, Topeka, Kan. 360 meters. 100 watts. Capper Publications. Schedule not regular. Central.

WJAR, Providence, R. I. 360 meters. 500 watts. The Outlet Co. Slogan, "The Gateway of Southern New England." Daily ex Sun, 10-11 am. Housewives' talk, music. 1:05-2:15 pm, weather, reports, music; 7, weather. Tues, Wed, Fri, 7-8 pm, music. Wed, 10:30-12 midnight, dance. Fri, 8:15 pm, concert. Sun, 7:20-10:20 pm, concert. Eastern.

WJAS, Pittsburgh, Pa. 360 meters. 500 watts. Pittsburgh Radio Supply House. Daily ex Sun, 11:30-12 m, 2:30-3 pm, Mon, Wed, Fri, 7:45-9 pm. Eastern.

WJAT, Marshall, Mo. 360 meters. 10 watts. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:15-5:45 pm, concert. Central.

WJAX, Cleveland, O. 390 meters. 500 watts. Union Trust Co. Slogan, "The Wave From Lake Erie." Daily ex Sat pm and Sun, 9-9:45 am, 10-10:45 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7:30-9:30 pm; Thurs, 8-10:30 pm, entertainment. Eastern.

WJAZ, Chicago, Ill. 448 meters. 1,000 watts. Zenith-Edgewater Beach (Chicago Radio Lab.) Daily ex Sun and Mon, 10 pm-2 am, music, entertainment. Sun, 6-9 pm, concert. Central.

WJD, Granville, O. 229 meters. 50 watts. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Central.

WJH, Washington, D. C. 273 meters. 100 watts. Wm. P. Boyer Co. Daily ex Sun, 3, 4 pm, markets, reports, music. Sun, 8 pm, church services. Eastern.

WJX, New York, N. Y. 360 meters. 500 watts. De Forest Radio Telephone & Telegraph Co.

WJY, New York City. 405 meters. 500 watts. R. C. A. Daily ex Sun, 4-6 pm, entertainment. Tues, Thurs, Fri, 7:30-11:30 pm, concert. Sun, 2:30-5 pm, 6-6:30. Eastern.

WJZ, New York City. 455 meters. 500 watts. R. C. A. Daily ex Sun, 3-6 pm, entertainment; 7-11:30 pm, special program. Sun, 11:00 am-1 pm, church service; 7-10:30 pm. Eastern.

WKAA, Cedar Rapids, Ia. 268 meters. 100 watts. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thurs, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAD, East Providence, R. I. 240 meters. 10 watts. Charles Looff.

WKAF, Wichita Falls, Tex. 360 meters. 100 watts. W. S. Radio Supply Co.

WKAN, Montgomery, Ala. 226 meters. 20 watts. United Battery Service Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Cranston, R. I. 360 meters. 200 watts. Dutee Wilcox Flint.

WKAQ, San Juan, Porto Rico. 360 meters. 500 watts. Radio Corp. of Porto Rico. Slogan, "The Island of Enchantment, Where the World's Best Coffee Grows." Tues, Fri, 9-10:30 pm, Wed, 8-9, entertainment. Intercolonial.

WKAR, East Lansing, Mich. 280 meters. 250 watts. Mich. Agri. College. Evening programs.

WKAV, Laconia, N. H. 254 meters. 50 watts. Laconia Radio Club.

WKAW, Beloit, Wis. 242 meters. 10 watts. Turner Cycle Co. Daily 12-12:15 pm. 7-7:30, concert. Central.

WKAY, Gainesville, Ga. 280 meters. 20 watts. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.

WKY, Oklahoma City, Okla. 360 meters. 100 watts. WKY Radio Shop. Daily 9 pm, weather. Mon, Wed, Fri, 9-10:30 pm, coucert. Central.

WLAG, Minneapolis and St. Paul, Minn. 417 meters. 500 watts. Cutting & Wash. Radio Corp. Slogan, "The Twin City Station of Ten Thousand Lakes." Clubs, "Tooth Brush," "Postcard." Daily ex Sun, 9:30am, 9:40, 10, 10:30, 10:45, 11:35, 2 pm, 2:30, 2:35, 4, 4:30, 5, 5:30, 6, 7:30, 9:15, lectures, music; 5:30-6 pm, children'a program; 9:30, music. Wed, Sat, 11-12:30 am, music. Sun, 10:30 am, 3:30 pm, 7:45, church services. Central.

WLAH, Syracuse, N. Y. 234 meters. 100 watts. Samuel Woodworth. No regular schedule.

WLAJ, Waco, Tex. 360 meters. 50 watts. Waco Elec. Supply Co. Daily ex Snn, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service. Central.

WLAK, Bellows Falls, Vt. 360 meters. 100 watts. Vermont Farm Machine Co.

WLAL, Tulsa, Okla. 360 meters. 100 watts. Naylor Elec. Co. Sun, 7:30 pm, church services. Central.

WLAN, Houlton, Me. 283 meters. 100 watts. Putnam Hdwe. Co.

WLAP, Louisville, Ky. 360 meters. 15 watts. W. V. Jordon.

WLAQ, Kalamazoo, Mich. 283 meters. 20 watts. Arthur E. Schilling. Daily ex Sun, 11:30-12:30 pm. Thurs, 10:30-12:30 pm. Sun, 2:30-5 pm. Central.

WLAV, Pensacola, Fla. 254 meters. 15 watts. Elec. Shop, Inc. Daily Mon, Tues, Fri, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. 360 meters, 500 watts. New York Police Dept.

WLAX, Greencastle, Ind. 231 meters. 10 watts. Greencastle Community Broadcasting Station. (Putnam Elec. Co.). Tues, 7:30 pm; Thurs, 7:30. Sun, 7:45 pm, church services. Central.

WLB, Minneapolis, Minn. 360 meters. 5 watts. U. of Minn. Dept. of Elec. Eng.

WLW, Cincinnati, O. 309 meters. 500 watts. Crosley Mfg. Co. Slogan, "WLW, In the Queen City of the West." Daily ex Sun. 10:30 am, 1:30 pm; daily ex Sat, Sun, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music. Sun, 9:30 am, S. S. services; 11, church services. Central.

WMAC, Cazenovia, N. Y. 261 meters. 100 watts. C. B. Meredith. No definite schedule.

WMAF, Dartmouth, Mass. 360 meters. 500 watts. Round Hills Radio Corp. Slogan, "The Voice from 'Way Down East." Temporarily discontinued.

WMAH, Lincoln, Neb. 254 meters. 100 watts. General Supply Co. Club, "Lincoln Hoot Owls." Mon, Fri, 9-10:30 pm, orchestra. Sun, 10:30-12 m; 7:30-9 pm, church services. Central.

WMAJ, Kansas City, Mo. 275 meters. 250 watts. Kansas City Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Sat, 8-9 pm, music. Central.

WMAK, Lockport, N. Y. 360 meters. 500 watts. Norton Labs. Daily ex Sun, 11 am, weather, farm reports. Tues, 8-9 pm, music. Eastern.

WMAL, Trenton, N. J. 256 meters. 50 watts. Trenton Hdwe. Co. Slogan, "The Home of Good Music." Mon, Thurs, 7:30-9 pm, music, lecture. Eastern.

WMAN, Columbus, O. 286 meters. 100 watts. First Baptist Church. Sun, 10:30-12 m, 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 246 meters. 50 watts. Utility Battery Service Co. Irregular schcdulc. Eastern.

WMAQ, Chicago, Ill. 448 meters. 500 watts. The Chicago Daily News. Daily ex Sun, Mon, 7-8 pm, 9:15-10. Daily ex Sat, Sun, 4:30-5 pm. Wed, 1-2 pm, Assn. of Commerce Luncheon. Central.

WMAV, Auburn, Ala. 250 meters. 250 watts. Ala. Polytechnic Institute. Tues, Thurs, Sat, 8 pm, music.

WMAY, St. Louis, Mo. 280 meters. 100 watts. Kingshighway Presbyterian Church. Slogan, "May Every By-Way Hear Kingshighway." Sun, 11 am, 8 pm, Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 268 meters. 50 watts. Mercer University.

WMC, Memphis, Tenn. 500 meters. 500 watts. The Commercial Appeal. Slogan, "Station WMC, Memphis. "Down in Dixie." Club, "Midnight Frolic." Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets. Daily ex Sun, Wed, 8:30 pm, program. Tues, Fri, 11 pm. Midnight frolic. Central.

WMU, Washington, D. C. 261 meters. 100 watts. Doubleday-Hill Elec. Co. Daily, 4:30-5:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

WNAC, Boston, Mass. 278 meters. 100 watts. Shepard Stores. Daily ex Sun, 1-2 pm, 4-5, 8-10. Mon, Wed, Fri, 6-8 pm. Sun, 11-12 m, church services; 3-4 pm, concert; 7:30-9:30, church and concert. Eastern.

WNAD, Norman, Okla. 360 meters. Univ. of Okla. Daily ex Sat, Sun, 10-10:30, news. Mon, Wed, Sun, 9-10 pm, program. Central.

WNAL, Omaha, Nebr. 242 meters, 100 watts. R. J. Rockwell. Temporarily off air.

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

WNAP, Springfield, O. 231 meters. 100 watts. Wittenberg College. No regular hours.

WNAQ, Charleston, S. C. 360 meters. 10 watts. Charleston Radio Elec. Co.

WNAR, Butler, Mo. 231 meters. 20 watts. C. C. Rhodes. Fri, 7:30 pm; Sun, 11 am, 7:30 pm. Central.

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

WNAT, Philadelphia, Pa. 360 meters. 100 watts. Lennig Bros. Co. Irregular schedule. Eastern.

WNAV, Knoxville, Tenn. 236 meters. 500 watts. People's Tel & Telg Co. Temporarily discontinued.

WNAW, Fortress Monroe, Va. 360 meters. 5 watts. Henry Kunzmann. Sun, 2-4 pm, 7-9. Eastern.

WNAX, Yankton, S. D. 244 meters. 100 watts. Dakota Radio Apparatus Co. Daily, 11:30 am, reports; 4:30 pm, reports, music. Wed, Sat, 9-10 pm, music. Central.

WNJ, Albany, N. Y. 360 meters. 55 watts. Shotton Radio Mfg. Co., Inc. Wed, 8:15 pm, concert. Eastern.

WOAC, Lima, O. 266 meters. 50 watts. Maus Radio Co.

WOAO, Sigourney, Ia. 360 meters. 10 watts. Friday Battery & Elec. Corp. Friday evening program.

WOAE, Fremont, Nebr. 360 meters. 20. watts. Medland College.

WOAF, Tylor, Tex. 360 meters. 10 watts. The Tyler Commercial College. Daily ex Sat & Sun. 12 m, weather, markets; 8 pm, weather, sports, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. 224 meters. 200 watts. Apollo Theater. Fri, 5:30-6:30 pm.

WOAH, Charleston, S. C. 360 meters. 100 watts. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 385 meters. 500 watts. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 6:15, news, markets. Tues, 9:30-10:30 pm, concert, Thurs, 7:30-8:30 pm, concert. Sun, 11 am, church services; 9:30-10:30 pm, concert. Central.

WOAJ, Parsons, Kans. 360 meters. 15 watts. C. E. Ervin. Slogan, "Queen City of the Plains." Temporarily discontinued.

WOAL, Webster Groves, Mo. 286 meters. 100 watts. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 360 meters. 150 watts. James D. Vaughan. Irregular schedule.

WOAO, Mishawaka, Ind. 360 meters. 50 watts. Loradion Mfg. Co. Daily, 12:15-12:45 pm, music; 5:30-6:15, police reports, news. Tues, Thurs, 6:30-8 pm, program. Fri, 9:30-12:30 am, "Rumhounds Hunt Club." Sun, 10:45-12 m, church services. Central.

WOAP, Kalamazoo, Mich. 240 meters. 50 watts. Kalamazoo College. Mon, Wed, Fri, 6:30-7:00 pm. Central.

WOAR, Kenosha, Wis. 229 meters. 50 watts. H. P. Lundskow. Wed, 7 pm. Sun, 6 pm. Central.

WOAT, Wilmington, Del. 360 meters. 50 watts. Boyd Martell Hamp. Temporarily discontinued.

WOAV, Erie, Pa. 242 meters. 100 watts. Penna. Nat'l Guard. Tues, 8:30-10 pm, music. Sun, 7:45 pm, church services. Eastern.

WOAW, Omaha, Neb. 526 meters. 500 watts. Woodmen of the World. Slogan, "Gateway to the West and to the East." Mon, Tues, Thurs, Sat, 6-7:30 pm, 9-11, concert. Fri, 6:30-8 pm, 9-11. Sun, 9-11 am, 9-11 pm, church services. Central.

WOAX, Trenton, N. J. 240 meters. 500 watts. F. J. Wolff. Intermittent schedule.

WOC, Davenport, Ia. 484 meters. 500 watts. Palmer School of Chiropractic. Slogan, "Where the West Begins and in the State Where the Tall Corn Grows." Daily ex Sun, Tues night, 10 am, markets; 10:55, time; 11, weather; 12 m, chimes; 2 pm, markets; (Sat, 12:30), 3:30, talk; 5:45, chimes, ex Wed, 6:30, Sandman, 6:50, scores, weather. Wed, 10 pm, concert. Sat, 9 pm, concert. Mon, Wed, Thurs, Fri, 8 pm, music. Sun, 9 am, chimes; 1:30 pm, orchestra; 7, organ; 7:30, sports; 8, church services; 9, concert. Tues, silent. Central.

WOI, Ames, Ia. 360 meters. 100 watts. Iowa State College. Daily ex Sun, 9 am, 9:45, 10:15, market, weather, reports; 12:45 pm, markets, weather, educational talks; 9:30, weather, music. Central.

WOO, Philadelphia, Pa. 509 meters. 500 watts. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 11:55, time; 12-1 pm, concert; 4:45 pm, organ recital; 5, sports, police reports; 9:55, time; 10:02, weather. Mon, Wed, Fri, 7:30-11 pm, music, concert. Eastern.

WOQ, Kansas City, Mo. 360 meters. 500 watts. Western Radio Co. Daily ex Sun, 9:50 am, markets; 10:30-11, music, time signals; 11:50 am-12:30 pm, markets; 2:45-3:15, music; 7-7:20 market. Mon, Wed, Fri, 7:30-8, music. Tues, Thurs, Sat, 8-9:30, music. Sun, 11 am-12:15 pm, 7-7:45, church services. Central.

WOR, Newark, N. J. 405 meters. 500 watts. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks, Mon, Wed, Sat, 8-11 pm, music, entertainment, lectures. Eastern.

WOS, Jefferson City, Mo. 441 meters. 500 watts. Missouri State Marketing Bureau. Slogan, "Watch Our State." Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, Sun, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Sun, 7:30-8:30 pm. Central.

WPAB, State Collego, Pa. 283 meters. 500 watts. Pa. State College. Mon, Wed, Fri, 8-9:30 pm. Eastern.

WPAC, Okmulgee, Okla. 360 meters. 200 watts. Doualdson Radio Co.

WPAH, Waupaca, Wis. 360 meters. 650 watts. Wisconsin Dept. of Markets. Daily ex Sun, 9:30 am, 10:30, 11:30, 12:30 pm, 2:30, 4:30, markets, weather, news, etc. Mon, 8-11 pm, music. Central.

WPAJ, New Haven, Conn. 268 meters. 30 watts. Doolittle Radio Corp.

WPAK, Fargo, N. Dak. 360 meters. 250 watts. North Dakota Agricultural College. Daily, 10 am, weather. Mon, Wed, Fri, 7:30-8:15 pm, music, lecture, address. Central.

WPAL, Columbus, O. 286 meters. 100 watts. Avery & Loeb Elec. Co.

WPAM, Topeka, Kans. 360 meters. 100 watts. Auerbach & Guettel. Daily ex Sun, 1 pm, markets; Wed, 9:30-10:30 pm; Sat, 8-9 pm, music. Central.

WPAQ, Frostburg, Md. 360 meters. 10 watts. General Sales & Engineering Co.

WPAT, El Paso, Tex. 360 meters. 20 watts. Saint Patrick's Cathedral. Temporarily discontinued.

WPAU, Moorhead, Minn. 360 meters. 20 watts. Concordia College.

WPAZ, Charleston, W. Va. 273 meters. 20 watts. Dr. John R. Koch. Mon, Wed, Fri, 7-8 pm. Sun, 3-4:15 pm. Eastern.

WPG, New Lebanon, O. 234 meters. 30 watts. Nushawg Poultry Farm. Slogan, "The Pulse of Miami Valley." Daily ex Sun, 12-12:15, news; 6-6:30 pm, markets. Mon, Fri, 8-9:45 pm, music, farm program. Central.

WQAA, Parkesbnrg, Pa. 360 meters. 500 watts. Horace A. Beale, Jr. Temporarily discontinued.

WQAC, Amarillo, Tex. 360-268-200 meters, 200 watts. E. B. Gish. Irregular schedule.

WQAD, Waterbury, Conn. 242 meters. 50 watts. The Whitall Elec. Co. Mon, Wed, Fri, 5:30-6:45 pm, music, Boy Scout news. Eastern.

WQAE, Springfield, Vt. 275 meters. 50 watts. Moore Radio News Station. Slogan, "Among the Green Hills of Vermont." Daily, 7-7:30 pm. Sun, 2:30-4:30 pm. Eastern.

WQAF, Sandusky, O. 240 meters. 5 watts. Sandusky Register.

WQAH, Lexington, Ky. 254 meters. 10 watts. Brock-Anderson Elect. Eng. Co.

WQAL, Mattoon, Ill. 258 meters. 20 watts. Coles County Tel. & Telg. Co. Slogan, "The Buckle on the Corn Belt." Wed, Sat, 9-10 pm, music, lecture; Sun afternoon, special program. Central.

WQAM, Miami, Fla. 360 meters. 100 watts. Electrical Equip Co. Slogan, "It is Always June in Miami." Daily ex Sun, 12-12:30 pm; 3-4:30, 7:30. Sun, 10-11 pm. Eastern.

WQAN, Scranton, Pa. 280 meters. 100 watts. Scranton Times. Slogan, "The Voice of the Anthracite." Daily ex Sun, 12:30-1 pm, 4-4:30, 7:30-8, news, reports, music. Tues, Fri, 8 pm, entertainment. Eastern.

WQAO, New York City, N. Y. 360 meters. 100 watts. Calvary Baptist Church. Sun, 10:30 am, 7:45 pm, church services. Eastern.

WQAQ, Abilene, Tex. 360 meters. 100 watts. West Texas Radio Co.-Abilene Daily Reporter. Slogan, "The Capital of West Texas." Tues, Thurs, Fri, 8-9 pm. Sun, am, pm, church services. Central.

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

WQAV, Greenville, S. C. 258 meters. 15 watts. Huntington & Guerry, Inc. Slogan, "The Textile Center of the South." Tues, Thurs, 7:30-8:30 pm, music. Sat, 7:30-8 pm, music. Eastern.

WQAW, Washington, D. C. 236 meters. 5 watts. Dept. of Elec. Eng., Catholic University of America.

WQAX, Peoria, Ill. 360 meters. 100 watts. Radio Equipment Co. Mon, Wed, Fri, 7:15-8 pm. Central.

WRAA, Houston, Tex. 360 meters. 200 watts. Rice Institute. Mon, 8-9 pm, concert, college activities. Sun, 4:30 pm, extension lecturers. All games broadcast. Central.

WRAD, Marion, Kan. 248 meters. 10 watts. Marion Radio Shop. Daily, 12-12:45 pm, 5:15-5:45, markets, weather. Mon, Thurs, 8 pm, concert. Sun, 5-6 pm. Central.

WRAF, La Porte, Ind. 224 meters. 20 watts. Radio Club, Inc. Wed, Thurs, 8 pm, talks, music. Sun, 2 pm, religious and musical program. Central.

WRAH, Providence, R. I. 231 meters. 10 watts. Stanley N. Read.

WRAL, St. Croix Falls, Wis. 248 meters. 130 watts. Northern State Power Co. Slogan, "The Dalles of the St. Croix Club, Royal Order of Interstate Knob Twisters." Wed, 10-11:30 pm, concert. Central.

WRAM, Galesburg, Ill. 241 meters. 250 watts. Lombard College.

WRAN, Waterloo, Iowa. 236 meters. 10 watts. Black-Hawk Elec. Co. Slogan, "We Radiate all news." Temporarily off the air.

WRAO, St. Louis, Mo. 360 meters. 20 watts. St. Louis Radio Service Co. Daily ex Sun, 4:15-5 pm, music, sports. Sun, 3:30-5 pm, music, sports. Central.

WRAV, Yellow Springs, O. 360 meters. 100 watts. Antioch College. Irregular schedule.

WRAW, Reading, Pa. 238 meters. 40 watts. Avenue Radio Shop. Thurs, 10 pm. Eastern.

WRAX, Gloucester City, N. J. 268 meters. 100 watts. Flexon's Garage. Mon, Wed, Fri evenings, program.

WRAY, Scranton, Pa. 280 meters. 100 watts. Radio Sales Corp. Mon, Wed, Sat, Sun, 8:30-10 pm, concert. Eastern.

WRAZ, Newark, N. J. 233 meters. 100 watts. Radio Shop of Newark. Irregular.

WRC, Washington, D. C. 469 meters. 500 watts. Radio Corp'n of America. Daily ex Sun, 10 am, reports; 5:15 pm, code practice; 6 pm, children's hour. Mon, Wed, Fri, 8-10 pm, music. Tues, Thurs, Sat, 3-4 pm, music. Eastern.

WRK, Hamilton, O. 360 meters. 50 watts. Doron Bros. Elec. Co. Slogan, "The Oldest Station in Existence." Fri, 8:15 pm, music, lecture. Sun, 2:15 pm, music. Central.

WRL, Schenectady, N. Y. 360 meters. 500 watts. Union College Radio Club. Irregular schedule.

WRM, Urbana, Ill. 360 meters. 500 watts. Univ. of Ill. Tues, 7-8 pm, music. Tues, Thurs, 8:30-9:30 pm, Univ. news, talks, music. Irregular schedule of University events. Central.

WRR, Dallas, Texas. 360 meters. 20 watts. City of Dallas. Daily ex Sun, 11:30-12:30 pm, weather; 2:45-3:30, sports, markets, news; music. Sun, 11 am, 7:30, church service. Central.

WRW, Tarrytown, N. Y. 273 meters. 150 watts. Tarrytown Radio Research Laboratory. Slogan, "Everything in Radio." Mon, Wed, Fri, 7:30-11:30 pm, music, lectures, entertainment. Sun, 8-9 pm, church services. Eastern.

WSAB, Cape Girardeau, Mo. 360 meters. 100 watts. Southeast Mo. State Teachers College. Mon, Wed, 3:30 pm, lecture, 9, concerts. Central.

WSAC, Clemson College, S. C. 360 meters. 500 watts. Clemson Agri. College. Mon, Wed, Fri, 7 pm. Eastern.

WSAO, Providence, R. I. 261 meters. 500 watts. Fosters-Jewelers. Daily, 2:30-4 pm. Tues, Thurs, Fri, Sat, 6-7 pm. Wed, 8:15 pm, music, entertainment. Sun, 2-3:30 pm. Eastern.

WSAG, St. Petersburg, Fla. 244 meters. 10 watts. Loran V. Davis, George Prestman, Sr.

WSAH, Chicago, Ill. 243 meters. 500 watts. A. G. Leonard, Jr. Daily ex Sun, 5:30-6:30 pm. Fri, 8:45-10. Central.

WSAI, Cincinnati, O. 309 meters. 500 watts. United States Playing Card Co. Tues, Thurs, 8-10 pm. Sat, 10-12 pm. Central.

WSAJ, Grove City, Pa. 360 meters. 250 watts. Grove City College. College activities. No definite schedule.

WSAL, Brookville, Ind. 246 meters. 10 watts. Franklin Elec. Co.

WSAN, Allentown, Pa. 229 meters. 10 watts. Allentown Radio Club.

WSAR, Fall River, Mass. 254 meters. 10 watts. Doughty & Welch Elect. Co. Daily ex Sun, 12-1 pm. Tues, Thurs, Sat, 7:15-8:15 pm. Eastern.

WSAT, Plainview, Tex. 268 meters. Donohoo-Ware Hardware Co.

WSAW, Canandaigua, N. Y. 275 meters. John J. Long, Jr.

WSAY, Port Chester, N. Y. 233 meters. 100 watts. Irving Austin, Chamber of Commerce.

WSAZ, Pomeroy, Ohio. 258 meters. 50 watts. Chase Elec. Shop.

WSB, Atlanta, Ga. 429 meters. 500 watts. Atlanta Journal. Slogan, "The Voice of the South." Daily ex Sun, 12-1 pm, music, weather; 2:30, reports; 4-4:30, music; 5-6, news, sports; 8-9, concert (ex Wed); 10:45-12, concert. Sun, 10:54-12:15 pm, 5-6, 7:30-9:15, church services. Central.

WSL, Utica, N. Y. 273 meters. 100 watts. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 5-6 pm, music, news. Mon, Wed, Sat, 8-9 pm. Sun, 10:30-12 m, 7:30-9 pm. Church services. Eastern.

WSY, Birmingham, Ala. 360 meters. 500 watts. Loveman, Joseph & Loeb. Tues, Fri, 8 pm, music. Sun, 11 am, 8 pm, church services. Central.

WTAB, Fall River, Mass. 248 meters. 10 watts. Fall River Daily Herald. Daily ex Sun, 7-8 pm. Eastern.

WTAC, Johnstown, Pa. 360 meters. 150 watts. Penn Traffic Co. Daily ex Sun, 4 pm. Sun, Thurs, 7:30 pm. Eastern.

WTAF, New Orleans, La. 268 meters. 10 watts. Louis J. Gallo. Daily, 6:45-7 pm, police reports. Tues, Sat, 8-9:30 pm, music.

WTAG, Providence, R. I. 258 meters. 10 watts. Kern Music Co.

WTAJ, Portland, Me. 236 meters. 20 watts. The Radio Shop. Wed, Sun, 7:45 pm. Eastern.

WTAL, Toledo, Ohio. 252 meters. 10 watts. Toledo Radio & Elec. Co. Tues, Thurs, 8:45 pm. Sat, 8 pm. Sun, 7:30 pm. Eastern.

WTAM, Cleveland, Ohio. 390 meters. 1,000 watts. Willard Storage Battery Co. Slogan, "The Voice from the Storage Battery." Wed, 8-10:30 pm, concert. Sat, 9-11 pm, dance music. Eastern.

WTAN, Mattoon, Ill. 240 meters. 100 watts. Ornderff Radio Shop.

WTAP, Cambridge, Ill. 242 meters. 100 watts. Cambridge Radio & Elec. Co. Daily, 12:15-1:15 pm, 9:30-10:15. Central.

WTAQ, Osseo, Wis. 226 meters. 100 watts. S. H. Van Gorden & Son.

WTAR, Norfolk, Va. 280 meters. 50 watts. Reliance Electric Co. Mon, Fri, 8 pm. Eastern.

WTAS, Elgin, Ill. 286 meters. 500 watts. Chas. E. Erbstein. Daily ex Sun, 8 pm, music. Sun, 2-5 pm, music. Central.

WTAT, Boston, Mass. 246 meters. 100 watts. Edison Elec. Illuminating Co. (Portable Station).

WTAU, Tecumseh, Neb. 360 meters. 10 watts. Buegr Battery & Elec. Co. Tues, 8:30 pm. Central.

WTAW, College Station, Tex. 280 meters. 50 watts. Agricultural and Mechanical College of Tex. Wed, Fri, 8-8:30 pm, music, talks. Sun, 11 am, church services. Central.

WTAX, Streator, Ill. 231 meters. 50 watts. Williams Hardware Co. Mon, 9-10 pm. Thurs, 10-12 midnight. Central.

WTAY, Oak Park, Ill. 226 meters. 500 watts. Oak Leaves.

WTAZ, Lambertville, N. J. 283 meters. 15 watts. Thomas J. McGuire.

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

WWAB, Trenton, N. J. 226 meters. 10 watts. Hoenig, Swern & Co. Wed, 7:30-10:30 pm. Eastern.

WWAC, Waco, Tex. 360 meters. 100 watts. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.

WWAO, Philadelphia, Pa. 360 meters. 100 watts. Wright & Wright, Inc.

WWAE, Joliet, Ill. 227 meters. 500 watts. Alamo Dance Hall. L. J. Crowley. Wed, Sat, Sun, 8:30-12 midnight, orchestra. Central.

WWAF, Camden, N. J. 236 meters. 100 watts. Galvin Radio Supply Co.

WWAO, Houghton, Mich. 244 meters. 250 watts. Michigan College of Mines.

WWI, Dearborn, Mich. 273 meters. 50 watts. Ford Motor Co. Wed, 8-10 pm, music, lectures. Eastern.

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

Further Details of the Famous Miloplex Hook-Up

Part XVII—In Which He Press-Agents His Own Picture

By the Mystery Man

GRACIOUS Queen, the King is without. Without what? retorted Her Highness, holding in her neither hand her bent rolling pin. Without power to lay at thy feet in person the 3,201 postals and letters from his friends, each addressed in pleading terms to only yourself.

Gadzooks! Make haste to his assistance, and announce to the populace my edict, "The King lives—and eats." Why? Well, 500 was enough to soften the heart but when over 3,000 of you answered my call for help what else could she do but condescend—I say condescend because in the news as 'twas told to me she bit off a mouthful of sob stuff and with gobs of saline tears coughed up the information that after all "I beat no man" at all, and I, throwing my arms around her (or was it quarter-way) said, "Listen, Sweetie, I'll save you all my foreign postage stamps and soap coupons for them kind words." So, oh, boy, oh, joy! send on your 'lassus', Mr. Bush!

Then tripping along to the picture man went I—he took, top, side and rear bumper views of "Meaziz". The proofs came back New Year's and were so beautiful the artist said he would have to cut all but the head off or they might think I was a Follies pony ballet chick, but (that's certainly some word) Maggie's picture showed her halfway out of the sidelines, while Howler was clear out except the part that goes over the fence last. Back again to the photog, but nothing doing—you know he claimed he wasn't equipped to take airplane or panorama views—Mercy! Well, my pen and ink artist saved the day; the picture is most ready; the printer is hiring a new non-union night shift, so sit tight, O. M., it's coming and I hope all of you who receive it will recognize "Meaziz."

You know, it's a mighty dangerous business, this broadcasting one's photo. Some fair damsel might slap her lamps on it and, exclaiming "Heaven Eyes," start sending me menus that would wean me away from my adorable Maggie. I know one that's near (or is it nehr) enough, and, confidentially, Maggie has invited her over to a poison party—pie contest, I presume; and now that this gush of innocence is over, listen!

There won't be no loop circuit with my picture. The truth is the first 500 were so anxious to get it I decided to play a joke on you and publish it unannounced.

It ran in my article on January 5 and is the little fellow that goes with the log published the week before. Atta baby! you've got it—go to it. But notice, where it says loop or honeycomb coil, a fellow named Pullwitt conceived the idea. Then he had to go and show it to my dog Howler and I stuck my nose in it, and out of the whole mess Tripp, away up in Canada, told you what it did or done.

You know, I receive many—too many—letters telling me they have shielded their panels perfectly. Well, man, don't tell me about it; tear the shield out and ten times out of nine your set will work better. Perhaps a small patch in one or two places would help (yes, not much bigger than a small-sized pancake); keep your head, man; rotor plates on variable condensers always to ground, ticklers where you're using—Oh, yes, I know, get this; for a long time I have wanted to spout about tickler coils, not that I would ever use one for inductive feedback as many do; but, listen, I do on some circuits—primarily to save you money. A variometer in the plate circuit is a much better trick, but, anyway, paste this over your workbench or jab it in your Jimmy pipe and inhale it—read very carefully:

The better your secondary, the less tickler you need. A stingy secondary demands a whale of a tickler.

There, that's settled. What next? And what next is the more important. This is what's next; read twice as carefully:

The tickler should be at the low potential or minus filament end of your secondary.

Well, I never knew that—you now know why I don't go to bed at 7:30.

But—why? What's the big idea? Well, listen, my children, and I shall tell the A class while the B class listens. Listen: If you place it at the low voltage or filament end of the secondary, it won't effect your tuning but very, very little. And you don't find that in books.

I have been reading much lately relative to what the authors call aperiodic or untuned primaries, and every time I read the word, Maggie has to fill the ice bag, I get so warm. Maybe they are aperiodic, but I'd rather call them "spasmodic" and if they hain't tuned—well, they just hain't you know. The fundamental wave length of your antenna and that of your primary must be reconciled or you might as well not stay for the last act. Oh, yes, it will work. Yes, and you can get by with the prickly heat if you only have one arm. but if you must have a spasmodic primary, at least place a small variable condenser in it some place; make it think you're going to tune it anyway. You can't kid an antenna very much at best.

All of the circuits I have given you so far, with one exception, have been designed with the one idea of "conservation of energy." A small kick on the grid was taken in charge and caused to step out and work without losing 67 percent doing so. As I keep the camp-fires burning, something in Radio frequency work will be offered. Nothing very radical, but I shall try and give them to you fundamentally good, even if I have to pick on a few wild Radio frequency transformers and tell you what makes them so "wild."

The mere fact that regeneration got a good start, doesn't mean anything to me other than less work. I like Radio frequency just as well—may be better. This I know—and I also believe some of my Radio frequency circuits (which need air) will be released shortly. And when I do let go of it, I'll put in it a simplified reflex trick you will like.

One can do much when he is sure of eating—more when 3,000 of you say, "keep it up."

Oh, mercy yes, I won't forget tuned impedance. Why neglect so simple a baby? You know the editor told me I could have an inch and a half more space. I'm going to make it two and one-half; what's an inch among friends? Then I'll dare the man that runs the h— box to throw it out—you know what I mean.

Notice that I'm saying nothing about the late circuits—just sort of laying low to see how you fellows like them. You know it is possible to throw a rose at a maiden fair and have it tossed back smelling like garlic; I tossed you a couple of roses and am this week waiting for the rebound.

You know, I get sort of nervous like when I read about the Dyne family—Super, Auto, Radio, Hetero and their relatives. The Dynes may come and the Dynes may go, but, methinks, some of the old standards are more fun; they will step out if you learn how to drive them. And now that peace and contentment may reign supreme in this my eating house for 1924, I hail, "God save the King—the Queen can take care of herself."

There's no such word as "phail." Let's eat.

(TO BE CONTINUED.)

UV-201-A

Radiotron UV-201-A is a high-power vacuum tube which, while suitable for a detector, is intended primarily to be used as an amplifier, at either radio or audio frequency.

It is famous for volume, for clearness and for economy of service—drawing but .25 ampere.

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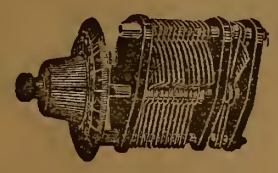

CONDENSERS

3 Plate Variable; value, $1.75	$1.05
11 Plate Variable; value, $2.50	1.20
13 Plate Variable; value $2.50	1.20
17 Plate Variable; value, $3.50	1.95
23 Plate Variable; value, $3.50	1.35
43 Plate Variable; value, $4.50	1.95
13 Plate VERNIER; value, $5.50	$3.75
23 Plate VERNIER; value, $6.00	4.00
43 Plate VERNIER; value, $6.50	4.25

BEST QUALITY JACKS, Single Circuit; value, 65c; special at $ .30
Double Circuit; value, 90c; special at .45

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Practical Circuits at Bargain Prices!

REINARTZ CIRCUIT EVERY PART COMPLETE

1 Reinartz wound coil, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD. variable condenser, 1 13-plate .00025 MFD. variable condenser, 3 inductance switches, 23 switch points and nuts, 6 switch atops and nuts, 8 binding posts, 2 3" dials, 1 variable grid leak, 1 .002 MFD. phone condenser, 23 feet bus bar wire, 1 high-grade panel ALREADY DRILLED AS PER DIAGRAM and complete instructions $10.95

Two-Stage Audio Frequency Amplifier—Parts complete in every detail for this Circuit—$11.00
Specify type of tubes you intend using

FLEWELLING CIRCUIT

EVERY PART COMPLETE

2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .0005 MFD. variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 3" dial and 1 high-grade panel ALREADY DRILLED as per Diagram in Booklet of instruction sent free $11.95

Two-Stage Audio Frequency Amplifier—Parts complete in every detail for this Circuit—$11.00
Specify type of tubes you intend using

Every article advertised above is guaranteed by the manufacturer and by us—Mail orders filled immediately—transportation PREPAID on all orders of $5.00 or over east of the Mississippi River. Send cash, check or money order—absolutely no goods sent C. O. D.

PERFECTION

MAKE PERFECTION YOUR SELECTION

GOLD SEAL HOMCHARGER

New type—the world's most popular Charger

List $18.50

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4.00	Frost, 2000 Ohms	3.50
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LIST		OUR PRICE
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The Neutrodyne Circuit is the last word in Radio and is the best set made today. Works without aerial or ground. Will receive any American station.

1 Formica Panel 7x24
5 Bakelite Sockets
3 Neutroformers
2 Neutrodons
2 Franco Audio Transformers
1 "A" Battery Switch
3 Dials, 4-inch
1 Amsco Rheostat
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8 Binding Posts with Names
3 Jacks, 12 ft. Spaghetti
22 ft. No. 14 Gold Plated Wire
1 Condenser, .006 Dubilier
1 Grid Leak and Condenser, Freshman
1 Dubilier Condenser, .002

Special price for complete licensed parts for 5-tube Neutrodyne set. $32.50

PERFECTION RADIO CORP., 22-26 Murray St., N. Y. City

Radio Digest Illustrated

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Distance of Transmission

At Times Small Stations Outreach the Larger Ones

ONE of the fascinations of Radio is the reception of distant stations. The uncertainty of the range of Radio transmitting and the freakish manner in which small stations will outreach the more powerful transmitters, keeps everyone guessing.

The rauge of a broadcasting station is dependent on a large number of factors. It is impossible to predict from one evening to another what is likely to happen. Some of the conditions limiting the range of a station are coustant and others are extremely variable.

Hills, tall buildings and other natural barriers all shield a locality. A New York station moved its apparatus from the eastern to a western part of the city. The station is now heard with difficulty iu some eastern localities, although in that part of the country west of the Hudson River the station comes in loudly.

The Chicago broadcasting stations are heard in New England more successfully than stations closer to that part of the country. Why? The difference cannot be attributed to greater power or to better efficiency, because in some cases, the weaker and the inefficient transmitters are heard the greater distances. Radio has not yet reached its climax. Some things must be learned before we can tell just the why of this.

Concentration Essential in Radio

Visualize the Artist While Listening In

FROM entertaiument aspects, and more particularly musical entertainment, Radio will be frequently compared with the phonograph, since both cater to the vast number of people who appreciate good music, whether they play any instrument or not.

It was discovered early in the experience with the phonograph that a power to visualize the artist or performing organization while listening to the record greatly aided the listener. On the other hand, when the attention is allowed to wander, and one is only half conscious of the music, the effect is likely to be disagreeable.

In the concert hall it is a simple matter to concentrate on the playing of an orchestra, for instance, because, being seated facing the stage and having the light focused ou the artists, it requires an effort to tear the mind off the music.

At home, however, there is nothing to look at except a piece of mahogany furniture, on the one hand, or a set of dials on a black panel, on the other. With the headphones on, more or less concentration is assured, but even then it has been observed that listeners will find they have paid so little attention that they do not know the name of the artist though announced.

It is not necessary to settle down with all the quiet concentration of a clam nestling in its shell, but it is a fact that, heard in noisy surroundings, where the attention is only partly on the music, both the phonograph and the Radiophone are apt to sound mechanical.

It is obvious that each of these forms of entertainment have their own field, and far from supplanting each other, they are each boosting the sale of the other. But for Radio it is claimed that the music is not merely reproduced, as in the phonograph, but it is the actual work of the performers.

Radio might affect the phonograph business in two ways: First, owuers of a Radio set would no longer be interested in their phonographs; or second, persons who like something they hear by Radio, wanting to hear it again, would purchase a phonograph record.

Radio and the phonograph are two different things. Neither is a substitute for the other. If the Priuce of Wales or Marshal Foch is talking at a dinner today, the phonograph obviously will not enable one to hear him, while Radio will. But suppose you want to hear Kreisler play a certain selection today. Kreisler is not giving a concert in your town. If he was, that selection might not be on his program. Obviously, the only recourse you have is the phonograph.

The expressed opinion of many others in the phonograph industry agrees substantially with the foregoing. They claim, also, that anything which stimulates an interest in music must react in a demand for more records.

RADIO INDI-GEST

Radioless Race Discovered

(Special Radio Dispatch by Leased Wire)

By SIMPLY WADDLES

YOU'VE heard of the many races that exist in the U. S. A., you've heard perhaps of the Radiobugs who have settled there to stay. And you've heard perhaps of a people rather slightly known—the remarkable Radioless Race who have no Radiophone. Lectures and concerts they cannot hear, so primitive is this race, unless (perhaps a few times a year) they dress and go out some place.

They have no means to tap the air for entertainment galore. A turn of the knob means to them the way of opening a door.

One quaint custom they yet observe, which seems to us a crime, is that of calling Central to get the correct time. To send each one a Digest would prove a nifty plan to civilize the Radioless Race and make each one a Phan.

Our Own A. & Q. Dept.

Dear Indi: My pet goat ate my Radio set. Do you think it would help him if I gave him the Radio Digest? D. S. B.

Answer.—It would help both circulations—his and ours. Tear out all the pictures of the pretty girls and handsome announcers so the goat won't turn cannibal. INDI.

My Friend Indi: Was tuning in the other night shortly between midnight and noon the next day when I heard a most h-oo-oo-oo-tiful solo sung by one person. Please send me the name of the song and the call of the station. The song went something like this: "Tra-la-la-la, tra-la-la-la, tra-la-la-la, tra-la-la-la, tra-la-la-la, tra-la-la-la."

FIDDLE D. DIAL.

Answer.—If you're sure only one soloist was singing the solo, the tune you so aptly describe must have been Jack Nelson's regular—you know—"Jack Nelson of WDAP himself personally will now sing that popular melody, 'I've Got a Song for Sale that My Sweetie Turned Down,' words and music for which were written by Jack Nelson." INDI.

WLAG Gives "Fun on the Air"

WE REMAIN modest! We still love to admit how modest we are and how good we are, all in the same breath. We have been officially notified by one of our leased co-respondents that the "Twin City Station of the Land of Ten Thousand Lakes" has recognized us. Yessirree! Eleanor Poehler's own very good plant is using our stuff to entertain the multitude. Our own Station BLAH of Walla Walla, Station WMU of Washington, D. C., Station WLAG of Minneapolis-St. Paul, and next? The offer still holds—a dollar will be accepted from every Radioknut sending us corrections or additions to this list. Indi.

My Radio, She

My Radio's filled
With sobs and groans;
It's worth four dollars
And cost "forty bones,"
And that's why it's "She" to me.

When I want it to work
It commences to fussin'
And keeps gettin' worse
'Till I give it a cussin'
And that's why it's "She" to me.

It's chock full of stuff
That's nifty and fine
But it always comes through
With a howl and a whine
And that's why it's "She" to me.

CACTUS JACK, HOOTCHAGIN, KANSAS.

Use 'Em on the Ship Code Ops

Drear Indi: Have the Radiokuuts noticed that—

Getting rid of old safety razor blades is a cinch compared to disposing of defunct B batteries? ART.

Arragh Go Wan

"Mike," said Patrick, "an' have ye heard th' new tiliphone boxes they're after calling the Radio set?"

"I have not," returned Michael Indignantly, "au' what's more, I'll have nothin' to do with the divilish things at all. Me boss has one in the parlor, an' he sits there by the hour wid two tiliphones to his head, an' lets the noise come in at one ear an' go out the other. Now what good does that do him, at all?" AMERICAN LEGION WEEKLY.

B-eautiful L-oving A-nd H-andsome

Dear Indi: I have trouble getting your silent announcer at Walla Walla (BLAH) and I thiuk if said announcer would adopt a slogan I could get him better (or worse). It might he like that used hy the announcer in "Lap-Land," who says, "Our call letters are WOF which stands for 'Wash Our Face.'" (Lap-Land is where Missouri laps over on the United States.) INS. U. LATION.

But 'Tis a Function of the Male

Dearest Indi: How shocking! I didn't even kuow they were allowing them to send osculations through the mail. The Detroit Free Press (WCX) announcer in signing off recently, read a telegram from a lady in Iowa asking for "A Kiss in the Dark." Announcer stated that if the L. from I would send her address he would give her one.

P. A. P.

Condensed

By DIELECTRIC

Despite the fact that most of the stations now licensed to broadcast are using apparatus far in advance of that in operation a year ago, there are changes continually taking place; altering this and installing that to bring nearer perfection the transmission of sound through the ether. On the Pacific coast one of the best known stations shut down long enough to improve its sending device, installing a harmonic suppressor which confines energy to the prescribed frequency, 750 kilocycles. In New York city, WEAF experimented with new power tubes and increased energy in the hope that its programs would reach out beyond its former radius. Evidently this was accomplished. One result of a test by experts of the Westinghouse Company was to prove that Radio impulses may be received underground.

What did we ever do before the days of Radio anyway? Burr Macintosh was appealing to the audience at a theater for funds to send disabled soldiers to a mountain camp and during his appeal word came of a number of gifts from outside—the Radio audience. The Christmas season is not so far removed that we cannot allude to it once more. At the regular Sunday afternoon men's conference in the Bedford Branch Y. M. C. A., Brooklyn, Mr. Hammond had two surprises via Radio the Sunday before Christmas. He announced plans for entertaining a large number of children, planning to provide ice cream, candy and cake, and two members of his unseen audience sent word that each would provide one of the items in sufficient quantity to make 500 youngsters happy.

As last year, listeners in on New Year's Eve had their choice of merry parties to tune to, beginning with eastern and continuing through to Pacific time. The Drake Hotel picked up KSD and rebroadcast the doings of the revelers in St. Louis; Trinity Church, New York, chimed out its glorious greeting; watch night services were on the air for all who would listen—Radio's welcome to a promising new year. But nothing compared in impressiveness to the ringing of the bell in the tower of Independence Hall, which station WOO broadcast to the world. I made the suggestion that this be done last Fourth of July. It tolled off the years that have passed since our independence was secured and theu struck 1924, in which ceremony was a significance iutelligible not alone to us Americans but to others across the sea.

Twice have Brother Elks in this country been privileged to sit in their lodge rooms, or at home, while listening to words spoken by representatives of other lodges, hear their songs, and the Eleventh Hour Toast as broadcast by station WNAC in Boston. This has been a national event in Elkdom. Why, even a member of that notorious crowd, The Red Apple Club of Detroit, was warmly greeted while away from home by those who had set their dials for WCX to get the staid proceedings of this Quaker organization. Would it not be a good thing, of general interest I mean, to have other nationally organized bodies announce Transcontinental Masonic, or Rotary, broadcasting programs?

Can you conceive a more potent agency for disseminating information than Radio broadcasting? I think not. The vastness of its reach, cosmopolitan appeal and the fact that its approach is primarily as an entertainer suffice to place it in the forefront of publicity agencies. This application of Radiophony is by no means new, though I believe its effectiveness is too little realized. Chambers of Commerce in some places have taken advantage of the immense audiences reached in this manner and presented the attractions of their municipalities. One of the latest to do so is the Chamber of Commerce of Hot Springs, Arkansas, which contemplates building its own station.

How to Make Inexpensive Neutrodyne Receiver

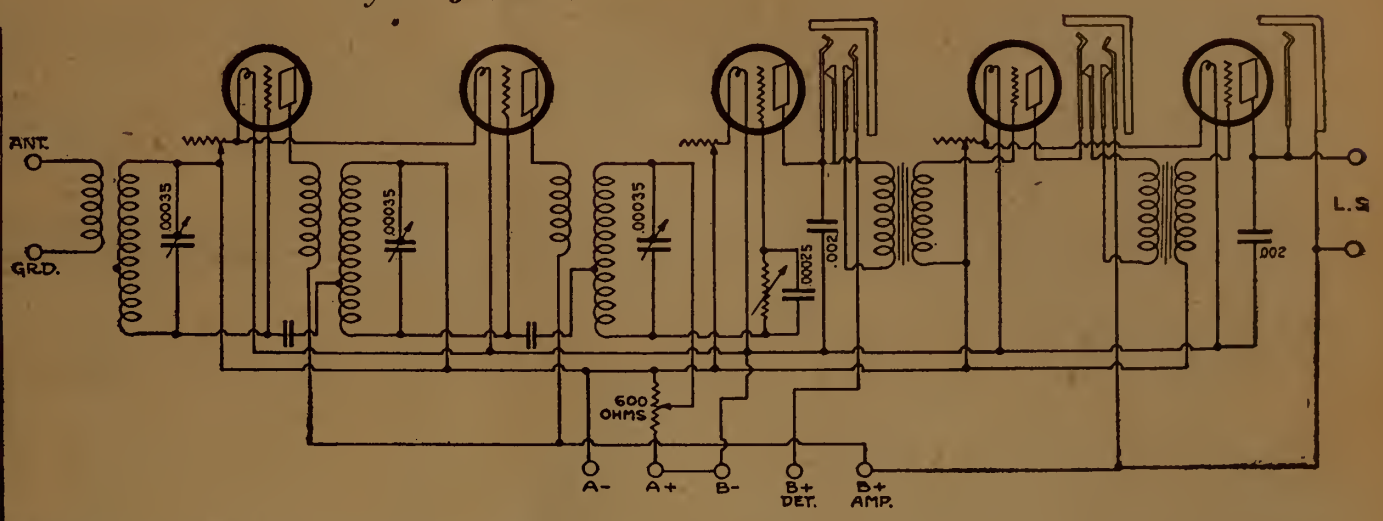
Part I—Hook-Up and Parts Required

By H. J. Marx

A NUMBER of readers have requested another five tube neutrodyne article but eliminating the anti-capacity switch, the variometer, the battery switch and also the filament control jacks, in an effort to reduce the cost of construction. The set now to be described was therefore laid out and assembled. The test showed very good reception.

PARTS REQUIRED

One Panel, 8 by 26 by 3/16 inches.
One Baseboard, 7½ by 25 by ½ inches.
Five Tube Sockets.
Two 25-Ohm Rheostats.
One 6-Ohm Rheostat.
Two Double Circuit Jacks.
One Open Circuit Jack.
Nine Binding Posts.
One 600-Ohm Potentiometer.
Two Audio Frequency Transformers.
One Variable Grid Leak.
One .00025 Grid Condenser.
Two .002 Fixed Condenser.
Three Neutroformers with Condensers.
Two Neutrodons.
One Cabinet to Fit.



No effort was made to produce a more compact set. The total cost without cabinet, tubes or battery was about $60.

Apparatus Required

Don't try to save money by using wooden panels, for they are likely to absorb moisture, and this, in turn, not only may cause leakage in the circuit but also effects the balancing. One fan, who used a wooden panel, found that the set never stayed balanced but required constant readjustment. For the wooden baseboard, a hard, kiln-dried wood should be used. It is advisable, also, to give it a coat of very thin shellac. In wiring, the bare leads should not rest on this baseboard.

The two 25-ohm rheostats are used for the amplifiers. A tubes are recommended. The 6-ohm rheostat is for the detector, which should be a soft tube.

In order to simplify the wiring, no filament control jacks are used.

The resistance of the potentiometer should be 400 ohms or over. The higher values will save battery losses, when dry cell tubes are used.

Two, four or five-to-one ratio audio frequency transformers are required. The use of a high ratio transformer in the first audio stage is not recommended, because it often creates distortion, howling and other troubles.

There are numerous grid leaks on the market, most of them fairly good, and fans seem to be well qualified to select the best ones.

The problem of neutroformers is not very serious. The coils all appear to be very efficient, the main difficulty lying with the cheap condensers, for they will do more toward controlling the efficiency of the circuit than any other factor. The neutrodon problem is gradually straightening out, and a decided improvement in the design of this article is noticeable.

The Circuit

The circuit requires no special comment except that it conforms very closely to the usual type. Two condensers of .002 mfd. capacity each are used for bypassing Radio frequency strays. They are connected from the plate to the A+ leads of the third and fifth tubes.

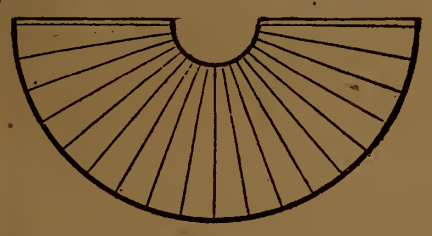
The panel layout with photos of the completed set will be shown in the next article.

(TO BE CONTINUED.)

Scales for Instruments Simply and Easily Made

The following is a description of a method whereby scales for condensers, variometers, etc., may be made easily and cheaply:

First obtain a semicircular celluloid protractor, and place it in a photographic printing frame. Then place some sensitive paper in the frame and take a print of the protractor, using it as a negative. The paper should either be bromide or gaslight, so as to produce black tones. When the print is developed, fix and wash in the usual way, and when quite dry cut away the portions not wanted. By careful cutting the worker may provide himself with two scales as shown. Protractors usually have two sets of readings, but for the present purpose it will be advisable to use only those which run in a clockwise direction. These scales, when mounted on ebonite, have a very neat appearance.



Test Coil of Continuity

Always test a coil for continuity after the winding has been completed. By doing so there can be no possibility of wiring a coil with broken leads into the circuit.

2-LO, LONDON, ENGLAND
ON ONE TUBE

Another Record for the

ELGIN SUPER-REINARTZ

Tuesday, November 27, during the test period between 9 and 9:30 P. M., Rev. E. A. Cole in the residence of J. A. McIver, of Roodhouse, Ill., while operating a set made of materials and in accordance with the hookup furnished by the ELGIN RADIO SUPPLY CO., tuned in 2-LO, London, England, using receivers and but one tube. Later another tube was lighted and the loud speaker used, so that four people could hear the program and concluding announcement. The numbers, time, and the order in which they were played were

Officially Confirmed

by the St. Louis Post Dispatch in conjunction with the National Association of Broadcasters, who had charge of the tests. (See page 34, St. Louis Post Dispatch, Dec. 2, 1923.) This same hookup has been advertised extensively as the one which brings in stations 2000 miles overland on a loud speaker and one tube; and this has been demonstrated so often as to need no repetition.

Send a two-cent stamp for circular giving one, two, and three tube hookup, and price list of parts for this remarkable circuit. Address the

ELGIN RADIO SUPPLY CO.

207 Chicago St. ELGIN, ILL.

CROSLEY MODEL X-J
$65

That's the unanimous opinion of owners of the Crosley Model X-J Radio Receiver. It is the last word in radio efficiency at a price within the reach of all.

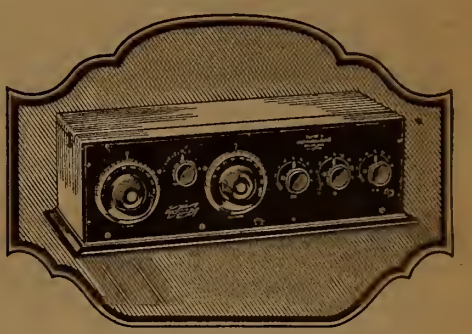
Local interference can be easily tuned out and far distant stations quickly and clearly heard.

This 4-tube set, combining one stage of tuned radio frequency amplification, detector, and two stages of audio frequency amplification, is the best radio receiver ever offered for consistent performance.

Listen in on a Crosley Model X-J for real enjoyment. Then go to any good dealer and purchase this unequalled instrument for just $65.

Free Catalog on Request

Crosley Manufacturing Company
The Largest Manufacturer of Radio Receivers in the World
POWEL CROSLEY, Jr., President
1494 Alfred St. Cincinnati, Ohio



Radiodyne

"The Voice of the Nation"

NO LOOPS — — NO ANTENNA

THE RADIODYNE is operated by simply grounding to a water pipe or radiator, and throwing a few feet of wire on the floor. Uses any standard tubes—dry cell or storage battery. Extremely selective. Simple to operate—only two controls.

Stations within a radius of 2000 miles can be picked up on the loud speaker; any wave length from 200 to 700 meters.

PRICE $150.00

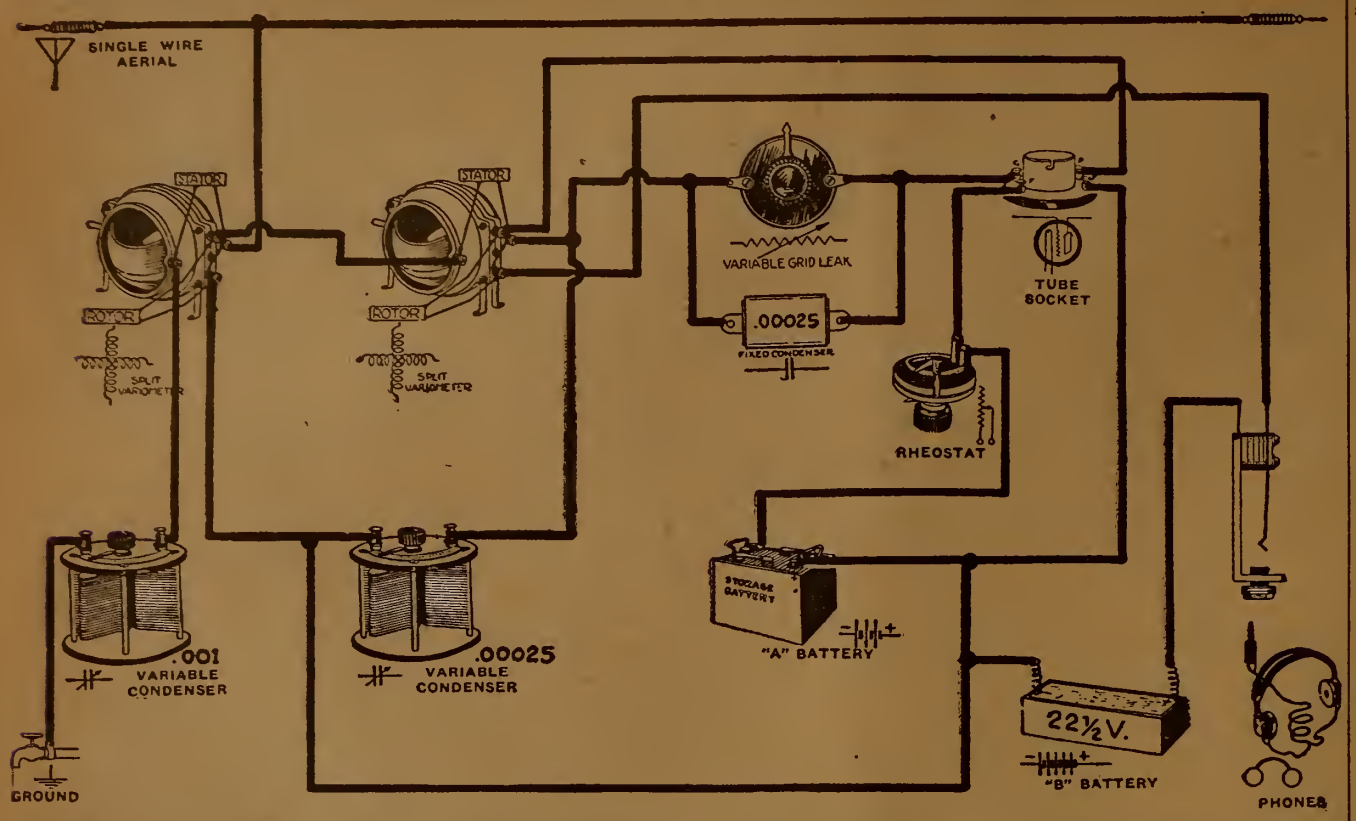
For use in apartments, boats, automobiles, railroad trains, etc., the RADIODYNE is enjoyable where other receiving sets would not be practical.

When interference, strays, static, etc., make other types of reception utterly useless, the RADIODYNE picks up broadcast programs clear and distinct.

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

Western Coil & Electrical Co.
312 5th St. Racine, Wisconsin

REGENERATIVE SIMPLEX HOOK-UP FOR LONG DISTANCE



THE last Simplex was a simple one. Here's one a few jumps ahead. We now require two variometers, two variable condensers and a variable grid leak. Then we are all set. The wiring is simple, the circuit is regenerative and it is quite a little bit harder to tune, but you are all set to do some long distance work. The plate circuit is inductively coupled by means of the second variometer to the grid circuit of the tube. The secondary is inductively coupled to the primary circuit by means of the first variometer. Both these variometers are of the split type, that is, the rotor and stator windings are not connected in series, thus making it equivalent to an untapped coupler with approximately the same inductance value in both windings. The primary circuit is tuned by means of the .001 variable condenser. The secondary circuit is tuned by means of the .00025 variable condenser. The grid leak is variable for best adjustment for various tubes. Only 22½ volts are required for the plate battery. This circuit is very selective and efficient in tuning out local broadcasting stations. Audio frequency amplification can be added in the manner usually employed in other hook-ups.

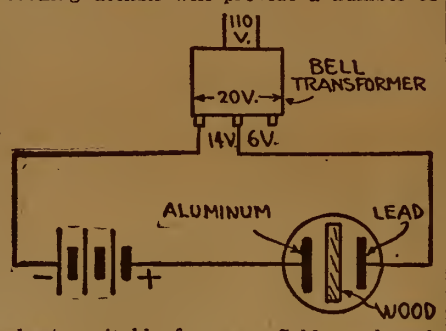
throughout a complete charge, though a second may be needed to complete an exhausted A battery. It is possible to improvise a drip pan to keep up the level of the soda solution. This is a most satisfactory and simple outfit.—Frederick F. Simms, Ettrick P. O., Va.

There are a lot of freak circuits out, but the standard circuits are reliable and can be worked by anyone.

Using Bell Transformer for Charging A Battery

Where one has alternating current for lighting, a bell transformer will serve both the signal devices about the house, and will efficiently charge the A battery. When installing this transformer, select the 50-watt size with taps for 6, 14 and 20 volts. The taps at 6 or 14 volts are used for the bells, and at 14 and 20 for charging batteries.

Make up a rectifier by filling a quart jar with water to within 1½ inches of top and stir in six heaping tablespoonfuls of baking soda. Cut one 2 by 6-inch sheet each of lead and aluminum. A discarded cooking utensil will provide a number of



sheets suitable for use. Solder a length of wire to the lead plate; fasten another with a small brass bolt to the aluminum; cut a wood separator ½ inch thick, 2 inches wide and 8 inches long, which is then placed with these plates in the jar of soda solution.

The wire from the aluminum plate is connected to the positive side of the A battery, the lead plate to the transformer, and the negative A battery to the transformer. Use 14 volts from the transformer to start charging and until the hydrometer shows 1.215. To hasten the charge, 20 volts may now be used. Starting at 20 volts will overheat the transformer and melt its sealing compound. As the soda solution boils during charging, it should be replenished with water. One sheet of aluminum should last

3/4 Actual Size

"HEGEHOG"

PREMIER
Audio-Frequency
TRANSFORMER
$3.50 Smallest Most Efficient

WE BACK this little wonder to the very limit. For all around efficiency it is unexcelled. Give it a thorough tryout. Install it in any of the latest hook-ups—(Neutrodyne, Autodyne, Superdyne, Miloplex, Autoplex). Judge it for volume, tone quality and consistent performance. Give it every possible test. Then consider its size and price. If you do not find the "Hegehog" unsurpassed in every way, your money will be gladly refunded. We guarantee it unconditionally. There is nothing superior to the "Hegehog" in efficiency and for compactness. Make this test. Send for FREE Bulletin No. 92. Ratios 1 to 3, 1 to 4, 1 to 5, $3.50; 1 to 10, $4.50.

Ask Your Dealer

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Simple Explanation of Radio for Everybody

Chapter IX, Part II—Audio Frequency Amplification

By M. W. Thompson

THE following article is the eighteenth of a series for Radio beginners, written by Marvin W. Thompson, well known in airphone circles for his understandable style of approaching his subject. The remaining chapters will be:

Chapter X—Loud Speakers.

Chapter XI—Dry Cells and Storage Batteries.

FIGURE 69 shows the circuit in which both filaments are lighted from one source and both plates kept at positive potential by one set of plate batteries. Battery Y is a 22½-volt unit, as is battery Z. If you will trace the circuit from the plate of the detector tube and through the primary of the transformer, you will see that only battery Y supplies the detector plate. Starting at the amplifier plate, however, we find that we must go through the phones and both batteries Y and Z before reaching the filament. The load on Y is double that on Z.

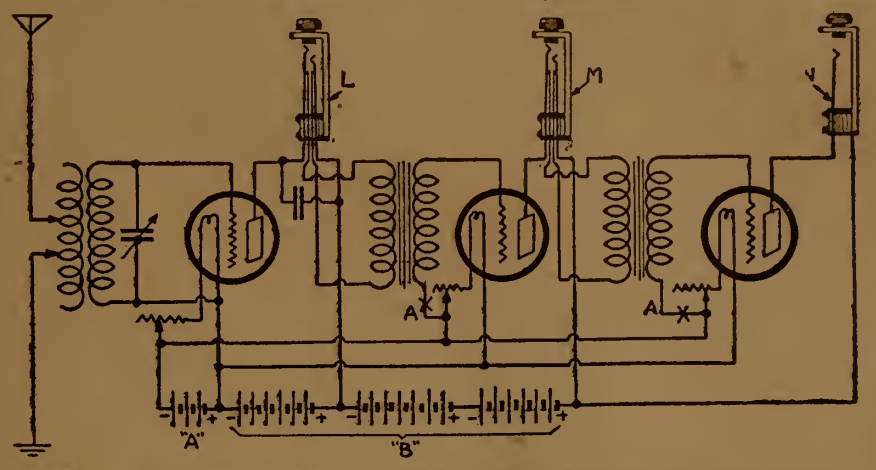

Figure 70—Jacks in each stage of amplification permit ready use of any number of tubes.

Jacks

This practice of utilizing but two sets of batteries for more than one tube can be carried out indefinitely, as shown by Figure 70. In this diagram we have added a further improvement: Jacks which permit the use of the detector only, one stage of amplification or two stages. A device known as a phone plug is attached to the tips of the cord of the head receivers and may be inserted either in jack L, jack M or jack N. Jacks M and N are known as two-circuit jacks because, when no plug is inserted in jack M, the plate circuit includes the primary of the first audio frequency transformer; when the phone plug is inserted, the primary is eliminated and the phones substituted for it. Jack N is a single open-circuit jack because, when the plug is out, the single circuit possible is open (not completed). This last may also be a double-circuit jack, in which case the phones are in circuit when the plug is in, and the loud speaker horn is automatically connected when the phone plug is withdrawn. (See Figure 71.)

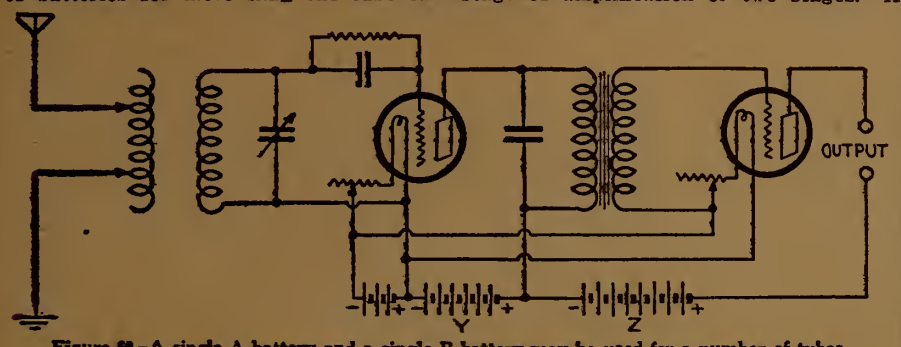

Figure 69—A single A battery and a single B battery may be used for a number of tubes.

The C Battery

Another refinement of audio frequency amplification, and one which is very recent—it came in with the new thoriated-tungsten filament tubes—is the use of a third or C battery. It was found, when using the four tubes UV-201A, C-301A, UV-199 and C-299, that, if more than 45 volts were applied to the plates, distor-

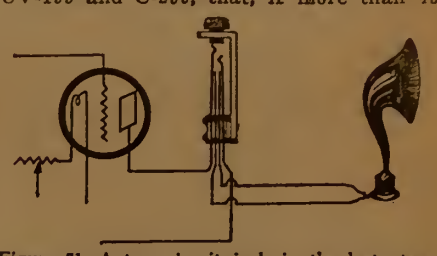

Figure 71—A two circuit jack in the last stage will automatically throw in the loud speaker upon withdrawal of the phone plug.

(Continued on page 24)

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4.50	23 Plate Vernier with Bakelite Dial	3.95
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1.25	6 Ohm Rheostat with dial	1.10
1.50	30 Ohm Rheostat with dial	1.35
1.50	400 Ohm Potentiometer with dial	1.30
1.75	400 Ohm Potentiometer with dial	1.55
	2 inch Bakelite Dials	.40
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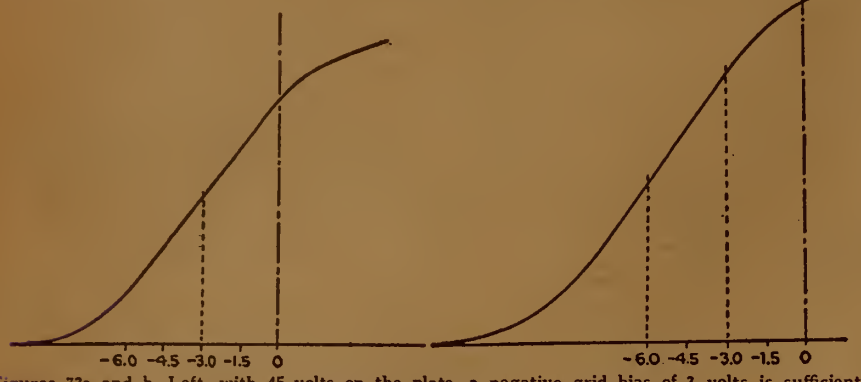
(Continued from page 23)

tion was likely to occur, and a volume less than that expected was produced. Tests and experimentation showed that the insertion of a third battery which would make the grid 4½ or 6 volts negative in relation to the filament, would help. Reference to Figure 72a will make this clearer. The curve here shown results when 45 volts is used on one of the new tubes. The grid is in its natural relation to the filament—3 volts negative; and this results in operation on the straight portion of the curve, which is essential to clear unblurred amplification. If, now, the plate current is doubled to 90 volts, the curve appears as in Figure 72b. It is just as though we moved the entire curve to the left in relation to the vertical zero grid potential line. It can be seen at a glance that if the tube is operated as an amplifier with the grid only 3 volts negative, operation will occur at the beginning of the upper bend and distortion appear. Operation should occur at the point where the grid is 6 volts negative, so the grid return is disconnected from the filament and a two-cell 3-volt battery inserted, with its negative end toward the grid and its positive side connected to the filament. We then have a total grid bias of 6 volts. (See Figure 73.)



Figures 72a and b—Left, with 45 volts on the plate, a negative grid bias of 3 volts is sufficient. Right, when the plate potential is increased to 90 volts, the grid bias must be increased to avoid distortion.

To Clear Up Signals

It will frequently be found, when using two or three stages of audio frequency amplification with 90 volts on the plates, that the voice and music which comes out of the horn, while enjoyably loud and clear, has what Radio men call "whiskers" on it. This term has been applied because the only adjective that suitably describes the phenomenon is "fuzzy." The letters c, s, and z have a peculiar sibilant quality and the higher notes from stringed and reed instruments seem to hang on, instead of breaking off sharply as they should. Since it is usually impossible to determine just what part of the amplifying system is at fault, the two slight additions shown in Figure 74 should be tried separately. First try connecting a small fixed mica condenser of .00025 or .0005-

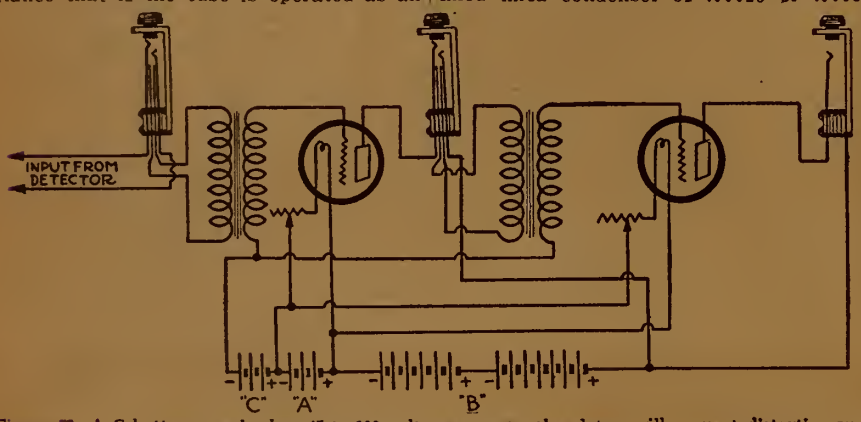


Figure 73—A C battery, used when 45 to 100 volts are put on the plates, will prevent distortion and give more volume.

mfd. capacity across the secondary of the last audio frequency transformer and, if readily available, even a .001.

If this does not remedy the objectionable fuzziness, try grid leaks of various values connected across the primary. One or the other of these methods should clear up the reproduction. This may cut down

(Continued on page 26)

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How and Why of Super-Heterodyne Receiver

Chapter II—Special Units Required

By H. J. Marx

AFTER the amateur begins to understand the fundamental principles of the super-heterodyne circuits, the problem of parts required is decidedly simplified. The main trouble in the past was that the fan used wholly unsuited apparatus, which not only did not operate well but sometimes refused to function.

The fact will be appreciated that inasmuch as the super-heterodyne is credited with unusual selectivity, this characteristic depends entirely on the efficiency of the apparatus in the circuit.

The Special Transformers

The special transformers are the first to be considered. Their function is the same as any Radio transformer except that their efficient operation peak is usually somewhere between 3,000 (100,000 cycles) and 10,000 (30,000 cycles) meters. Owing to the lack of special super-heterodyne transformers, long wave Radio frequency transformers, such as the UV-

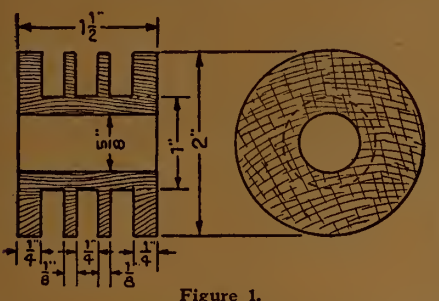

Figure 1.

1716 (no longer available), were used. There is no reason, except lack of patience, why the fan should not construct these transformers himself. Surely the fans in Radio have demonstrated that this is one quality they possess an abundance of. Then why not make them?

It would be a little cheaper and simpler to design them for the lowest possible frequency, but why not make as good a job as possible? The details of construction cover a transformer that operates at a wave length peak of about 10,000 meters or 30,000 cycles' frequency.

Construction Details

Get some kiln-dried mahogany, or other hard wood, and have a woodturner make three spools as shown in Figure 1. It is customary to have about three or more stages of super-audible amplifiers.

The primary consists of 500 turns of

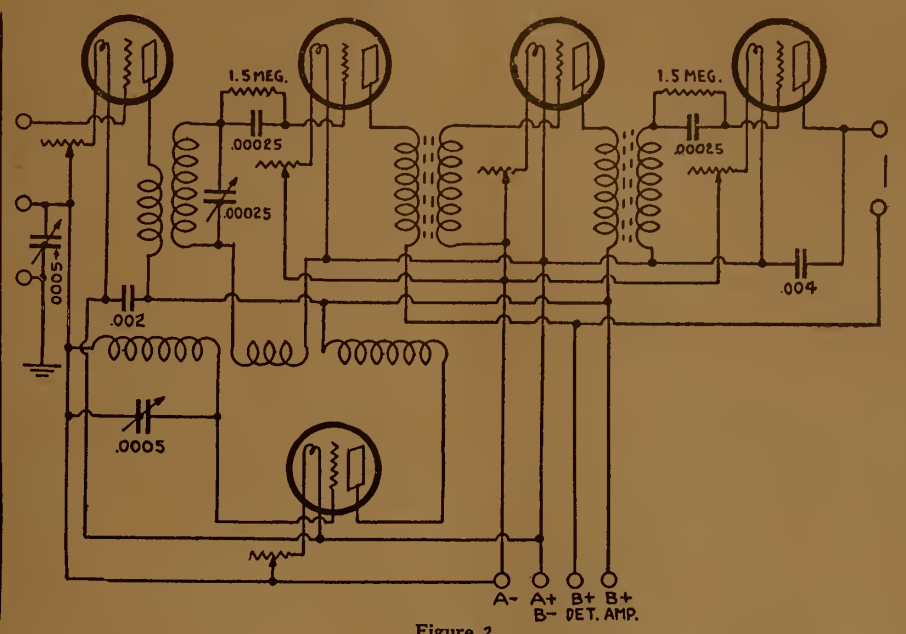

Figure 2.

number 30 dsc. copper wire and is wound on the center groove of the spool. The secondary consists of 2,000 turns of number 36 dsc. copper wire and is divided into two windings of 1,000 turns each in the outside grooves of the spool. All the windings run in the same direction. The ends of the terminals are designated as inside and outside ends. The inside end of the first winding is the grid return or filament lead, the outside end is connected in series with the inside end of the third coil. The outside end of this third coil is the grid terminal.

The inside end of the second, or center, coil is the B+ terminal, while the outer end is the plate terminal.

In handling such fine wire considerable care should be exercised to avoid breakage in the winding. It is rather difficult to make a good joint if the wire is broken. The spool should be mounted on a piece of panel stock with four terminals, to which the wire should be soldered. Be careful to see that the wire does not burn through when soldering. After this is finished, the coil should be enclosed to avoid its being knocked around, causing the fine wire connections to be broken.

Adding R. F.

It is quite logical to add Radio frequency amplification before heterodyne action takes place. For this purpose the type of air core Radio frequency transformers used in heterodyne circuits appears to be best suited. A variable condenser is added to tune the secondary circuit. This adds another tuning control, but since the total is only three for tuning, it doesn't make the apparatus too complicated.

Five Tube Circuit

A five-tube super-heterodyne circuit is shown in Figure 2. The first tube is purely a Radio frequency amplifier, the second one the first detector, the third a long wave or super-audible amplifier, the fourth the second detector, and the one below is the oscillator.

The first stage can be neutralized if desired. This will materially assist in preventing the tube from persistently going into oscillation. A Radio frequency bypass condenser (.004 mfd. capacity) is added from the plate lead to the positive filament lead of the second detector tube.

The detector plate voltage is either 22½ or 45, depending on the type of tube used. The amplifier plate voltage should be about 90. Audio frequency amplification can be added in the usual manner.

In the next article the construction of the oscillator unit will be described in detail.

(TO BE CONTINUED.)

Place for the Set

Many experimenters do not know that the lower the Radio set is placed with respect to the aerial the better will be the results. With an antenna 30 feet off the earth the best results are obtained if the receiver is located on the street floor instead of in the attic.

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American Specialty Co.

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RADIO FOR EVERYBODY

(Continued from page 24)

the volume from three to five per cent, but the gain in faithfulness to the original music more than offsets it.

The Push-Pull Amplifier

There comes a time to the owner of every high-class receiver when his set

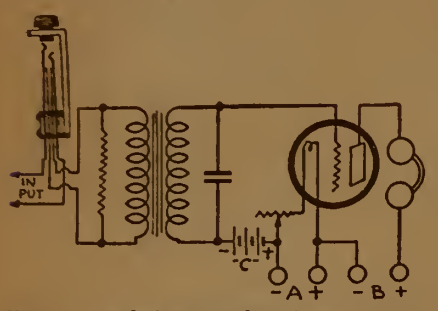


Figure 74—A leak across the primary or a condenser across the secondary will usually clear up reproduction.

will be tuned to a program and it is strong and loud in the headphones with two steps of amplification, but, try as he will, he cannot increase the signals sufficiently to actuate a loud speaker. A third step of amplification distorts the signals—increasing filament brightness

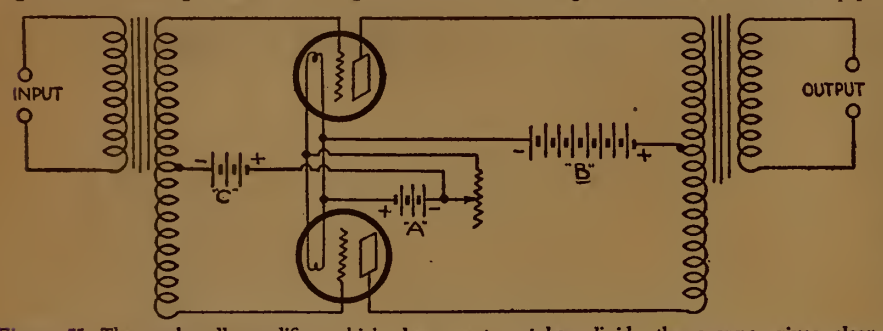


Figure 75—The push-pull amplifier which, because two tubes divide the energy, gives clear reproduction and great volume.

does not help. What is needed is a stage of "push-pull" amplification.

The circuit for the push-pull amplifier is shown in Figure 75. Such a unit is simple to build and operate, the only difficulty being the provision of the special transformers necessary. These are sold in pairs, as the secondary of one must have a center tap, while it is the primary of the other that must be tapped. In such a unit the incoming energy is divided between two tubes and neither is overcrowded. It will enable its user to increase the strength of local signals to a tremendous volume if necessary, or strengthen distant signals to a satisfactory degree for enjoyment. Adjustment of the C battery is the only point requiring especial care and once this is set, the unit requires no further attention.

(TO BE CONTINUED.)

A Good Aerial and How It Should Be Erected

What kind of aerial do you use?

This is a highly important question and should be given careful consideration by every Radiophan.

The lead-in, even though it is insulated, still acts as a part of the aerial, and if you happen to live near the ground floor of an apartment house and find that it is necessary to use an extremely long lead in to reach the aerial on the roof, you might better forget the aerial altogether and simply use the lead-in.

The ground wire also acts as an aerial, or rather counterpoise in this case, and if you have an extremely long one, just try disconnecting it from the cold water pipe and see if you do not get practically the same results.

A single straight wire is the best for all around receiving. There is no question about that, but there are different ways of taking off the lead-in. If you take this from the middle it means that you are really using only about half of the aerial. The rest of the wire is simply holding the aerial up and is not assisting you at all.

It is possible to have the aerial and lead-in all in one length, if you can get a single piece of wire long enough. By running the aerial wire through the eye of the insulator, at the "near end," it is possible to keep right on with this wire and drop it down to the outside of your window, where an insulated wire will have to be attached. By doing it this way, rather than attaching a separate piece of wire to the aerial, you will save one joint and make things just that much easier, for both yourself and the broadcasting.

Every joint in both aerial and ground lead should be carefully soldered.

The Reader's View

Improving Broadcasting Studio

I think that anybody who is interested in Radio should help to improve it if possible and I therefore, being a meteorologist, think that the proper amount of humidity which will improve the audibility of the broadcasting room will increase the efficiency. The air of the average room in winter will be found to have about 25 per cent to 30 per cent relative humidity and in my opinion should have at least 65 to 70 per cent in order to increase the audibility.

If you know of a broadcasting room where you can test this theory, just take a watering can and sprinkle the floor half an hour before broadcasting and watch the result. I notice that of a band playing, the instruments nearest the transmitter stand out plainly, the others you can hardly hear.—W. R. Pringle.

Fading vs. Spark Stations

I noticed in your December 8 issue that WGR operator says he has found the real cause of fading signals, claiming that it is caused by change of potential in the mains supplying the current for the transformers.

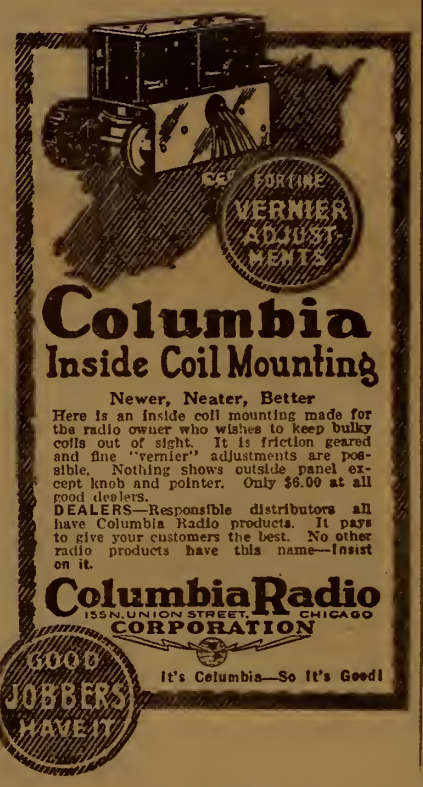
If this is the case, I would like to have WGR answer the following questions:

Why do signals from WTAM, Celeveland, fade as much as other stations (I understand that this station is operated from storage batteries entirely) and their potential is constant?

Now, do the central power stations at these various places maintain their potential in the daytime and then let them vary so much at night? I can't think so. All of these stations begin to fade as soon as my set begins to bring in the more distant stations. Then the code is so bad here that it is impossible to hear any station at night for even one-half hour without fading or having the tubes spill over.

This code interference covers my entire range at least each half hour, sometimes on one wave length and then again on another. It is so bad at times that I miss whole programs.

I have been hoping the government would take this matter up and give us some wave lengths and restrict commercial and ship stations from using these wave lengths. Then, and not until then, will we ever get good reception.—B. C. L., Seymour, Mo.



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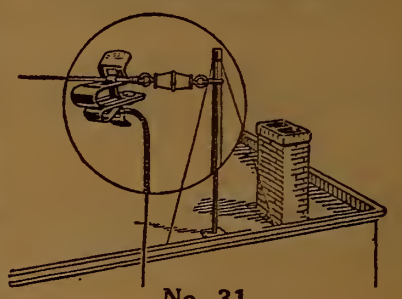

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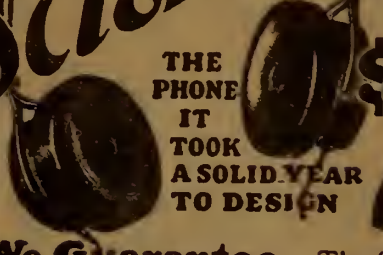

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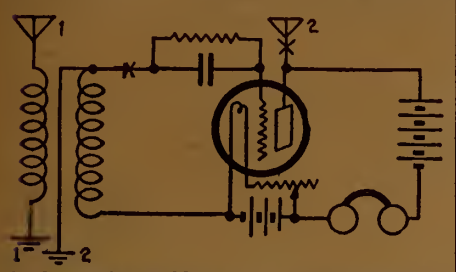
Selective Three Tube Single Circuit Receiver

Chapter IV—Changing Other Types of Sets to Grill Hook-Up

By Fred Grill

As mentioned in last week's issue of Radio Digest, I shall devote this chapter to the changing over of other circuits to conform with the hook-up described by me in these articles.

After much investigation I have found that the standard Armstrong regenerative three circuit tuner is about the most generally used. The single circuit regenera-



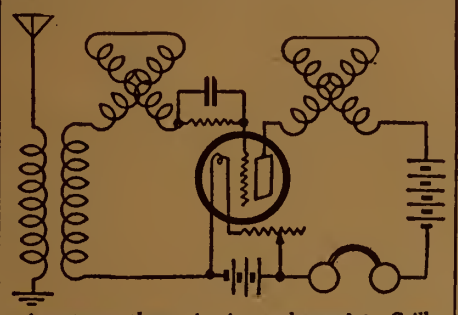
In the regular double circuit two variometers are used. Use ground number 2 and aerial number 2.

tive also is in much favor, as is the Reinartz, Cockaday and Flewelling, although in my section of the country the latter circuit does not seem to have gained the popularity it rightly deserves. It is a standby in many western and middle states. In New England one will find that the Green circuit has its followers, while in other parts of the country it may be unknown. At this time the New England section has taken up the Reinartz circuit and almost all have agreed that it is up to the mark for amateur as well as broadcast reception.

Grill in Three Circuit

The standard three circuit set has been chosen first because of its great popularity and second because of the ease in which you may transform your present three circuit tuner to coincide with my hook-up.

This change can be made without the entire disassembling of your now workable set. I know, as no doubt many of you do, that wandering in circuit land surely is a wondrous journey. Many are left in a quandary after a mere stroll through it, but les. so that real circuit hound.

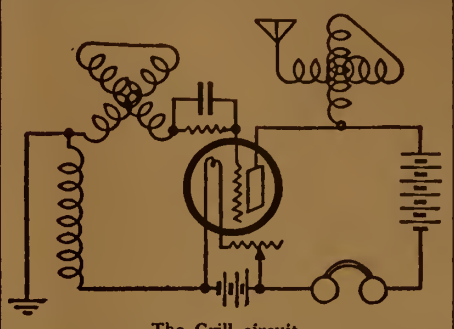


Armstrong three circuit as changed to Grill hook-up.

The first thing you should do in changing your three circuit tuner to the single circuit is to remove all tubes from the sockets. Next you should take off all battery connections.

Changing the Connections

Now the real work will begin. Do not let this scare you because the connections to be changed are but very few. They are



The Grill circuit.

the plate variometer, the grid variometer and the primary connections, and you have completed your construction of the Grill receiver. Of course, the object of this article is not to have you discover the value and the causes of satisfaction that will be found while using my circuit and I do not claim that changing the connections in your set as I am about to illustrate will make you a first-class set.

My idea is but to give to the Radio skeptics a mere idea of the possibilities of this circuit. After a trial in the following manner I am sure you will be convinced of its efficiency and will determine to build a receiver utilizing my circuit.

Parts Necessary

The parts to use are the plate variometer and the grid variometer, and the secondary of the variocoupler can be substituted for the purpose of test, for the plate of the tapped coil mentioned in the original constructional data for the set.

The hook-ups illustrate in a very good way the changes that are to be made. To the experienced Radio bug the diagrams are self-explanatory.

It is to the others that I dedicate the following few lines. The first thing to be done is to take the plate variometer connections off and connect the variometer directly in series with the plate and the antenna. Close the plate circuit where the variometer was connected. Now take the point between the grid variometer and the rotor of the variocoupler, and make a connection to it, which is to be used for the ground connection.

This completes the changing of connections to make a Grill receiver from the ordinary Armstrong three circuit receiver.

Conclusion

I had intended to answer questions which I hoped to publish as a supplement to this article, but as the time is rather limited, I find that I am forced to answer such questions to me and to the Radio Digest at a later date. Also I may find that it would be advisable for me to publish some of the correspondence from readers if it would help some other Radio fans along this line. Should anyone have any criticism or suggestions, I would welcome them.

(THE END.)

Hints for Making Tests on Various Instruments

Here are some hints for the Radiophan who wants to go over his set, testing his coils, connections, transformers and condensers and making sure there are no breaks in the circuit. An ordinary dry or storage battery is all the equipment necessary to make sure the circuit is all right.

From one terminal of the battery run a wire of convenient length to one terminal of the head set. Then fasten another wire to the other terminal of the battery and leave the other end open. Put the phones to the ears.

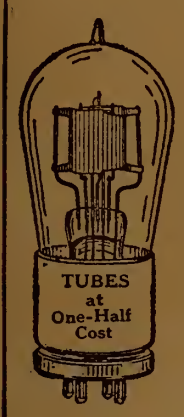
You will now find that you have two open terminals, one from the battery, the other being the open phone tip. Touch these together, and a click in the telephones will be heard. This shows that the circuit in the receivers is right, and the test on the coils can now be made.

Touch one of the open terminals to one end of the coil and the other open end to the other end of the coil. If the click sounds in the receiver, the coil is all right.

In testing the transformers, the phones should click when the two terminals of the primary or the two terminals of the secondary are touched. The click, however, should not be heard when one of the testing wires is touched to one of the terminals of the primary and the other wire to a terminal of the secondary. In other words, there should be no circuit between the primary and the secondary of a transformer.

When the testing wires are touched to the terminals of a condenser there should be no click. If a click occurs, the condenser is defective. If a variable condenser, it is probable that the plates are touching. If a fixed condenser, it is defective and may as well be thrown away.

With the phones and the battery hooked up in this fashion, short circuits and all manner of troubles can be detected. Just remember there should be a click when a circuit is supposed to be closed, but no click when the circuit is open. Frequently a circuit can be improved 100 percent by going over it in this fashion.



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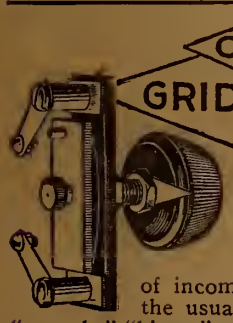

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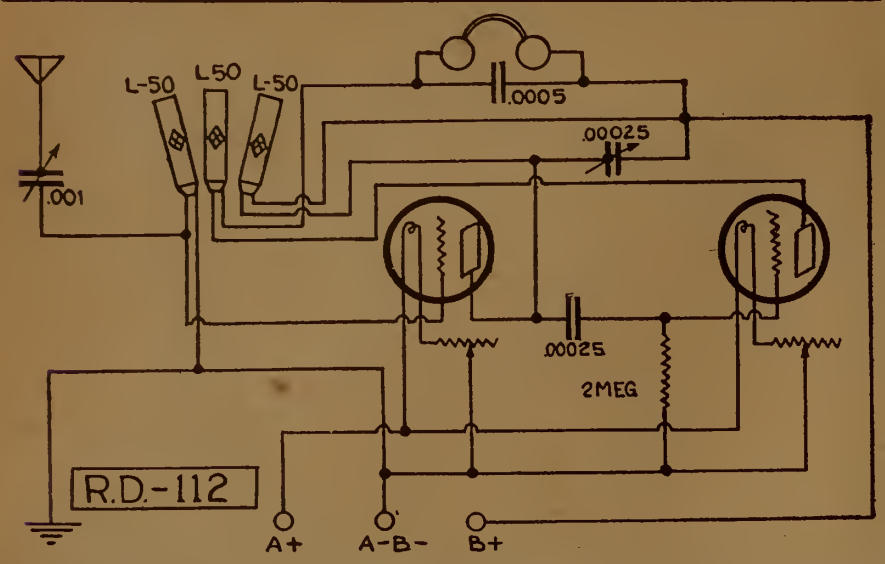
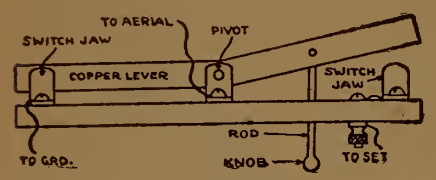


HERE'S a circuit, R. D.-112, that uses triple honeycomb coils and will surprise you in its results. It is a combination of tuned Radio frequency coupling with a regenerator or feedback effect. Actually there are only two condenser controls and the adjustment of the honeycomb coil coupling. The circuit is best suited for A tubes with about 45 to 67½ volts on the plate.

Lightning Switch

Lightning switches are usually inconvenient as they must be operated from outdoors. The illustration shows one that can be operated from within the house. A bar of copper is bent in the exact center and also a small hole is drilled at that point, so that a small angle of metal



may be loosely bolted to it to make a smooth working pivot, as shown. This is then mounted near the center of a piece of wood that will just fit snugly under the window sash when this is closed on it. Near each end of the lever are mounted an old switch jaw, so that when the lever swings, it makes contact with only one at a time. A rod, with a knob attached, is then put through a hole bored in the wood and fastened loosely to the lever near the center. A binding post is then placed on the inside of the wood near one of the jaws and connected to it on the other side. When this is placed under a closed window, it may be easily operated from the inside of the house and affords a good and neat aerial connection. —C. R. Willlams, Janesville, Wis.

Panel Marking

Neat dial markers may be supplied to any panel mounted receiver by scratching a narrow slot with a knife in the proper place on the panel and then filling the slot with white lead or white water color paint.

Review of Books

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

An Introduction to Radio. A real book for the amateur. This treatise comes iu two volumes. 96 pages in each volume, fully illustrated, with flexible leather covers. Price, two volumes, $1.

Experimental Wireless Stations. By P. E. Edelman. Simple directions are given in this book for making Radio equipment for the transmission of messages over long distances. Price, $3.

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

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

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest Illustrated, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special attention given to practical tuning. Price, $2.00.

The A B C 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.

Elements of Radio Communication. By Ellery W. Stone. A splendid, well connected, complete, accurate and up-to-date discussion of every phase of Radio telegraphy and Radiotelephony. Written in simple language. The subject is presented from the physical rather than from the mathematical standpoint, and higher mathematics consequently from no stumbling block in the path of the reader unfamiliar with them. Price, $2.50.

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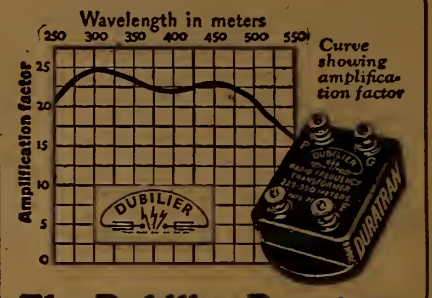
Always consult the manufacturers' directions for the handling of Radio sets. The tubes vary so widely that full information is essential to proper operation.



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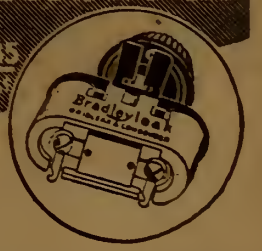

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Details of the Yeiser One Tube Reflex

Circuit May Be Used with Loop or Aerial

THERE appeared in the December 29 issue of Radio Digest a new hook-up by J. O. Yeiser which has attracted considerable attention by the way the questions are coming to the editor's desk and to the author of the circuit. To furnish sufficient data to cover all details, the questions asked are given and answered in the following questions and answers:

Question.—Will the Yeiser set operate on an aerial?

Answer.—Yes. Add a variocoupler, and hook the rotor up just as the loop is shown in the diagram. Aerial and ground are connected to the primary of the coupler in the usual manner.

Question.—Is this circuit easy to operate?

Answer.—Yes, extremely simple and very selective, but complicated and hard to build, as a marked polarity of coils is obtained, and each coil must be hooked up so that the magnetic "flux" will be in the proper direction. (Use the right-hand rule for determining the north pole of a magnetic field.)

It can be seen that by reversing the leads of coil B, coils A and C will be reversed. Bear this in mind, as there are nine possible ways of hooking up the tri-coil transformer, and only one will work.

Question.—Will a 201-A, or 199 work?

Answer.—Yes, any hard tube.

Question.—What do the circles around the condensers mean?

Answer.—These condensers are by-pass condensers and are not critical. The condensers shown in dotted lines are optional. The condenser across coil C should be a .0004 variable, which will tune the R. F. and is a little more efficient. Coil A may also be tuned by a .0004 variable in multiple.

Question.—How do you operate this set after assembling?

Answer.—It is advisable to remove the .001-mfd. condenser located between the plate and grid to learn the set. After you have adjusted it to work perfectly, add the condenser, and in some cases, I have found that a 50 L honeycomb coil attached to the grid in series with this .001-mfd. condenser greatly simplifies the tuning.

Do not build this set in a permanent cabinet till you have assembled all the parts, arranged them in the particular style which you intend to build them, and adjusted all your leads. Often it happens that a little rearrangement will double the efficiency of any set.

Question.—Do you laminate the core of the tri-coil transformer?

WORKSHOP KINKS? EARN A DOLLAR—

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

RADIO KINKS DEPARTMENT,
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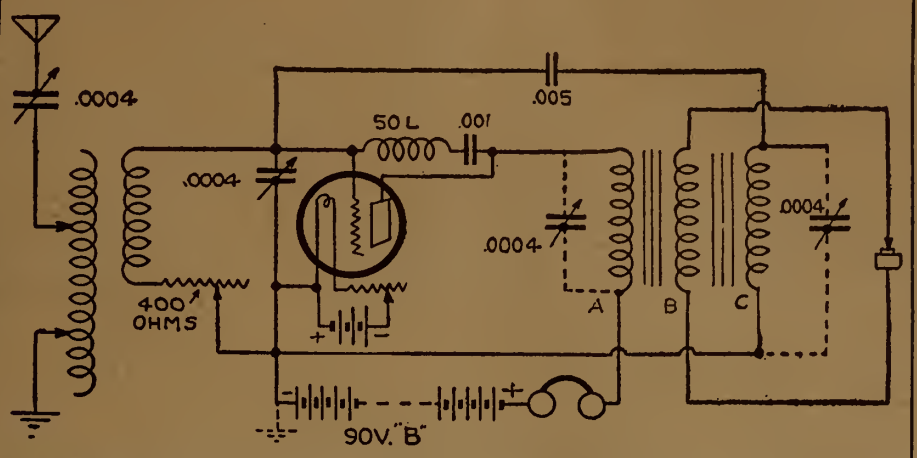
USE OF COIL TRANSFORMER



Answer.—Yes, if you use iron foil. However, it may be easier for the average ham to mould the core from soft iron filings which have been very carefully washed and blown, and mixed with shellac. (Iron filings usually are oil-soaked; be sure all the oil has been removed.)

Question.—How do you wind your coils?

Answer.—Use 38, 40, or 42 silk-covered wire. (Enameled wire is nice and compact. but if you haven't a lathe, you are apt to short-circuit your layers. Silk-covered is more expensive, but safest.) Coil A is the primary winding and should not be over 1,000 ohms.

Coil B is the rectifier coil and should not have a ratio of over 3 to 1 over the coil A.

Coil C handles both radio and audio frequency, using coil A as the primary of the radio frequency, and coil B as the primary of the audio frequency circuit. Coil C also acts as a tickler. This coil should not be over 6-to-1 ratio with coil A, or 2-to-1 ratio with coil B.—J. O. Yeiser, Omaha, Neb.

Selecting Proper Wire

Wire for winding inductances comes in many sizes and different insulations. There are single and double cotton-covered wires, usually listed as scc. and dcc., respectively. And single and double silk-covered wire—ssc. and dsc. There is also a wire with an enamel covering. Any of these wires may be used for coils, but with slightly different results.

The enamel-covered wire takes up the least space for a given length, but it also has the disadvantage of having the greatest distributed capacity, which means that a coil of it would not tune sharply. In regard to space, the silk-covered wire comes next. This wire is very good, but rather expensive. The wire with the cotton covering has the greatest bulk, but is quite cheap and efficient, and most coils are wound with it.

The matter of the double or single covering is one that must be determined by the particular case, depending upon the insulating value, the spacing of the wires and the mechanical strength that is needed.

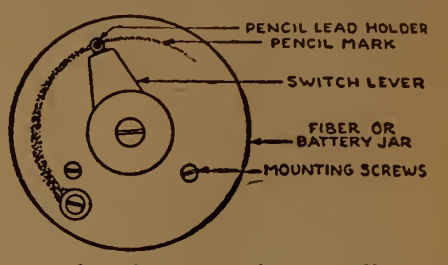
The size of the wire depends upon its use. In the wire gauge that is used for copper wire, the higher the number the smaller the wire. For coils that are to be inserted in the aerial circuit, the size should be preferably between 18 and 22. In the secondary and other circuits, the size may range from 20 to 26. Smaller wire than this would reduce the efficiency.

Radio Fans Critical

Wise experimenters have already reached the stage where they disregard fancy Radio parts and are looking for rugged, well-built, efficient apparatus.

Variable Grid Leak for the Flewelling Circuit

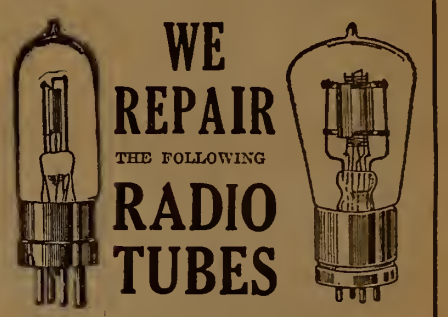
Having exhausted all sources of information on the famous Flewelling circuit, I was still at a loss for a means of making a good, simple variable grid leak, but necessity is the mother of invention and I worked out the following idea which functions exceedingly well. To make one, cut a disc from a piece of fiber board or an old storage battery jar; then take a switch lever, cut the end off, bend the remaining part down about ¼ inch and make it into a circle to hold a piece of lead from a lead pencil, and mount it as shown. Make the pencil line thick at the binding post before assembling the parts. The feature of this idea is that the piece of pencil does not wear out the resistance line. This variable grid leak is adaptable



to panel or base mounting according to the way it is assembled. If a piece of panel is used, the high polish must be removed with a piece of sandpaper before the pencil line is put on. Make the connection to the center part and to the binding post.—P. M. Cummings, Magog, Que.

Precautions for the New Set

In a new set, never connect the B batteries until the A battery has first been connected and the tube has been tried out to see how it lights. This will avoid danger of burning out the tube.



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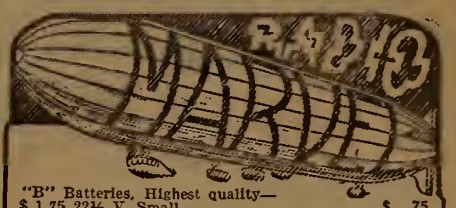

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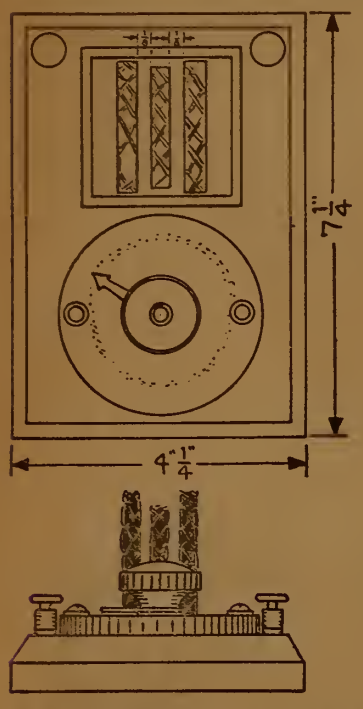
Inductive Wave Trap Plans

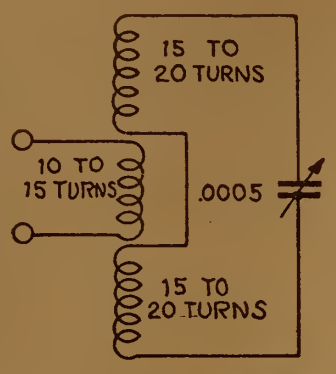
Giving Constructional Details

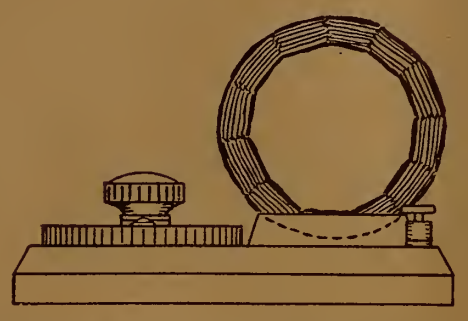
IN DECIDING on the construction of a wave trap the following factors must be considered: First, efficiency; second, simplicity; third, low cost; fourth, compactness.

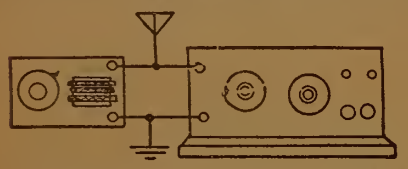
In considering the first requirement there is little question or doubt that the inductivity coupled types not only are more efficient, but also are not as apt to have an effect on the tuning range of the receiver. As far as simplicity is concerned there is no question or doubt that Radio in itself has enough complication without introducing more to even increase the difficulty that confronts the new fan. After digging deeply into the pocketbook for an efficient receiver with its accessories few feel like investing much more for a wave trap. The receiving set with its batteries present quite a problem as to where they will fit best in a home. Obviously we must avoid adding some more bulky apparatus or parts that would possibly detract from the appearance of a well constructed receiver. The wave trap illustrated should be, then, within the limits of all and affords no serious problems of construction.

Its requirements are a baseboard, a small mounting block for the coils and disc type condenser, two binding posts, three 25-turn special inductances similar to those that have been previously described in articles and some connection wire. Inasmuch as these small inductances only come in 25-turn units it will be necessary to remove some of the turns from them. The two outside coils require about 15 to 20 turns, while the inside coil requires about 10 to 15 turns. Best values are determined by a little experimentation with the particular receiver with which the trap is supposed to operate. Undoubtedly it is advisable to remove the wire on the coils only to the maximum number as 15, 20 and 20, then for a trial if the lower wave length range is not suitably covered, some more turns can be removed.

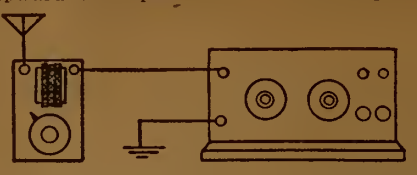








These coils should be mounted on a small block in which three slots or cuts have been made so that the coils are held upward and spaced about 1 inch apart.



The two outside coils are connected together in series. The inner terminal or wire on one side should connect to the outer side of the other coil. The wiring diagram shows how the connections are made to the condenser. It is immaterial which way the binding posts are connected, either to the coil or to the set.

In the two smaller illustrations two methods are shown for connecting the wave trap to the receiving set. The use of this wave trap simply adds one additional control to the set, but is sufficient to eliminate all unpleasant interference.

The ordinary 6-ohm rheostat is not suitable for the new, low current tubes.

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Splicing Wires

When making a connection between two wires, do not merely twist the wire ends together. This will sooner or later cause trouble by producing weak signals and other bad effects. When two wires are to be joined, the insulation should be removed from each for a distance of 2 inches. The wire itself should then be scraped so that it shines brightly. A right-angled bend should then be made in each wire at a point about ¾ inch from the insulation, leaving about 1¼ inch of clean wire between the bend and the tip. By hooking these right-angled bends together, each may be wrapped around the other wire of the pair, care being used to wind each wire tightly on the other. A spliced joint of this kind will be strong mechanically and a good conductor.

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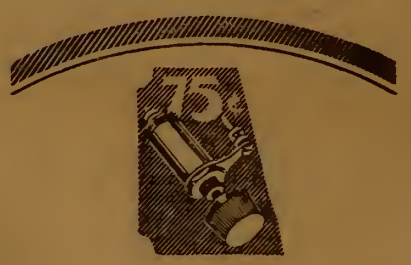

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The new **TWITCHELL AUXILIARY TUNER** connected to your present set will enable you to bring in the long and short wave stations which your present set cannot get. It also cuts out all local stations so you may bring in distance any time without local interference. Copyrighted diagram of this tuner 50c, or with all parts $9.00. Complete instrument in walnut cabinet, ready to use, $15.00. Transportation prepaid.
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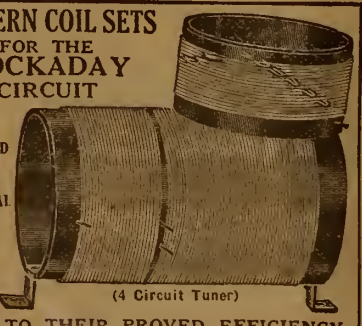

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Questions and Answers

Not Enough Volume

(05511) RBS, Baltimore, Md.

I was referred to you by the Radio Corporation of America, as the company that could supply me with the best information regarding a Radio hook-up, that would give me the best results. I have built a short wave regenerative set with two stages of audio frequency amplification, in accordance with the Call Book Company plans. This set has a range of about 1,000 miles with very little volume. I wish to build a new set to increase both distance and volume, and to operate a Music Master loud speaker.

A.—The circuit you have described is capable of operating a loud speaker effectively if functioning normally. If amplifiers are efficient and volume inadequate we would recommend another stage of audio frequency.

ULTRA-AUDION QUESTION

Dear Sir:

In your very useful and highly appreciated publication I noticed in the Questions and Answers department a question answered, and I think that I am able to give you a little additional information on the matter discussed.

The question is number 5035, and appears in the issue of Oct. 13, 1923, which I have just received.

The set I used during reception was a homemade single tube ultra-audion receiver. I use a 90-degree vario-coupler and a 23-plate condenser. The tube used at that time was a UV-200.

The ground was made by a connection to the conductor's train valve. I may state that there was absolutely no frictional electricity noticeable in this case.

The stations listened to, with the length of reception, were CJCA from 7:30 p. m. till 8 p. m.; 9CA from 8:00 p. m. till 8:30 p. m., and CJCA again from 8:30 p. m. till 10:00 p. m.

Both these stations are local ones and I should estimate that I was possibly eight miles from the station when they signed off and that I had traveled altogether about 20 miles during the 2½ hours I was listening in.

Yours very sincerely,

W. H. Croft, Edmonton, Canada.

Circuit Noises

(05367) CHK, Grosse Isle, Mich.

I have built one of the Neutrodynes as outlined in your articles in Radio Digest from Fred Eisemann parts, with some changes in the layout, however.

It is a most remarkable set and its range appears unlimited. Yet, I am greatly troubled with crackling noises like static, louder on high frequencies, like KDKA, and not so loud on lower frequencies, like KSD. Connections are well soldered and wet B batteries, dry A batteries are used. The noises are greater at 10 p. m. than at 6 p. m.

I am about to rebuild the set to include an additional R. F. step and a variometer, and wish to know if there are any special precautions in design I can take to lessen this noise.

I use UV-199 tubes for R. F. and 201A for A. F.

A.—It is our opinion that the disturbance encountered in the operation of circuit of the blueprint submitted is due to external rather than internal causes. It is evidenced often that leaking electric systems have definite wave lengths. Yours may be rather low, which would account for audibility experienced on lower wave lengths. This condition can be determined by disconnecting the antenna. If disturbance is greatly lessened, you may conclude it is due to a power leak in your vicinity.

If the source of difficulty is not thus located, it is within the set and from the description afforded it would be impossible for us to isolate it.

Present-Day Apparatus

(05328) WO, Pratt, Kans.

As a personal matter only, what kind of Radio parts, or whose Radio equipment do you consider reliable? Any information you give me will be considered confidential.

Also I wish you would advise me as to where I can get a line upon long distance equipment for receiving sets, and what hook-ups are most generally preferred.

I do not care to experiment or put money out on something that will not bring results. I have a set now with one stage Radio, detector and two stages audio, but it is not in the least satisfactory. Have not as yet been able to get any Canadian stations, northwest from Denver, nor any of eastern coast stations, in fact, nothing east of Atlanta-Chicago line. What is the reason? Have an aerial 125 feet long, 30 foot high, with lead-in from north.

A.—It is contrary to our policy to recommend or discuss the relative merits of manufactured receivers and apparatus. We can say, however, that reliable dealers have standardized their apparatus so that the public may safely accept their verdict and obtain ruggedly constructed apparatus of such electrical perfection as present development can furnish.

Your receiver should be effective and is proving so in many cases. However, from your description, it is impossible to determine the source of limitation.

In construction of a receiving set, the writer recommends as very efficient a three-tube Reflex circuit. In the De Luxe Reflex circuit, as shown in issues of May 5, 12, 19 and 26, you would find one that would meet your requirements as to range and quality.

Signal volume will be great, tone quality and selectivity excellent, operation comparatively simple.

Booklet and blueprints for this circuit are now available for 50 cents through our Book Department.

Miloplex

(05608) CVY, Troy, N. Y.

As a subscriber to the Digest I would like to ask you a few questions with reference to the Miloplex circuit which you have been featuring in your last three issues. I have built and tried out each successive circuit, and have had best results using the first one.

On page 11 of current issue you publish a testimonial in which the writer states he used honeycomb coils. I would like to try this out, and would be pleased to have you inform me what values to use.

The reception I get is considerably interfered with owing to the close proximity of my set to high-tension alternating current lines. Could this be remedied without much experimentation, and if so, how?

I am using a two-wire antenna, about 80 feet long, and 35 feet above ground, with about 35 feet of lead-in. My location is only about 20 feet above sea-level. Would a single wire help any?

A.—If desired, honeycomb coils of 50 and 50 or 75 and 75 turns for primary and tickler respectively can be used.

It is necessary to build antenna system at right angles to service lines in vicinity. If this method fails to eliminate interference, you can resort to the use of a counterpoise in place of the ground, which will prove most effective. Reconstruction of your present antenna system to that of a single wire, 100 feet in length if possible, will not only be advantageous in the matter of the interference but also adds selectivity of reception.

Battery Losses

(06246) WDC, Trumanburg, N. Y.

Will you tell me whether leaving the A and B batteries connected after pulling out the jack runs down either battery or not?

A.—No current is consumed from either A or B battery when the filament of tube is turned off. In using filament control jacks, it is, of course, understood that plugging them in turns on, and removing them turns off the tube filament.

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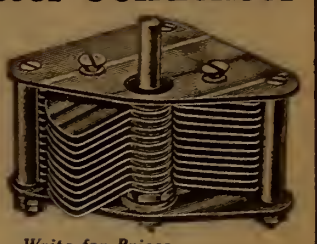

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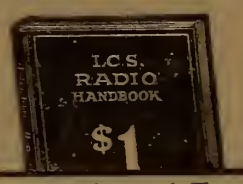

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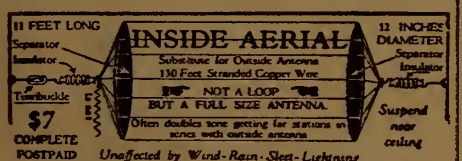

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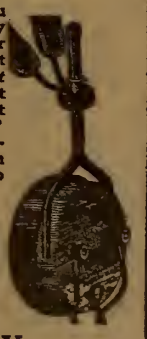

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Champion Jack Dempsey has become a Radiophan. Here's wishing him luck in this field too; may he stick to it.
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Portable Radio set with real umbrella aerial, shown by Doris Gilbert at a recent Radio show.
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